

THE UNITED NATIONS DEVELOPMENT PROGRAMME IN
UZBEKISTAN

GLOBAL ENVIRONMENT FACILITY

STATE COMMITTEE OF THE REPUBLIC OF UZBEKISTAN ON
ECOLOGY AND ENVIRONMENTAL PROTECTION



THE SIXTH NATIONAL REPORT OF THE REPUBLIC OF UZBEKISTAN ON THE CONSERVATION OF BIOLOGICAL DIVERSITY



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DIVERSITY**

Tashkent 2018

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Acronyms, abbreviations, definitions and terms

- 3NR CBD** - The third national report to CBD
A21 - Agenda 21 for the Republic of Uzbekistan
AEWA - African-Eurasian Waterbird Agreement
Aichi SGT - Aichi Strategic Goals and Targets
AR NCSA - Analytical report on conservation of BD within the frameworks of national capacity self-assessments of country for implementing global environmental conventions
AS RUz - Academy of Sciences of the Republic of Uzbekistan
ASB - Aral Sea Basin
AZB - Anthropogenic zone background. This state of BHC is peculiar to the majority of controlled water courses of plain belt in RICA and can be taken as the regional background within an anthropogenic zone. The state of BHC corresponds to “basic” environmental quality.
BB - Biospheric background - ecological structure of BHC on a set of dominating taxons is mainly identical to that for RFA of water courses in other mountainous area of Eurasia. The state of BHC corresponds to “high” environmental quality.
BC - biocenosis
BD - biodiversity
BHC - biohydrocoenosis
BPI and MBI - Biotic periphytic index and **Modified biotic index** - characterize biological class of water quality and invariant state of BC of periphyton and zoobenthos, which considers change in the structure of their constituent indicator taxons, corresponding to “high”, “basic” or “poor” environmental quality
CADI - The Central Asian Desert Initiative
CAI - The Central Asia Initiative for Sustainable Development “Sub-regional Agenda-21”
CAMI - The Central Asian Mammals Initiative
CAREC - The Regional Environmental Centre for Central Asia
CBD - The UN Convention on Biological Diversity
NAPFEP - National Action Program for Environmental Protection
NBSAP - National Biodiversity Strategy and Action Plan
NCAPSDMA - National Strategy and Action Plan for Sustainable Development of Mountainous Areas
NCSA - Project GEF/UNDP/RUz National capacity self-assessments of country in relation to implementation of global environmental conventions
NE - natural environment
NGO - non-governmental non-profit organization
NRSE - National report on the state of the environment and the use of natural resources in the Republic of Uzbekistan
NSG - National Strategic Goal
NSSD - National Strategy for Sustainable Development of the Republic of Uzbekistan
NT - National Target
OSCE - Organization for Security and Cooperation in Europe
OSME - Ornithological Society of the Middle East
PASB - Program of actions to improve the environmental, social and economic situation in the Aral Sea basin
Periphyton (fouling) - one of the most important components of aqueous ecosystems, which is the assemblage of different organisms inhabiting various underwater (alive or dead) substrates independent on their origin. High information value of periphyton and, consequently, its indicating capacity are conditioned by complex species composition of organisms represented by numerous and ecologically diverse species.
PES - payments for ecosystem services
PGR - plant genetic resources
PKM RUz - The Resolution of the Cabinet of Ministers of the Republic of Uzbekistan
PNA - protected natural area
RB - Regional background - is characterized by wider variation of taxonomic structure of BHC due to extended ecological gradients emerging in water courses when they pass different altitudinal belt with simultaneous

CBD SP - CBD Strategic Plan	increase of rate of intermediate inflow, representing regional specific features of different hydrochemical districts and landscapes in RFA. The state of BHC corresponds to “high” environmental quality.
CC GTI - Coordination Center of the Global Taxonomy Initiative	RC - Republican centre
CDW - collector and drainage waters	REAP - Regional Environmental Action Plan (Central Asia)
CEPF - The Critical Ecosystem Partnership Fund	RFA - run-off formation area
CHM - clearing house mechanism	RI - research institute
CITES - Convention on International Trade in Endangered Species	RICA - zone of intensive consumption of surface run-off
CM - Cabinet of Ministers (Government) of the Republic of Uzbekistan	RPC - Research and Production Center
CMS - Convention on the Conservation of Migratory Species of Wild Animals	RSPB - The Royal Society for the Protection of Birds
COP - Conference of Parties to CBD	Invariant Ecological State of BHC - Framework characteristic of the state of BHC which can be in the state of "ecological progress" or “ecological regress”, as determined by their taxonomic and trophic structure compared to similar background characteristics of regional aqueous ecosystems not affected directly by anthropogenic pollution
Cryophilic and polyoxybiontic species - species inhabiting mainly cold and toxic water courses- indicators of clear waters	RUz - The Republic of Uzbekistan
CSD UN - UN Commission on Sustainable Development	SAPCSL - The Strategy and the Action Plan for Conservation of Snow Leopard in the Republic of Uzbekistan
CST - Centre for Science and Technology within the Coordination Council for Scientific and Technological Development under the Cabinet of Ministers of the Republic of Uzbekistan	Saprobiotic indices - these indices formalize taxonomic analysis of BC in the form of scoring taking into account sensitivity of taxons constituting BC to different levels of organic, nutrient and toxic pollution
E - environment	SCEEP - State Committee of the Republic of Uzbekistan on Ecology and Environmental Protection
ECONET - International project of GEF/UNEP/WWF “Designing ecological network in Central Asia”	SDG - Sustainable Development Goal
EIA - environmental impact assessment	SGP - GEF Small Grants Programme
EP - Environmental Protection	SI - Saprobity index - is the indicator of organic pollution, but to certain extent it can also characterize trophicity level of an aqueous ecosystem
EPR - UNECE Environmental Performance Review for the Republic of Uzbekistan	SMNE - State Monitoring of Natural Environments
ES - ecosystem services	SNC FCCC - The Second National Communication of the Republic of Uzbekistan under the UN Framework Convention on Climate Change
ESD - Education for sustainable development	T - target
ETL - electric transmission line	The Bonn Convention - The Convention on the Conservation of Migratory Species of Wild Animals
GAG/GAT - Global Aichi Goals / Global Aichi Targets	
GEC - Global Environmental Conventions	
GEF - Global Environment Facility	
GIS - Geographic Information System	
GSLEP - Global Snow Leopard & Ecosystem Protection Program	
GSPC - Global Strategy for Plant Conservation	
GTI - Global Taxonomy Initiative CBD	
HEI - Higher Education Institution	
IA EAP - Implementation Activities for the Environmental Action Plan of the Republic of Uzbekistan	
IAC - Information Analytical Center of SCEEP	
IBA - Important Bird Area	

IBA - International Program “Important Bird Area”

ICSD - Inter-State Commission on Sustainable Development in Central Asia

ICWC - Inter-State Commission for Water Coordination

IFAS - International Fund for Saving the Aral Sea

IGES - Institute for Global Environmental Strategies

IPCC - The International Panel on Climate Change

IUCN – International Union for Conservation of Nature

IWC - International Waterbird Census

IWWL - Irrigation-waste water lakes

KBDA - Key Biodiversity Areas

EAP - Environmental Action Plan of the Republic of Uzbekistan

MA - The Ministry of Agriculture of the Republic of Uzbekistan

MDG - Millennium Development Goal

MES - The Ministry of Emergency Situations

MF - The Ministry of Finance of the Republic of Uzbekistan

MJ - Ministry of Justice of the Republic of Uzbekistan

MM - mass media

MPC - maximum permissible concentration

MPS - monitoring of pollution sources

MWR - The Ministry of Water Resources

NABU - Nature and Biodiversity Conservation Union

NAPCD - National action program to combat desertification

NAPCDD - National action program to combat desertification and drought

The Ramsar Convention - The Convention on Wetlands of International Importance, especially as Waterfowl Habitat

TNC FCCC - The Third National Communication of the Republic of Uzbekistan under the UN Framework Convention on Climate Change

UN - United Nations

UNCCD - The United Nations Convention to Combat Desertification

UNDP - United Nations Development Program

UNECE - United Nations Economic Commission for Europe

UNEP - The United Nations Environment Programme

UNESCO - The United Nations Educational, Scientific and Cultural Organization

UNFCCC - The United Nations Framework Convention on Climate Change

Uzhydromet- Hydrometeorological Service at the Ministry of Emergency of the Republic of Uzbekistan

UzRB - Red Book of the Republic of Uzbekistan

WB - The World Bank Group (The World Bank)

WBDB - World Bird Data Base

WSSD - The World Summit on Sustainable Development (“Rio+10”)

WWF – World Wildlife Fund

Zoobenthos - (from bentos - depth) - the assemblage of invertebrate animals (body size more than 2 mm - macrozoobenthos) inhabiting bottom (benthic), aquatic flora (phytoplankton) and other substrates

Preface

Being a Party to the UN Convention on Biological Diversity and in accordance with the Article 26 of the Convention, the Republic of Uzbekistan has prepared the Sixth National Report on the Conservation of Biological Diversity.

National Reports are the most important tool for biodiversity conservation hence sustainable development, which allows the Conference of Parties to monitor the implementation of the Convention providing materials for preparation of the regular Global Biodiversity Outlook. National Reports are also an important tool for planning activities for conservation of biodiversity at the national level providing results of analysis and monitoring strategic activities required for making timely decisions.

The Sixth National Reports are one of the sources of information needed for the assessment of the progress towards achievement of the Aichi Global Strategic Goals and the implementation of the National targets in the field of conservation and sustainable use of biodiversity. The information provided in the Sixth National Reports will be used for preparation of the final review of the implementation of the Strategic plan in the field of conservation and sustainable use of biodiversity for the period 2011-2020 and the achievement of the targets adopted in Aichi. The review will take place at the 15th meeting of the Conference of Parties in 2020 by issuing the Fifth Global Biodiversity Outlook and conducting the corresponding analysis.

The information provided in the Sixth National Reports will be used for the development of subsequent activities in the field of biodiversity conservation for the period after the year 2020.

The Sixth National Report of the Republic of Uzbekistan on conservation of biodiversity has been prepared within the framework of GEF/UNDP/the Government of the Republic of Uzbekistan “Technical Support to Eligible Parties to Produce the Sixth National Report to the Convention on Biological Diversity”, and is the result of a thorough analysis and assessment of available data on current state and trends in the field of biodiversity, its conservation and sustainable use. The report was prepared with the assistance of a large number of specialists from ministries, scientific and public organizations. The group of national experts for the preparation of the report included representatives of the Institute of Botany and the Institute of Zoology of the Academy of Sciences, State Committee on Forestry, Uzhydromet, and the Bioinspection of the State Committee for Ecology and Environment Protection.

The report was prepared following a consultative process with the participation of the stakeholder ministries and departments, leading biodiversity experts, representatives of universities, environmental NGOs, and representatives of various sectors of economy.

As part of the preparation of the National Report, a Steering Committee was established, which included official representatives of all stakeholder ministries and agencies.

Representatives of following stakeholder ministries and agencies have participated in the preparation of the report: the State Committee for Ecology and Environment Protection, the Ministry of Agriculture, the Ministry of Water Resources, the Ministry of Higher and Secondary Special Education, the Ministry of Foreign Affairs, the State Committee of the Republic of Uzbekistan on Forestry, the State Committee of the Republic of Uzbekistan on land resources, geodesy, cartography and state cadaster, the State Committee of Uzbekistan on geology and mineral resources, the State Committee for Tourism Development, Academy of Sciences of Uzbekistan, Center for Hydrometeorological Service at the Ministry of Emergency Situations, JSC Uzbekistan Temir Yullari, International Fund for Saving the Aral Sea, Association Uzbekbaliksanoat, Women’s Committee of Uzbekistan. Further assistance was provided by environmental NGOs such as: “Ecological Movement of Uzbekistan”, “Uzbekistan Society for the Protection of Birds”, “Zoological Society”, “Uzbek sport hunting and fishing Association” (Uzbekokhotrybolovsportob’edinenie).

To implement a comprehensive discussion of the results of the implementation of the National Targets, as well as to obtain feedback during the preparation of the 6NR, a number of consultative meetings was organized with the participation of all stakeholders.

The first meeting with stakeholders was held under the framework of the Inception workshop of the project “Technical Support to Eligible Parties to Produce the Sixth National Report to the Convention on Biological Diversity” in July 2018. The workshop was attended by experts from the State Committee for Ecology and Environment Protection, representatives from the State Committee on Forestry, the State Committee for Geology, the State Committee for Tourism Development, the Ministry of Water Resources, the Ministry of Agriculture, the State Committee on land resources, geodesy, cartography and state cadaster, the Center for Hydrometeorological Service at the Ministry of Emergency Situations, the Institute of Botany and the Institute of Zoology of the Academy of Sciences, the National University of Uzbekistan, the Women's Committee, “Uzbekiston Temir Yollari” JSC, as well as environmental NGOs - the Ecological Movement of Uzbekistan, the Uzbekistan Society for the Protection of Birds, the Zoologist Society, Eco-resource Center “Ekomaktab”, and UNDP, GEF Small Grants Programme, and invited specialists. The Inception workshop provided information on the joint project of the State Committee for Ecology and Environment Protection, UNDP/GEF “Technical Support to Eligible Parties to Produce the Sixth National Report to the Convention on Biological Diversity”. Stakeholders were informed about the structure of the 6th National Report on Biodiversity Conservation, as well as the National Targets for the conservation and sustainable use of biodiversity and their relationship to the Aichi Global Targets.

The first Consultative Meeting with stakeholders took place on 5 October 2018. The Consultative Meeting was attended by experts from the State Committee for Ecology and Environment Protection, representatives from the State Committee on Forestry, the State Committee on Geology, the State Committee for Tourism Development, the Ministry of Water Resources, the Ministry of Agriculture, the State Committee on land resources, geodesy, cartography and state cadaster, Uzghydromet, the Institute of Zoology, the National University of Uzbekistan, “Uzbekiston Temir Yullari” JSC, Uzbekistan Society for the Protection of Birds, the Ecological Movement of Uzbekistan, the Eco-Resource Center “Ekomaktab”, UNDP in Uzbekistan, and a number of invited experts.

The main purpose of the meeting was to inform participants about the progress of the preparation of the 6th National Report, its format and content, and also to obtain comments and suggestions from the official representatives of the stakeholder ministries and organizations regarding each National Target. The presentations of the project national consultants reflected the structure and content for each National Target. Comments and suggestions from stakeholders and participated experts have been considered by the national consultants in the further preparation of the report.

As a result of the first Consultative Meeting, required inputs have been received for assessing the progress in the implementation of National Targets from the relevant ministries, agencies, organizations, particular environmental NGOs, and the Women's Committee.

The initial version of the Sixth National Report on Biodiversity Conservation of the Republic of Uzbekistan was prepared in early November 2018 and submitted to stakeholder ministries and organizations for their review.

On December 13, 2018, the report was presented on the Steering Committee meeting of the joint project of the State Committee for Ecology and Environment Protection, UNDP / GEF “Technical Support to Eligible Parties to Produce the Sixth National Report to the Convention on Biological Diversity”.

INTRODUCTION (NATIONAL CONTEXT)

The Republic of Uzbekistan is situated in the southwestern part of Central Asia and occupies the area of 447400 km², of which 425400 km² (95%) is the land area. The length of borders is 6621 km. In terms of the surface, the territory of the country is divided into a big flat northwestern part and a smaller submontane and mountain southeastern part. Deserts and semi-deserts (including the Kyzylkum Desert and southeastern part of the Ustyurt plateau) covers almost 85% of the country area. They occupy northwestern, northern and central parts of Uzbekistan.

The mountain part includes the western spurs of Tian-Shan, Pamir-Alai ranges and their submontane areas. Mountains and submontane areas occupy about 13% of the territory of the country in its eastern and southeastern parts. The highest point above the sea level is the mountain Khazret Sultan - 4643 m (the Gissar Range). The lowest point is the Mingbuloq depression - corresponds to the level of 12,8 m below the sea level (the Kyzylkum Desert). About 2% of the area of the country is occupied by alluvial valleys.

Natural landscapes, having different extent of anthropogenic fracturing, occupy 82% of the country territory. Landscapes transformed by human make 18% - they include arable lands, human settlements, industrial enterprises etc.

Main surface water sources of the Republic of Uzbekistan are the rivers Amudarya, Syrdarya and their main tributaries fed by precipitations and glacier melting in their watersheds. Water resources of country comprise surface run-off of the rivers Syrdarya and Amudarya (55%), small rivers (33%), groundwaters (about 10%), collector and drainage run-off (2%). A total of 17777 natural water courses are located in the territory of the country, majority of which are represented by rivers with length of less than 10 km. Run-off along these rivers is not year-round and in low-water years it is not formed each year.

Lakes of Uzbekistan are characterized by very diverse shape, size, different origin and uneven distribution throughout the country. There are about 525 lakes in Uzbekistan. The majority of these are represented by small water bodies with the water-surface area of less than 1 km². With the development of irrigation agriculture and discharge of collector and drainage run-off beyond the borders of irrigated lands, irrigation-waste water lakes (IWWL) started to emerge in topographic lows. In the Aral Sea Basin, their volume has already exceeded the volume of all water reservoirs. The biggest of them include the lakes Sarygamysh, Dengizkul, Sudochye in the basin of the river Amudarya and Aydar-Arnasay lake system in the middle reaches of the river Syrdarya.

The climate is sharply continental and arid - the indicator of aridity, according to the UNEP classification, ranges between 0,03 and 0,20, the territory of the country is subject to intensive desertification and droughts. The territory of Uzbekistan is characterized by continental, subtropical climate with big seasonal and daily air temperature fluctuations. One of peculiarities of climate in Uzbekistan is long and hot summer.

The population of the country is steadily increasing and by June 1, 2018, it reached 32,9 million people. The share of rural population makes more than 49% of total population of the Republic of Uzbekistan.

Uzbekistan is classified as a country with a fast-growing economy. Currently, economic growth in Uzbekistan is ensured by implementation of market reforms and attracting foreign investments, structural transformations in the economy, modernization and updating of production, creation of export-oriented production, development of small business and private enterprises. To achieve economic growth, Uzbekistan has been intensively using its natural resources. Economic sectors of the country related to biodiversity include irrigation agriculture, animal husbandry, forestry, fishing and tourism. These sectors have some activities that may negatively affect biodiversity, such as agricultural irrigation, transhumance, energy production, mining and chemical industries, unsustainable water management and waste disposal, development of transport infrastructure and urban systems.

The territory of Uzbekistan is characterized by very diverse natural ecosystems. Flat regions are broadly represented by desert ecosystems. In mountains, where altitudinal zoning is very evident, several climate zones and belts corresponding to main types of mountain ecosystems are clearly observed. Flood plain forest ecosystems are located both in flat and mountain regions forming specific habitats in each of them. Wetland ecosystems are mainly observed in flat regions of the country. Natural ecosystems of Uzbekistan are characterized by high level of biological diversity, which reflects a complex history of development of local flora and fauna, geographic location of the country and exceptional diversity.

Conservation of biodiversity in the Republic of Uzbekistan while ensuring sustainable development is one of priorities of the state environmental policy supported by:

- The development and implementation of the National Biodiversity Strategy and Action Plan (NBSAP);
- Keeping up to date the national Red Book;
- Continuously improving the legal and regulatory framework;
- Monitoring the performance of the State Environmental Expert Review and Environmental Impact Assessment for economic activity projects;
- Keeping cadasters of fauna and flora;

Introducing economic arrangements for conservation and sustainable use of biodiversity.

SECTION I. INFORMATION ON TARGETS IMPLEMENTED AT THE NATIONAL LEVEL

GENERAL INFORMATION ON NATIONAL TARGETS

Biological diversity is an integral part of economic development. Conservation and sustainable use of biodiversity in Uzbekistan is the only reliable way for ensuring environmental security and sustainable development of the country as well as for adaptation to ongoing climate changes. State policy and implemented measures in the field of environmental protection and environmental sustainability in Uzbekistan are based on the following principles of integration of economic and environmental policies for conservation and restoration of natural environment as a necessary condition to improve the standard of living of the population; transition from protection of individual nature elements to comprehensive integrated protection of ecosystems; responsibility of all members of society for protection of environment, conservation of its diversity, creation of favorable living conditions for population.

In response to the Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No.142 dated May 27, 2013 “On Environmental Action Plan for 2013-2017” under the project UNDP/GEF/RUz: “National planning in the field of biodiversity to support the implementation of the CBD Strategic Plan for 2011-2020 in Uzbekistan”, an updated Uzbekistan National Biodiversity Strategy and Action Plan (NBSAP) was developed. The goal of the updated strategy is the achievement of stable balance between economic development in the country and continuous functioning of ecosystems.

Considering national needs in the field of sustainable development, and to fulfil international commitments under the Convention on biological diversity, Uzbekistan organized a broad consultative process for development and adoption of the updated National Biodiversity Strategy. To develop the updated NBSAP, thematic groups of national and international experts were created. The national strategy has been developed in collaboration with members of multilateral working team comprising official representatives of key ministries and agencies- State Committee on Ecology and Environmental Protection, The Ministry of Finance, The Ministry of Economy, The Ministry of Agriculture, The Ministry of Water Resources, The Ministry of Higher and Secondary Specialized Education, The State Committee for Geology and Mineral Resources, The State Committee on Land Resources, Geodesy, Cartography and State Cadaster, The Hydrometeorological Service at the Ministry of Emergency, The Academy of Sciences. The academic community, environmental NGO's, The Women's Committee and economic sector representatives participated in the Development of the NBSAP. With wide stakeholder participation, collection and analysis of information on products and results of previous national planning processes in the field of biodiversity were carried out. It served as the basis for the assessment of existing gaps and the development of updated NBSAP version.

To date, the document has been approved by main relevant agencies and finalized taking into account comments from concerned ministries and agencies. The long process of agreeing and approving the National Biodiversity Strategy comes from the period of reforms and structural transformations in economy, state administration and international policy, implemented in Uzbekistan in 2016-2017.

The updated NBSAP is aimed at mobilizing coordinated efforts of governmental and non-governmental structures at different levels, local communities, as well as engaging donors interested in the support and implementation of strategies related to conservation and the sustainable use of the biodiversity in Uzbekistan. The NBSAP defines strategic directions for conservation and sustainable use of biodiversity in the country:

- By the development of systematic biodiversity monitoring to produce base information for making managerial decisions and improvement of government and society awareness

of significance of biodiversity and ecosystem services, their contribution to well-being and development of the country.

- Supporting and restoring ecosystems and their key components in productive landscapes for provision of ecosystems services;
- Integration of activities for conservation and sustainable use of biodiversity into greater efforts to reform the environmental management;
- Appraisal approach to economic use of biodiversity and ecosystem services for the recognition of their true economic value.
- Integration of actions for conservation and sustainable use of biodiversity into the development plans for economic sectors;
- Expansion of the area and the improvement of management efficiency for the system of protected natural areas;
- Development of new approaches and searching for sources of financing activities related to biodiversity conservation.

The conceptual framework for the updated NBSAP are the National strategic goals and targets developed taking into account national needs and priorities in the field of biodiversity conservation and national contributions to the achievement of global targets adopted in Aichi in 2010. The National goals and targets were developed in participatory way by representatives of key ministries and agencies, community and stakeholders. Targets include priority issues in the sphere of biodiversity, social and economic conditions of the country and the existing capacity; all of those specific and time-bound. Achievement of national targets shall ensure a comprehensive approach taking into account political, social and economic, ecological, legal, educational, environmental and other aspects aimed at conservation and sustainable use of biodiversity as a strategically important resource and a guarantor of environmental sustainability of the country. A total of 4 National strategic goals and 9 targets were developed (see Table 1). To assess the progress in the achievement of results of national targets in the field of conservation and sustainable use of biodiversity, indicators and results indicators were developed. National goals and targets as well as their performance indicators were presented in the Fifth national report of Uzbekistan on conservation of biodiversity (2015)(<https://www.cbd.int/doc/world/uz/uz-nr-05-ru.pdf>).

When developing national targets, particular attention was paid to integrating issues related to biodiversity conservation, support or restoration of ecosystem services into key economic sectors, as well as to more efficient accounting of ecosystem and biodiversity values into economic planning. The other important measures include improvement and development of national monitoring of biodiversity and PNA system, improvement of awareness of state administration and governance bodies and the whole society on the significance of biodiversity and ecosystem services.

Targets also include the need of integration of efforts aimed at conserve biodiversity and ecosystem services with related or overlapping initiatives to combat desertification, reduction of risks imposed by climate change, ensuring alternative source of income in rural areas.

Table 1 shows the alignment between each National strategic goal and its corresponding targets with the Aichi Global Strategic Goals and Targets facilitating the requirement for the assessment of national contribution into the achievement of global targets. In addition, it contains results indicators for the assessment of the progress towards the implementation of national targets in the field of conservation and sustainable use of biodiversity in the Republic of Uzbekistan with deadlines for assessment of results set to years 2020 and 2025.

The indicators were developed as part of the preparation of the updated draft NBSAP (2014), with the participation of representatives from all stakeholders, including the general public, key ministries and agencies responsible for the implementation of activities included in the draft Action Plan on the conservation and sustainable use of biodiversity. These indicators are developed taking into account specific national targets and available information required to

assess the progress of their implementation. When selecting indicators, it was taken into account that, first of all, they should contribute to the correct reflection of ongoing processes and trends in convenient form for perception, and which also allows to show progress / regress over time.

Table 1.**NATIONAL STRATEGIC GOALS AND TARGETS FOR CONSERVATION AND SUSTAINABLE USE OF BIODIVERSITY OF UZBEKISTAN AND INDICATORS FOR THE ASSESSMENT OF THE RESULTS IMPLEMENTATION**

National targets/Aichi targets	Indicators (2020, 2025)
STRATEGIC GOAL I. <i>Mainstreaming biodiversity across the state administration and governance bodies and society for sustainable development of the country</i> (AICHI STRATEGIC GOAL A: <i>Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society</i>)	
NT 1: Improvement of the system of state monitoring of natural environment by inclusion of biodiversity monitoring into it. Aichi target 19: By 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.	By 2020, monitoring research and cadaster update of biodiversity components are included into the list of the State's priorities, which are reflected in planning processes; By 2020, the cadastral works are financed sustainably; By 2020, the data bases on biodiversity are developed, systematized and regularly updated; By 2020, information exchange arrangements in the sphere of biodiversity and ecosystem services (Clearing House Mechanism) are functioning between all the stakeholders; By 2025, the data gathered through monitoring of biodiversity components is applied in biodiversity and ecosystem services management.
NT 2: Expanding knowledge and awareness of the state administration and governance bodies and the whole society of the value of biodiversity and ecosystem services. Aichi target 1: By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.	By 2020, the majority of staff members of relevant ministries and agencies understand the importance of biodiversity and ecosystem services for future development of the country; By 2025, the majority of staff members of local authorities understand the importance of biodiversity and ecosystem services for future development of the country; By 2020, the majority of staff members of relevant educational institutions understand the importance of biodiversity and ecosystem services for future development of the country; By 2025, the majority of teachers of general education institutions understand the importance of biodiversity and ecosystem services for future development of the country; By 2020, the educational programs in the sphere of biodiversity are included into the learning process in all educational institutions.
NT 3: Development and integration of arrangements of economic	3.1 By 2020, methodology and approaches to conduct economic valuation of

National targets/Aichi targets	Indicators (2020, 2025)
valuation of biodiversity and ecosystem services into the planning processes. Aichi target 2: By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems.	biodiversity and ecosystem services are selected and adapted to the national specifics; 3.2. By 2025, methods of economic valuation of biodiversity and ecosystem services are developed, approved and adopted at the national level.
NT 4: Development and integration into state Environmental Impact Assessment (EIA) procedure of arrangements to evaluate impact of economic and other activities on biodiversity. Aichi target 3: By 2020, at the latest, incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio-economic conditions. Aichi target 4: By 2020, at the latest, governments, business and stakeholders at all levels have taken measures to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits. Aichi target 8: By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.	4.1. By 2020, the legislation that relate to the Environmental Impact Assessment (EIA) fully considers the issues of biodiversity and ecosystem services conservation; 4.2. By 2020, the schemes to regulate compensation principle for inevitable / residual damage to biodiversity are developed and pilot testing is conducted; 4.3. By 2025, the fees for environmental pollution and special use of natural resources are applied without fail based on their assessed value.
STRATEGIC GOAL II. Reducing the direct pressures on biodiversity and sustainable use of its components in productive landscapes (AICHI STRATEGIC GOAL B: Reduce the direct pressures on biodiversity and promote sustainable use)	
NT 5: Development and commencement of implementation of the set of measures to reduce the rate of degradation and fragmentation of the most vulnerable natural ecosystems.	5.1. By 2020, the processes of degradation and fragmentation of the most vulnerable natural ecosystems are studied and a set of measures to reduce the rate of these processes is developed;

National targets/Aichi targets	Indicators (2020, 2025)
Aichi target 5: By 2020, the rate of loss of all-natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced; Aichi target 7: By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity; Aichi target 15: By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 percent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.	5.2. By 2020, a set of measures to reduce the rate of degradation and fragmentation of the most vulnerable natural ecosystems is included in the process of sectoral planning; 5.3. By 2025, the activity aimed at conserving and restoring natural ecosystems is included into the national action programs; 5.4. By 2025, the share of degraded lands is decreasing or at least is being stabilized in comparison to 2015.
NT 6: Ensuring sustainable use of biodiversity in water bodies within improved legal and methodological frameworks. Aichi target 6: By 2020 all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.	6.1. By 2020, the amendments and adjustments are introduced into the regulations on the fishery activity in comparison to 2015; 6.2. By 2025, the productivity of water bodies is increased in comparison to 2015; 6.3. By 2025, the sustainable activity to restore fish stocks is being implemented.
STRATEGIC GOAL III. <i>Developing the system of protected natural areas to conserve biodiversity and increase the scope of benefits from ecosystem services</i> AICHI STRATEGIC GOAL C: <i>To improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity;</i> AICHI STRATEGIC GOAL D: <i>Enhance the benefits from biodiversity and ecosystem services to all people</i>	
NT 7: Expansion of total area of protected natural areas in the country for creation of national environmental network (PNA of different categories), ensuring their efficient management. Aichi target 11: By 2020, at least 17 percent of terrestrial and inland water, and 10 percent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures, and	7.1. By 2020, the necessary changes and amendments are introduced into the legislation on PNA; 7.2. By 2020, the effectiveness of management of the PNA system is assessed in accordance with international practice; 7.3. By 2025, the total area of protected natural areas (I-IV categories) is increased; 7.4. By 2025, the ecosystem representativeness of protected natural areas is increased at least by 10% of the area of each type of natural ecosystems; 7.5. By 2025, the PNA system includes more unique natural sites in comparison to 2015;

National targets/Aichi targets	Indicators (2020, 2025)
integrated into the wider landscapes and seascapes; Aichi target 12: By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained; Aichi target 14: By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable segments of the population.	7.6. By 2025, the number of rare and endangered species of plants covered by territorial protection (PNA of I-IV categories) increased to 70%; 7.7. By 2025, the number of rare and endangered species of animals covered by territorial protection (PNA of I-IV categories) increased to 90%.
NT 8: Development of state program on conservation and sustainable use of biological diversity components used for food production and farming. Aichi target 13: By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity; Aichi target 18: By 2020, the traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels.	8.1. By 2020, the national database on biodiversity components used for food production and farming is developed and updated on a regular basis; 8.2. By 2020, the main habitats of wild relatives of cultivated plants are identified; 8.3. By 2025, the state program of measures for conservation and sustainable use of biological diversity components used for food production and farming is developed and being implemented.
STRATEGIC GOAL IV. <i>Enhancing the effectiveness of conservation and sustainable use of biodiversity through participatory planning and capacity building</i>	
AICHI STRATEGIC GOAL E: <i>Enhance implementation through participatory planning, knowledge management and capacity building</i>	
NT 9: Inclusion of provisions of the National Biodiversity Strategy and Action Plan as integral parts of the plans for national, territorial and sectoral development.	9.1. By 2020, activities within the framework of NBSAP are included into the plans for national, territorial and sectoral development; 9.2. By 2025, activities to conserve biodiversity and maintain ecosystem services is

National targets/Aichi targets	Indicators (2020, 2025)
Aichi target 17: By 2015 each Party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan.	being implemented in relevant economic sectors according to the Action Plan of the National Strategy.
Global Targets	National contribution to the implementation of the Global Targets
Aichi Target 9: By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated and measures are in place to manage pathways to prevent their introduction and establishment	The national contribution to the target is briefly reported in Section VI on the contribution to the GSPC. Systematic studies are being conducted to identify, composition and geographical distribution of invasive plant species, the species composition and the pathways of invasive species of the fauna of vertebrate animals are determined, which is reflected in Sections V and VII.
Aichi Target 10: By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.	The national contribution to the implementation of the target is indirectly determined by the results obtained in implementing the NT 5: to develop and implement a set of measures to reduce the rate of degradation and fragmentation of the most vulnerable natural ecosystems, including taking into account climate change.
Aichi Target 16: By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation.	Currently, the issue of accession of the Republic of Uzbekistan to the Nagoya Protocol is not being considered
Aichi Target 20: By 2020, at the latest, the mobilization of financial resources for effectively implementing the Strategic Plan for Biodiversity 2011-2020 from all sources and in accordance with the consolidated and agreed process in the Strategy for Resource Mobilization should increase substantially from the current levels. This target will be subject to changes contingent to resources needs assessments to be developed and reported by Parties.	According to the developed updated NBSAP (currently under consideration by the Cabinet of Ministers of the Republic of Uzbekistan), mobilizing financial resources for the conservation and sustainable use of biodiversity includes: increasing domestic investment in biodiversity; gaining access to international financial and technical assistance; identifying and developing innovative mechanisms for financing biodiversity-related activities and maintaining ecosystem services.

NATIONAL STRATEGIC GOALS AND TARGETS

NATIONAL STRATEGIC GOAL I. *Mainstreaming biodiversity across the state administration and governance bodies and society for sustainable development of the country*

National Target (NT) 1: *Improvement of the system of state monitoring of natural environment by inclusion of biodiversity monitoring into it.*

In the first national biodiversity strategy (1998), the performance of scientific research and monitoring within PNA was defined as the one of priority directions in the field of scientific research and observations of protected natural area (PNA) management. It was planned to include conservation performance indicators to support the goals of action planning and decision-making in direct relation to a specific protected area and for the whole system itself. In the action plan of the National biodiversity strategy it was planned to “develop standard programs of scientific research and monitoring for each category of protected areas”. The absence of a target for comprehensive monitoring of biodiversity, covering not only PNA’s, but also a wide range of outer ecosystems and landscapes was missed in the first NBSAP that suggests that this problem was underestimated. Since the preparation of the first NBSAP, monitoring in the country was conducted from separate directions. Currently, a unified agreed biodiversity system is being developed for benchmark ecosystems in state nature reserves of the Republic of Uzbekistan. For other PNA categories and unprotected areas, a unified biodiversity component monitoring system is still not developed.

During preparation of the updated NBSAP (submitted to review to the CM RUz), strategic directions for conservation and sustainable use of biodiversity were determined by the analysis of previous planning and implementation processes. One of the priority strategic directions was the “Development of a systematic monitoring of biodiversity as a means of mainstreaming base information for making managerial decision and improvement of government and society awareness of significance of biodiversity and ecosystem services, their contribution to well-being and development of the country. Development of monitoring research and systematic observations of biodiversity components shall be considered within the scope of national priorities ensuring information database for implementing national environmental policy and economic planning”.

NT 1 was developed and defined following a consultative process with the participation of relevant ministries and agencies, scientists, representatives of HEIs, environmental NGOs and economic sector representatives, taking into account priority issues in the sphere of biodiversity, social and economic conditions in the country and existing capacity. Outcome Indicators were developed to monitor performance of biodiversity conservation and to assess the progress in the achievement of the target. Achievement of NT 1 relates to the national level, but the results will also be relevant at the regional and international levels.

Legal acts, official reports following the results of activity within the frameworks of international conventions, agreements and memorandums, results of the implementation of program documents (EAP; GMEP), materials of completed and effective national and international projects in the field of biodiversity, departmental materials of involved organizations, scientific publications, materials and publications of environmental NGO and expert reviews have become the sources of information for the analysis of measures taken for implementing NT 1.

Interrelation between the NT for development of the biodiversity monitoring system with global Aichi targets (Table 2) is driven by the development of the process of international information exchange and improvement of awareness of issues related to biodiversity and ecosystem services. Achievement of the national target 1 will facilitate the coordination of actions needed to implement the CBD and decisions of the Conference of Parties in relation to biodiversity monitoring, as well as to increase synergies with the three Rio Conventions.

Table 2. Correlation between the National target 1 and Global Aichi Goals and targets

National strategic goals / targets	Global Aichi Goals / targets
Direct correlation	
STRATEGIC GOAL I. Mainstreaming biodiversity across the state administration and governance bodies and society for sustainable development of the country AICHI STRATEGIC GOAL A: Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society	
NT 1: Improvement of the system of state monitoring of natural environment by inclusion of biodiversity monitoring into it.	Aichi target 19: By 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.
Indirect correlation	
NT 1: Improvement of the system of state monitoring of natural environment by inclusion of biodiversity monitoring into it.	Aichi target 1: By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.

The achievement of the NT for the development of the biodiversity monitoring system is the most important integral part for the accomplishment of the national strategic goal 1 “Mainstreaming biodiversity across the state administration and governance bodies and society for sustainable development of the country”. The importance of the progress in the achievement of NT 1 lies in the need of periodic assessments of the current state of the biological diversity of the country, identification of trends, storage and exchange of data. In addition it is crucial to continue forecasting possible changes for making operational decisions and planning actions for conservation and sustainable management of biodiversity components. The country needs scientific evidence for mainstreaming the implementation of the updated National biodiversity strategy to understand environmental, social and economic implications of biodiversity loss and deterioration of ecosystem condition. Monitoring is part of the biodiversity control and management system and its results allow the assessment of state and trends in the field of biodiversity, as well as the identification of threats, the determination of priorities in the field of conservation and sustainable use of biodiversity. The unified state biodiversity monitoring system is needed to ensure that knowledge, base science and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are accumulated, systematized, used for management purposes, distributed and successively transferred. In addition, “the lack of current scientific information about the state and significance of biodiversity, which is needed for development of the policy and making decisions” is recognized as one of indirect causes of biodiversity loss at the national level.

The significance of NT 1 is also driven by the fact that the progress in its achievement will facilitate the achievement of all the other national targets. Moreover, this target represents a general commitment of Uzbekistan to the increase of volume and quality of the information on biodiversity, its state and trends needed for its conservation and sustainable use.

For the achievement of the NT 1 it is needed to create and develop the unified biodiversity monitoring system component, establishing the procedure of organization and implementation of flora and fauna monitoring, as well as to create the information database for monitored objects and to improve works related to keeping state cadasters based on modern GIS technologies.

The systemic monitoring of natural environment began with the Resolution of the Cabinet of Ministers RUz dated April 3, 2002 No. 111 “On approval of the Regulation on state

monitoring of natural environment in the Republic of Uzbekistan”, which established the general structure and course for state monitoring, main directions of the activity and the responsible ministries and agencies (<http://www.lex.uz/acts/261166>). In the context of implementing this Regulation, within the last 15 years, a unified natural environmental monitoring system has been created, a list of main natural and technogenic sources of pollution has been drawn up, modern measurement methodologies have been developed and physical infrastructure of environmental analysis laboratories were upgraded. However, the procedure for state monitoring of natural environment did not stipulate the procedure of regular monitoring of biodiversity components.

The state monitoring of natural environment is formed by combining monitoring systems of ministries, agencies and bodies of economic management. The Office for coordination and monitoring of environmental pollution was created at the central administration of the State Committee on Ecology and Environmental Protection. Its main aim is to coordinate the activity of ministries and agencies in relation to state monitoring, development of the unified monitoring program and ensuring control over its implementation, creation of information database and provision of information to relevant organizations. In addition to it, the Department of cadaster and monitoring was created at the Inspectorate for control over protection and use of biodiversity in protected natural areas (hereinafter - Bioinspectorate), which has direct responsibility for the collection and management of the information on biological diversity (Resolution of the President of the Republic of Uzbekistan No. 2915 dated April 21, 2017; <http://lex.uz/docs/3190807>).

Currently, certain measures are taken to solve problems related to the organization of the systemic monitoring of biodiversity, including the development of a corresponding monitoring structures and its main directions. In this way, the monitoring and cadaster update of biodiversity components are included into the list of the State’s priorities and reflected in the planning processes. According to the effective legislation (The Law on protection and use of flora, 2016; The Law on protection and use of fauna, 2016), the monitoring of flora and fauna is an integral part of state monitoring of natural environment and is implemented as per the procedure established by the Cabinet of Ministers of the Republic of Uzbekistan.

Achievement of the target for development of the biodiversity monitoring system is included (in full or partially) in a number of program documents approved within the period from 2015 to 2018, namely: the Action Strategy on five priority areas of development of the Republic of Uzbekistan in 2017-2021, the Program of State Monitoring of Natural Environments (SMNE) for 2016-2020, the Environmental Action Plan of the Republic of Uzbekistan for 2013-2017 (EAP), the National action program to combat desertification and drought (NAPCDD, 2015), the Third National Communication of the Republic of Uzbekistan under the UN Framework Convention on Climate Change (TNC FCCC, 2016), the Resolution of the President of the Republic of Uzbekistan dated 04.09.2017 No.3256 “On measures for organization of activity of the Institute of botany and the Institute of zoology of the Academy of Sciences of the Republic of Uzbekistan” (2017). Targeted monitoring is a component of state procedure for pre-project planning of development programs and is an integral aspect of the environmental impact assessment (EIA).

In September 2015, leaders of UN member states, including Uzbekistan, approved the 2030 Agenda for Sustainable Development, which contains Sustainable Development Goals (SDG) composed of 17 global goals and 169 targets. Global sustainable development goals and targets are based on the Millennium Development Goals, have complex nature, ensure balance between all three sustainable development components (economic, social and environmental) and are intended to continue the work that had been started. The resolution on SDG approved by the UN General Assembly, recommended to all member states to develop national programs covering all aspects of implementing the Agenda for Sustainable Development as soon as possible. With the Resolution No. 841 of the Cabinet of Ministers of the Republic of Uzbekistan “On Measures for Realizing National Sustainable Development Goals and Objectives for the Period up to 2030” dated 10/20/2018, the organization of systematic work on the consistent

implementation of the Sustainable Development Goals of the UN Global Agenda tasks in the field of sustainable development for the period up to 2030 (<http://lex.uz/docs/4013358?query=Program>) has been appointed.

In 2017, the Action Strategy on five priority areas of development for the Republic of Uzbekistan in 2017-2021, which ensures comprehensive achievement of Sustainable Development Goals, was approved by the Decree of the President of the Republic of Uzbekistan (<http://lex.uz/docs/3107042>). To implement the Strategy, the State action program for strategy implementation is annually reviewed and approved. It contains the list of main activities intended to implement the strategy.

Activities which implementation is directly related to the improvement of the state monitoring of natural environment are planned in the State action program for the strategy implementation for the “The Year of Supporting Active Entrepreneurship, Innovative Ideas and Technologies” (2018) (<http://lex.uz/docs/3516841>) within the frameworks of implementation for the priority direction in the sphere of ensuring security. Namely it is focused on taking efficient measures for environmental protection, to ensure rational use of natural resources, to provide environmental security and to improve environmental awareness of population. Main results of implementation of these activities shall include the development and approval of the State Concept of the Republic of Uzbekistan in the field of ecology, environmental protection and rational use of natural resources for 2019-2023. This concept provides support and improvement to the ecosystems ensuring environmental-friendly living of people (Activity 214; <http://lex.uz/docs/3516847#3517305>).

In 2016, the Government approved the Resolution “On approval of the Program of State Monitoring of Natural Environments in the Republic of Uzbekistan for 2016-2020”, which contains sections on the monitoring of biological diversity components (<http://www.lex.uz/docs/3019801>).

The acting Program of State Monitoring of Natural Environments (SMNE) includes significant volume of activities related to the organization and performance of the monitoring of various biodiversity components. In this way, two sections of the Program (IX, X) - “Monitoring of state of lake ecosystems and adjacent territories” and “Monitoring of animal and plant communities” are represented by a set of main activities (total of 8 main activities) in relation to which implementation arrangements and main executors are indicated and which are driven by deadlines and financing sources. The set of activities for the organization and performance of monitoring of biodiversity components provided in the Program includes both: monitoring at the level of ecosystems and monitoring of species. Annual monitoring of biodiversity of water bodies of international importance - lakes Dengizkul of Aydar-Arnasay lake system and water reservoirs Tudakul and Kuyimazar, is also planned. The program includes activities for the identification of 20 territories for performance of local monitoring using a species indicator, performance of monitoring of animal and plant communities listed in the Red Book in PNA, performance of monitoring in lands of forestry enterprises and forest-hunting grounds, performance of local monitoring of ecosystem condition in the territory of PNA. It is planned to use the results of implemented activities for: the inclusion the of animal and plant communities in the system of state cadaster and their use for making decisions related to conservation and sustainable use of biological resources; in reports on performance of CBD commitments, Ramsar and Bonn Conventions; to conduct long-term local monitoring in PNA; for the determination of the number of resource species in lands of forestry enterprises and forest-hunting grounds, and any other applicable.

Taking into account regional climate pattern of Uzbekistan, the interrelation between desertification processes and loss of biodiversity is pronounced and consequently, targets of the National action program to combat desertification and drought (NAPCDD, 2015) requires a comprehensive approach which considers the biodiversity as one of components of ecosystems affected by desertification processes. The NAPCDD specifies commitments in the field of monitoring, which are common for all the three Rio conventions - CBD, UNFCCC, UNCCD.

These are performance of scientific research, data collection, observations of natural environment components and impacting factors including land use, forest, agriculture, soils, water resources, flora and fauna and ecosystem condition, which will facilitate making decisions and taking measures and actions in each focal area.

The Third National Communication of the Republic of Uzbekistan under the UN Framework Convention on Climate Change - is a government document evaluating impacts of climate change and describing adaptation scenarios required to respond to forecast future climate-related threats and hazards. This document defines main targets in this field. Among these is the development of environmental monitoring, including: a) taking inventory of natural and anthropogenic ecosystems and organization of a comprehensive and regular system of state monitoring of biodiversity; b) development of observation network of routes and points of monitoring of main biodiversity components of terrestrial and aquatic ecosystems; c) organization of monitoring of species as a consequence of climate change (target 7). And also: scientific research and awareness, including: a) assessment of the risk of climate change in relation to the biodiversity of terrestrial and aquatic ecosystems; b) development and introduction of innovative fish farming technologies; c) improvement of public awareness of implications and risks of climate change for biodiversity (target 8). The document contains the assessment of impact of climate change as well as general recommendations for potential options for assessment and adaptation for each sector, including: agriculture, water resources, biodiversity and ecosystems.

Efforts to combat desertification and biodiversity protection complement measures for adaptation to climate change and droughts. General efforts require multidisciplinary approach and coordinated actions in many related fields, first of all, in environmental monitoring and information (scientific research programs and periodic monitoring, inventory of ecosystems and biological communities and indicators of influence of climate change on biodiversity).

In September 2017, within the frameworks of improvement of activity of the Academy of Sciences of the Republic of Uzbekistan (AS RUz), the Resolution of the President of the Republic of Uzbekistan “On measures for organization of activity of the Institute of botany and the Institute of zoology of the Academy of Sciences of the Republic of Uzbekistan” was approved (<http://lex.uz/docs/3327014>). The document defines the following as main targets and directions of activity of leading institutions of Uzbekistan in the field of study of biodiversity: (1) the development and introduction of information and analytical database on flora and fauna of the country; (2) keeping state cadaster for rare and threatened species of plants and animals listed in the Red Book; (3) the monitoring of components of flora and fauna, and (4) the assessment and monitoring of genetic pool of fishery resources. Within the frameworks of implementation of this Resolution, since January 2018 the AS RUz provides an applied scientific research grant “Inventory and assessment of current condition of fauna of vertebrate animals in Tashkent province as a basis for creation of the monitoring system for biological resources”. One of the main project tasks is the development of methodological frameworks for long-term monitoring, development and testing of recommendations for monitoring of terrestrial vertebrate animals, containing a list of indicators for species for assessing ecosystem conditions, main impacts on fauna, detailed description of location (scheme) of long-term monitoring points, methods and frequency of recording, submission of obtained data. After testing the project results in Tashkent province, it is planned to expand methods and approaches to performance of long-term monitoring to other regions of the country, which also need tools for science-based decision-making in the field of environmental protection.

Until the end of 2017, the National Environmental Action Plan was implemented in Uzbekistan (<http://lex.uz/docs/2174871>) which was the main tool for planning the policy in the field of environmental protection. The program was developed for 5-year period and included provisions for environmental planning. It defined national strategic priorities in relation to the improvement of the environmental quality, improvement of sustainable use of natural resources, inclusion of issues related to environmental protection and sustainable use of natural resources

into other economic sectors, as well as improvement of arrangements of monitoring of natural environment for regular assessment and preparation of forecast on its environmental condition. To achieve established goals of the EAP for 2013-2017, achievement of the following targets, in particular, was provided for: Environmental rehabilitation of the Aral Sea region by performance of forest improvement activities on drained floor of the Aral Sea on the area of 80 thousand hectares; Assessment of current condition of saiga (*Saiga tatarica*) population on the Ustyurt plateau and development of activities for its conservation; Creation of complex landscape sanctuary “Saygachiy” on the Ustyurt plateau; Assessment of condition of main commercial fish populations and determination of annual allowable catching norms; Assessment of genetic pool of Uzbekistan flora as the basis for keeping the state cadaster of flora (including identification of flora resources for individual phytogeographical districts and administrative territories and creation of electronic database on flora). Moreover, the preparation and publication of a next edition of “The Red Book of the Republic of Uzbekistan” is one of activities under the program which provided for the performance of research on assessment and monitoring of rare and threatened species. In 2016-2017, following the results of scientific research, the updated list of animals and plants was prepared for the inclusion into the national Red Book, which revised and extended edition was prepared for publication.

Issues related to the creation and development of the biodiversity component monitoring system for the elapsed period were also considered within the frameworks of implementation of a number of completed and ongoing international projects. The monitoring of biodiversity condition on the Ustyurt plateau was conducted during 4 years as part of implementation of the UNDP/GEF/SCEEP Project “Integrating biodiversity conservation principles into oil and gas sector of Uzbekistan”. Based on the experience gained, the Plan of biodiversity monitoring approved by the Bioinspectorate of the SCEEP and the Academy of Sciences was developed and proposed for application within the environmental protection system.

Inclusion of biodiversity monitoring component into the program documents demonstrates their priority in the state policy. It should be noted that since the development of national targets, monitoring activities in the country are still conducted mainly from separate directions, however, the activity related to the creation of a unified comprehensive biodiversity monitoring system has been revitalized and it included a territorial representative observation network of routes and points of monitoring as well as covered the main biodiversity components in the territory of natural reserves. In this way, currently, in response to the p.2 of the Resolution of the Cabinet of Ministers No. 339 dated May 4, 2018 “On approval of regulations intended to the implementation of the Law of the Republic of Uzbekistan “On protected natural areas” the SCEEP developed “The procedure for monitoring of natural successions of natural processes in benchmark ecosystems in state reserves of the Republic of Uzbekistan”, which is now pending for approval.

Collection of information in the field of biodiversity is performed by various government entities. Main information sources are statistic data, keeping biodiversity component cadaster and scientific research.

Statistic data come from local and national governments and are processed by the State Committee on Statistics. Statistic data relating to biodiversity are statistic reports on protected natural areas; forestry; water resources etc. Part of statistic data have a practical application for long-term monitoring, for example, statistic reports on protected natural areas. However, the main part of these data has limited value for monitoring purposes because it doesn't contain information on condition and trends in the field of biodiversity.

State cadaster of biodiversity components is the system of collection of basic data which serves as the basis for implementing further monitoring. The legal basis for creation and keeping the state cadaster is the Law of the Republic of Uzbekistan “On state cadasters” which purpose is the regulation of relations in the field of keeping state cadasters, collection and use of cadastral information (<http://www.lex.uz/acts/19480>). State cadaster of animal and plant communities is kept in accordance with Laws of the Republic of Uzbekistan “On protection and use of flora”

and “On protection and use of fauna”, the Resolution of the Cabinet of Ministers of the Republic of Uzbekistan #255 dated July 17, 1996 “On approval of the Regulation on procedure of creation and keeping the Unified state cadaster system of the Republic of Uzbekistan”. There is a number of regulations governing processes of information collection for state cadaster of biodiversity components, including: regulations on the procedure for maintaining state accounting, accounting for use volumes and the state cadastre of objects of wildlife, and Regulations on the procedure for maintaining state records, accounting for use volumes and the state cadastre of plant world objects (Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 914 " State Cadastre of Objects of Animal and Plant World (November 7, 2018); the Regulation on procedure of keeping state cadaster of specially protected nature areas of the Republic of Uzbekistan (the Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 104 dated 05.09.1998). In accordance with these Regulations, the works for keeping state cadasters and state accounting of animal and plant communities are funded from the state budget.

In accordance with the current legislation, the main tool for accounting, assessment and sustainable use of natural resources of the country is the Unified system of state cadasters which includes a systematized and standardized qualitative and quantitative characterization of animal and plant communities (<https://nrm.uz/contentf?doc=567431>). Cadastral data are the basis for planning the development of forestry and PNA system, for determination of condition of flora and fauna resources and for establishment of quotas for their use, for keeping “The Red Book”, for performance of the State Environmental Expert Review for various economic entities etc.

At the institutional level, keeping the state cadaster of biodiversity components is performed by SCEEP jointly with the Academy of Sciences of Uzbekistan. Scientific support of the state cadastre of flora and fauna objects is provided by the Academy of Sciences.

The cadastral survey of the territory, including the state registration of flora and fauna objects, is carried out by:

- The Academy of Sciences on rare and endangered species of wild animals and wild plants, as well as medicinal, decorative, food and technical species of wild plants throughout the country;
- Structural subdivisions of the State Committee on Forest Land, including the registration of animal pests of forestry;
- State reserves, complex (landscape) reserves, natural parks, state biosphere reserves, biological reserves and natural nurseries on the territory of these protected natural territories;
- Hunting-fishing farms in the territory of these farms;
- By the fishing organizations at the provided water bodies or their parts;
- Association “Uzbekbalikanoat”, Directorate of Aydar-Arnasay lakes system for commercial fish species;
- The Republican Center for the Prevention of Plague, Quarantine and Highly Dangerous Infections of the Ministry of Health of the Republic of Uzbekistan for animal carriers of especially dangerous infectious diseases;
- The Ministry of Agriculture of the Republic of Uzbekistan on animal pests of agriculture;
- The State Committee of the Republic of Uzbekistan on land resources, geodesy, cartography and the state cadastre on vegetation of natural pastures and hayfields;
- Agricultural organizations, institutions and organizations for plant world objects on agricultural lands;
- Forestry organizations on flora objects on forest lands;
- By scientific, educational organizations and biologists on a contractual basis with the State Committee for Ecology on flora and fauna objects in another territory.

Ministries, departments and organizations conducting a cadastral survey of the territory, state registration of wildlife and accounting for their use, provide the necessary information free of charge for maintaining the state cadastre of wildlife in the State Ecology Committee. Types, amount and deadlines for submission of necessary information on the state cadaster of animal

and plant communities are established by the SCEEP. The procedure of keeping the state cadaster of animal and plant communities is approved by the Cabinet of Ministers of the Republic of Uzbekistan.

Availability of a strong legal framework, rich experience and capacity for collection of evidence-based material ensure certain, but still insufficient level of activities aimed at keeping the state cadaster of animal and plant communities. Inconsistency and insufficient funding limit the organization of a systematic collection of cadastral information and compilation of corresponding data obtained in the result of departmental (sectoral) inventory and monitoring programs.

Collection of information on biodiversity components is performed by various government structures and agencies. Incoherent subordination of various executive structures restricts the feasibility of centralized exchange of information on biodiversity between stakeholders. In addition, creation of arrangements for exchange of information between all stakeholders and ensuring availability of monitoring results to sensitize authorities, academic communities and public is essential for development and unimpaired functioning of the biodiversity monitoring system and for the use of data for management purposes, which is provided for in the goals and targets related to the national monitoring system.

National Target 2: Expanding knowledge and awareness of the state administration and governance bodies and the whole society of the value of biodiversity and ecosystem services

Public awareness and education were cited in the NBSAP (1998) as one of the main three priority directions of activity in the Republic of Uzbekistan. This document defines the target: Improvement of awareness and strengthening of information base of officials responsible for making decisions with sub-goals trickling down the information and awareness on biodiversity conservation to the whole society: To develop information packages on biodiversity and guidelines based on the most valuable experience in this field addressed to government agencies, state and public organizations, in particular, organization of food sector which use natural resources; To provide easily accessible and easily used information on biodiversity to persons responsible for making decisions in all sectors; as well as; To improve general awareness and understanding by citizens of issues related to sustainable development, position and significance of biodiversity issues in them with sub-goal: To develop national action program for widespread demonstration of biodiversity and its role in sustainable development of Uzbekistan by mass media (press, radio, TV).

Within the frameworks of this activity it was planned to improve educational potential of persons responsible for making decisions; development of corresponding programs for improvement of public awareness by mass media and at the local level; revision of existing and development of new school and higher education programs; development of arrangements for participation of public in issues related to protected natural areas.

There are other national plans and strategies defining a number of targets. NAPFEP (1998): Development and improvement of continuing environmental education, upbringing and engagement of NGO and citizens' self-governing bodies in educational process. EAP (1999): Improvement of public awareness of environmental condition, making decisions and taking measures for its protection and creation of the System of continuing environmental education (development of the concept, state standard for environmental educations, training programs and methodological guidelines). Implementation Activities for the Environmental Action Plan of the Republic of Uzbekistan for 2006-2010 (IA EAP (2005)): Development of a new Concept of the Republic of Uzbekistan for continuing environmental education; Development and issuing of "The Environmental Encyclopedia of the Republic of Uzbekistan"; Development of the program and organization of television thematic series and meeting of public with experts in the field of biodiversity.

NT 2 "Expanding knowledge and awareness of the state administration and governance bodies and the whole society of the value of biodiversity and ecosystem services" is the most

important integral part in the achievement of national strategic goal I. NT 2 was developed following the consultative process with participation of relevant ministries and agencies, academic community, representatives of HEIs, environmental NGO and economic sector representatives, taking into account priority issues in the sphere of biodiversity, social and economic conditions in the country, and the existing capacity. Corresponding indicators were developed to assess the progress in the achievement of results of the target (. 1). Achievement of NT 2 relates to the national level.

There is an interrelation between the NT 2 and global Aichi targets which are focused on the need to understand a broad range of values related to biodiversity, including social, environmental and economic benefits (Table 3). This interrelation is working by way of participation in international programs and initiatives organized at national, regional and global levels by conventions, funds, international organizations and projects. In this way participants of such actions contribute to globally significant activities and become part of a movement for the conservation of biodiversity of our planet.

Table 3. Correlation between the National target 2 and Global Aichi Goals and targets in the field of awareness improvement

National strategic goals / targets	Global Aichi Goals / targets
Direct correlation	
STRATEGIC GOAL I. Mainstreaming biodiversity across the state administration and governance bodies and society for sustainable development of the country	
AICHI STRATEGIC GOAL A: Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society	
NT 2: Expanding knowledge and awareness of the state administration and governance bodies and the whole society of the value of biodiversity and ecosystem services.	Aichi target 1: By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.
Indirect correlation	
NT 2: Expanding knowledge and awareness of the state administration and governance bodies and the whole society of the value of biodiversity and ecosystem services.	Aichi target 19: By 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.

In a broad sense, the target for the improvement of knowledge and awareness is fundamental for the achievement of any national strategic goals, and therefore targets because the understanding of the values and advantages of biodiversity is the first main step towards integration of these values into all spheres of country development. Continuous and focused activity leads to behavioral changes of both, individual persons and organizations and governments, towards conservation and sustainable use of biodiversity. It is a prerequisite, that the majority of population understands that conservation of biodiversity is crucial for sustainable development of the country.

Insufficient awareness is an indirect cause of biodiversity loss due to the fact, that misunderstanding of significance and scale of environmental, social and economic implications of biodiversity loss and deterioration of ecosystem condition leads to the creation of emerging problems in this field by a leftover principle, without considering these problems as a priority.

Insufficient awareness leads to inefficient and unsustainable use of biological resources as well as to untimely adoption of appropriate measures.

Therefore, it is necessary to raise the priority of issues related to conservation and sustainable use of biodiversity. To develop a comprehensive system for mainstreaming main environmental priorities into the national environmental protection policy. It is necessary to include the mainstreaming of the biodiversity across the State administration and governance bodies and society by informing, educating and improving awareness and taking appropriate promotion measures.

Since the accession of the Republic of Uzbekistan to the CBD in 1995 (the Resolution of the Oliy Majlis No. 82-I dated 06.05.1995), the work on improvement of public awareness has begun. Commitments of Uzbekistan in accordance with the article 13 of the CBD “Education and improvement of public awareness” include the need to: a) encourage and facilitate the understanding of the importance of biodiversity conservation and measures required for it as well as the promotion of biodiversity via mass media and the inclusion of these issues into educational programs; and b) cooperation, in relevant cases, with other states and international organizations in the development of educational programs in the field of improvement of public awareness of issues related to conservation and sustainable use of biodiversity.

The CBD mechanism for scientific and technical cooperation, including management and information exchange components, is the Clearing House Mechanism (article 18.3). According to the decision of X/15, its mission lies in significant contribution into implementation of the CBD and its Strategic plan in the field of conservation and sustainable use of biodiversity for 2011-2020. This is completed through the provision of efficient information services and other appropriate means for encouraging and facilitating scientific and technical cooperation, exchange of knowledge and information, and creation of fully functioning network of Parties and partners to the Convention.

In 2005 and 2015 the Republic of Uzbekistan took measures for the creation of the national Integrated biodiversity data management system (the Clearing House Mechanism - CHM). CHM must have included available thematic databases and National biodiversity information system to facilitate the access of persons responsible for making decisions to required information, which would create the basis for long-term and sustainable management. Currently, the website operation is suspended due to period of ongoing reforms in the Republic of Uzbekistan, including reforms in the structure of the SCEEP.

Performance of county commitments to the CBD are reflected in National reports which included, among the other, description of the process of informing and improvement of knowledge of biodiversity value.

In this way, the Third national report (2006) indicated, that Uzbek schools and lyceums teach obligatory course in botany based on learning of local flora and vegetation, crops and plant breeding. More than 70 NGOs, initiative groups (including ones specialized in plants); “Ecoles”, “Yunona” etc.), child and youth clubs deal with biodiversity conservation, environmental education and learning, public awareness and communication of environmental issues. Many school environmental camps and recreational sites, where students combine rest with educational and practical activity for nature protection have emerged. The state standard for continuing environmental education and the Program of continuing environmental education have been developed and are being introduced in the country as an integral part of the unified arrangement of general public education system within the frameworks of “The National personnel training program”, “The program for the development of school education”, “The program for training, retraining and further training of teachers and technical educational personnel of systems of secondary, specialized and secondary vocational education”. However, necessary expansion of this activity, lack of funds and human resources were noted. Insufficient education and necessary improvement of public awareness exist at all levels.

According to the Fifth National Report (2015), tremendous work was being performed in Uzbekistan in the field of public awareness raising on significance of biodiversity conservation

through information campaigns, mass-media, publications, organization of seminars, distribution of information etc. Important national information documents are the National reports on the state of the environment and the use of natural resources in the Republic of Uzbekistan - NRSE (1991, 1995, 1998, 2002, 2005, 2008, 2011) which are issued periodically by the State Committee for Nature Protection (since 2017 - the State Committee of the Republic of Uzbekistan on Ecology and Environmental Protection). These reports were prepared using summarized data from structural divisions of the State Committee on Ecology and Environmental Protection, environmental information from relevant ministries and agencies, international projects and organizations. Materials of the reports are available to a wide range of stakeholders. They play an important role in the processes of informing, educations, upbringing as well as planning and sustainable management of biological resources, reflected in national targets. The country is working towards the introduction of environmental aspects, including biodiversity conservation issues, into educational programs. This will result in the creation of a strong basis for environmental awareness. In relation to education and improvement of awareness: the concept and the program “On development of environmental education, training and retraining of personnel in the field of environment, as well as perspectives of improvement of the competency development system in the Republic of Uzbekistan” were developed.

Achievement of the target for improvement of knowledge and awareness is directly or indirectly reflected in the following program documents of the country:

- Environmental Action Plan of the Republic of Uzbekistan for 1999-2005 (EAP, 1999)
- National Strategy for Sustainable Development of the Republic of Uzbekistan (NSSD, 1999)
- Agenda 21 for the Republic of Uzbekistan (A21, 2000)
- National action program to combat desertification (NAPCD, 1999) and other sectoral state programs, which serve as the arrangement for implementation of strategies for national environmental planning.

Currently, the area of strategic planning is actively developing in the Republic of Uzbekistan. Environmental issues are mentioned in such current program documents as the Environmental Action Plan of the Republic of Uzbekistan for 2013-2017 (EAP), National action program to combat desertification and drought (NAPCDD, 2015), The Third National Communication of the Republic of Uzbekistan under the UN Framework Convention on Climate Change (TNC, 2016) and in other sectoral programs and action plans.

In the State program for the implementation of the Action Strategy on five priority areas of development of the Republic of Uzbekistan in 2017-2021, it is planned to take efficient measures for environmental protection, to ensure rational use of natural resources, to provide environmental security and to improve environmental awareness of population (p.214 and 215). To implement the decisions of this program the SCEEP is developing the new Concept of the Republic of Uzbekistan in the field of ecology, environmental protection and rational use of natural resources for 2019-2023.

Due to arid climate, combating desertification and draught is one of important factors adversely affecting ecosystems and, ultimately, the level of country development. Climate change is leading to (according to latest scientist estimates) the increase of hazardous natural phenomena, including draught, which also have a negative impact on biodiversity and ecosystems. Main program documents of the UN convention to combat desertification and drought and the UN Framework Convention on Climate Change point to this dependence as well as to the necessary comprehensive approach and coordinated actions in all aspects of environmental protection. These documents emphasize the need to pay special attention to the improvement of public knowledge and awareness of environmental issues, including conservation of biodiversity and country ecosystems, which is one of the most important factors for sustainable development.

The main government unit responsible for improvement of knowledge and public awareness of environmental protection issues, including conservation of biodiversity and ecosystems, is the Information service of the State Committee on Ecology and Environmental Protection of the Republic of Uzbekistan (Department for public relations and mass media and Sector for development of information communication technologies). NGOs work actively in the field of public awareness. Understanding the need for cooperation with NGOs, the SCEEP developed “Recommendations for organization and performance of joint works with non-governmental non-profit organizations”.

Since the preparation of the Fifth national report in 2015, the activity related to public informing has been revitalized. This activity was diverse in terms of both, theme and used approaches as well as target audience. Performed activities aimed at improvement of awareness and knowledge included: the organization of round tables, seminars, trainings, published numerous printed materials, produced films, videos, cartoons, themed mobile applications and multimedia educational programs, and much more.

All these activities can be categorized by the following directions:

- Development and distribution of publications: thematic information bulletins, brochures, booklets, visual aids, posters, advertising, promotional and informative materials etc.
- Reflection of issues to strengthen understanding of a broad range of BD values by public in mass media (newspapers, magazines, radio, TV).
- Preparation of special statements and reports, presentations at conferences, meetings and round tables, issuing of special, science and popular science publications;
- Preparation and issuing of Policy briefs for persons making decisions; holding press conferences, preparation of documents for deputies of the Oliy Majlis (the Legislative Chamber of the Republic of Uzbekistan);
- Creation and support of thematic websites and communities in social networks, preparation of publications for them;
- Study tours (media tours), field visits, experience-exchange visits, information campaigns;
- Observance of international days related to biodiversity;
- Development of activity in the field of ecotourism;
- Creation of information resources and visit-centers;
- Holding exhibitions and competitions related to biodiversity;
- Implementation of activities for biodiversity monitoring with participation of public;
- Arrangement of trainings for various target audience;
- Participation in nature protection actions organized at national, regional and global levels by conventions, funds, international organizations and projects.

Following these activities, significant part of population of the country has basic knowledge and understanding of the value of biodiversity and the need for its conservation. However, to achieve a more sustainable result, it is necessary to switch from isolated, fragmented actions to systematic, comprehensive approach based on developed programs and actions plans with obligatory progress monitoring.

National Target 3: Development and integration of arrangements of economic valuation of biodiversity and ecosystem services into the planning processes.

Sustainable development aims for the improvement of quality of life and well-being of the population. However, it may increase the potential load on existing natural resources. Efficient natural resource management should be based on the creation of the market of ecosystem services (ES) having measurable value as well as any other component of nation's wealth. Herewith, the understanding of significance of biodiversity (BD) for national life should be part of public policy. Benefits from biodiversity are clearly visible if included into accounting systems for national heritage.

Issues related to economic valuation of BD and ES are among actual targets in the field of conservation and sustainable use of BD. They refer to economic category of instruments intended to gain the understanding of BD value as the basis for economic and environmental sustainability, including the development various mechanisms of stimulation. Since the basis for all ecosystems is the dynamic complex of plants, animals and microorganisms, the BD is one of key components in the procedure of ES valuation (<https://www.millenniumassessment.org/documents/document.786.aspx.pdf>).

The first national biodiversity strategy (1998) defined the development of arrangements for the sustainable use of biodiversity as one of priority directions in economic goals for the protected natural area system. It was planned to elaborate and test methods and arrangements for the achievement of a sustainable use of biological resources ensuring adequate level of biodiversity conservation within the frameworks of PNA system. It was required to perform assessments of current conditions of economic use of biological resources in Uzbekistan. It was planned to identify biological resources having actual or potential economic value, information on which was not available or sufficient for adequate assessment of their real economic value, availability and sustainability when used (NBSAP, 1998).

This approach allows for the identification of benefits and possible losses within PNA and facilitates the development of conservation principles provided by ES by characterizing unique nature of BD and ES within protected natural areas. However, the efficiency of PNAs is restricted by their isolation. Therefore, currently, the primary focus should be on BD conservation beyond PNA in productive landscapes.

Economic (financial) valuation of renewable natural resources is important to create and improve economic arrangements for BD conservation. In particular, economic valuation of biodiversity and ecosystem services is required to make justified decisions in the sphere of environmental management. By using these economic valuations, it is possible to measure losses in the result of unsustainable use of BD, to justify economic efficiency of investments for the improvement of the environment, to compare benefits provided by ES and etc. However, the economic value of BD and benefits from its use are not properly mainstreamed into public decisions, including those in production sectors such as agriculture, mining industry, energy sector and when planning land use, as a result, economic sectors often adversely impact the BD.

During development of the updated NBSAP by way of analysis of previous planning and implementation processes and taking into account consultative process with stakeholders it was recognized that ultimately, the use of methods for economic valuation of BD and ES in the context of industrial development and land use planning should be a standard component of economic planning in Uzbekistan. Appraisal approach to economic use of biodiversity and ecosystem services for recognition of their true economic value should become one of strategic directions of the Republic of Uzbekistan in planning and development of activities in the field of BD conservation. The draft of updated NBSAP recognizes the development of methods for economic valuation of BD, improvement of methods for economic assessment of damage to the nature, taking into account long-term implications, as one of priority directions in the field of development of economic arrangements for BD conservation.

The procedure of economic valuation of ES includes four main steps: (1) identification of ES; (2) determination of their economic value; (3) determination of beneficiary for an ES; and (4) the development of arrangements for payment (compensation) for the ES. Since the economic valuation of BD and ES is a whole new direction of activity for Uzbekistan, it was planned to begin from the development of national approaches in this field and valuation of individual BD components.

In this way, NT 3 was developed following the consultative process with participation of official representatives of relevant ministries and agencies, academic community, representatives of HEIs, environmental NGO and economic sector representatives, taking into account priority issues in the sphere of biodiversity, social and economic conditions in the country and existing capacity. The target aims to insert the valuation of biodiversity and ecosystem services at the

national and local levels to improve decision making. Corresponding indicators were developed to assess the progress in the achievement of results of the target (. 1). Achievement of NT 3 relates to the national level.

The sources of information for the analysis of measures taken for implementing NT 3, assessment of their effectiveness and degree of progress were legal acts, materials of completed and effective local, national and international projects in the field of biodiversity, departmental materials of involved organizations, scientific publications and expert reviews.

National target for the development and introduction of arrangements for economic valuation of BD and ES into the planning process directly correlates with the Global Aichi Target 2 and indirectly correlates with Aichi Targets 1, 3, 4, 5, 7, 19 (Table 4). Indirect correlation is driven by the necessity of undertaking actions related to economic valuation of biodiversity and development of regulating economic instruments for biodiversity conservation on its basis, e.g. incentives, sanctions, subsidies etc., and for development of the policy and strategy for sustainable use of BD.

Table 4. Correlation between the National target 3 and Global Aichi Goals and Targets in the field of economic valuation of biodiversity and ecosystem services

National strategic goals / targets	Global Aichi Goals / targets
Direct correlation	
STRATEGIC GOAL I. Mainstreaming biodiversity across the state administration and governance bodies and society for sustainable development of the country AICHI STRATEGIC GOAL A: Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society	
NT 3: Development and integration of arrangements of economic valuation of biodiversity and ecosystem services into the planning processes.	Aichi target 2: By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems.
Indirect correlation	
Aichi target 1: By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.	
Aichi target 3: By 2020, at the latest, incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio economic conditions.	
Aichi target 4: By 2020, at the latest, governments, business and stakeholders at all levels have taken measures to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits.	
Aichi target 5: By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced;	
Aichi target 7: By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity;	
Aichi target 19: By 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.	

The majority causes of loss of habitats, depletion of species and degradation of ecosystems is the result of unsustainable use of natural resources in long-term perspective, in particular, in the context of sensitive ecosystems in Uzbekistan, climate change and increase of population pressure. The main cause of this unsustainable use of resources is the **underestimation** of the economic value of BD and ES, and the absence of economic arrangements for their valuation.

Moreover, economic valuation of BD is required to reflect the value and to record natural resources in the structure of national wealth and in national economic accounts to demonstrate their significance and high value for national economy and its sustainable development. Currently, there is a growing need to determine real economic value of natural services and resources. **Unavailability of valuation or underestimated value of natural resources lead to an erroneous reduction of benefits from conservation.** To achieve more sustainable development, the national economy planning system should integrate economic value of BD and ES components into the planning process.

Significance of NT 3 is also determined by the fact, that **its achievement may become one of main approaches for mobilization of financial resources for the implementation of all targets related to conservation and sustainable use of biodiversity**, because it will allow for the increase of internal investments into BD and support of ES by the introduction of approaches for their economic valuation. In conditions of market relations, tax policy reforming, increase of the role of resources taxes in total budget profit intended for efficient and sustainable use of natural resources, gradual introduction and improvement of economic arrangements in the field of environmental management has a special place.

Current situation in the field of economic valuation of BD: currently, the absence of a systemic approach to economic valuation of ES in Uzbekistan doesn't allow to account for the whole amount of their benefits. That is why it is necessary to analyze existing methodological approaches to economic valuation of ES and opportunities for their application to make optimal management decisions in the field of efficient use and conservation of ES capacity in Uzbekistan at all levels.

To achieve this target, it was planned to create arrangements for economic valuation of BD and ES by the development of national approaches and methodological guidelines and to perform economic valuation of BD and ES using pilot territories as an example.

Integration of economic and environmental programs is one of the main goals in the development of Uzbekistan and recent experience shows, that economic, political and management reforms in the field of environmental protection are interrelated and mutually reinforcing constituents of a unified process. To ensure further gradual integration of economic arrangements for environmental management in the Republic of Uzbekistan, improvement of economic environmental management methods and to ensure comprehensive approach to environmental security issues, the Government of the country approved a number of Resolutions, the majority of which provides for the development of the system of payments for use of natural resources (<http://uznature.uz/ru/node/692>).

Until the end of 2017, the Environmental Action Plan (2013-2017) was implemented in Uzbekistan (<http://lex.uz/docs/2174871>) being the main instrument used for planning of public policy in this field. The plan was developed for 5-year period and included provisions of strategic documents on environmental planning which required updating of economic valuation of ecosystem services. The main provision for the achievement of the goals set in the plan is “the optimal combination of macroeconomic planning and environmental policy which is gradually implemented in close integration with the policy in social and other spheres...”. The plan was aimed at the implementation of environmental protection activities within the frameworks of economic reforms in Uzbekistan and to the creation of conditions for social and economic development of the country. Inclusion of environmental protection activities in the development plans for economic sectors should be supported by inclusion of alternative forms of

environmental management which have economic justification and benefit when certain ES are used.

Economic arrangements for environmental protection in the Republic of Uzbekistan provide for:

- collection of fees for special use of natural resources, for pollution of natural environment (including waste disposal) and for other types of negative impact on it;
- tax, credit and other privileges provided to enterprises, institutions, organizations and individual persons for introduction of low-waste and resource-saving technologies as well as for performance of activity facilitating environmental protection and environmental restoration;
- introduction of special taxation for enterprises, institutions and organizations for application of environmentally unsound technologies and performance of other environmentally unfriendly activity.

To ensure further transition to economic methods of management of environmental protection activity, and for gradual introduction of economic arrangements into environmental management, the Country approved regulations establishing a unified procedure of calculation and payment of fees for emission (discharge) of polluting substances into the natural environment and disposal of waste in the territory of the country. These fees are transferred to the budget and the Fund of ecology, environmental protection and waste management. The application of economic arrangements is based on the principle “pollutant - pays”, “user of natural resources - pays”. The procedure of payment of fees for pollution of natural environment and disposal of waste in the territory of the Republic of Uzbekistan is governed by a number of regulatory acts; main ones include:

- The Law of the Republic of Uzbekistan “On nature protection”;
- The Law of the Republic of Uzbekistan “On water and water use”;
- The Law of the Republic of Uzbekistan “On air protection”;
- The Law of the Republic of Uzbekistan “On waste”;
- the Resolution of the Cabinet of Ministers “On improvement of payments for pollution of natural environment and disposal of waste in the territory of the Republic of Uzbekistan”;
- The Resolution of the Cabinet of Ministers “On improvement of payment system for special use of natural resources”

In 2003, the Resolution of the Cabinet of Ministers of the Republic of Uzbekistan” No. 1999 dated May 1, 2003 “On improvement of payments for pollution of natural environment and disposal of waste in the territory of the Republic of Uzbekistan” introduced the compensation fees for pollution of natural environment and disposal of waste in the territory of the Republic of Uzbekistan for allowable and excessive emissions (<http://lex.uz/acts/244728>).

Currently, the Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 15 dated February 6, 2006 “On improvement of payment system for special use of natural resources” provides for the differential ratio used towards the increase of payment by 10 times if the user of natural resources exceeds established limits for emissions, discharge of polluting substances and volumes for waste disposal. Conversely, if the user of natural resources reduces the volumes of emissions, discharge of polluting substances and waste disposal below established limits, the ratio decreasing the amount of payment by 10 times is applied (<http://lex.uz/docs/973530>).

To develop the principle “pollutant - pays”, reduce financial pressure on community facilities and to revitalize the natural environment, the Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 11 dated 03.02.2010 “On additional measures for improvement of environmental protection activity in the system of utility services” was approved (<http://lex.uz/docs/1589683>).

Considering that the regulatory legal acts regulating economic mechanisms for environmental management need to be revised and updated in accordance with today's requirements, as well as in order to further improve economic mechanisms for environmental

protection, Resolution of the Cabinet of Ministers No. 820 "On measures to further improve economic mechanisms for the protection of nature "dated October 11, 2018, approved the" Regulations on the procedure for applying compensation payments for pollution environment and waste disposal on the territory of the Republic of Uzbekistan" (<http://lex.uz/ru/docs/3971360?twolang=true>).

The purpose of the Law "On protected natural areas" is governing relations in the organization, protection and use of protected natural areas (<http://www.lex.uz/acts/415228>). Identification of protected natural areas as plots of land and (or) water bodies of priority environmental, scientific, cultural, esthetic, recreational and sanitary importance assumes their full or partial, permanent or temporary withdrawal from economic use. Hence it is important to introduce corresponding economic incentives or forms of management which provide environmentally-friendly activity, for funding these territories. Environmental aspect of these forms of management assumes conservation, reproduction and restoration of natural facilities and complexes in protected natural areas. This allows for the efficient integration of biodiversity conservation interests into social and economic development of the country ensuring support or even increase of ES flow for development of tourism and improvement of general attractiveness of PNA. However, it should be noted, that it refers to all PNA except for state reserves, protected areas of national natural parks and biosphere reserves where any economic activity is prohibited by law.

An example of valuation approach to economic use of BD is the established quota system for use of biological resources. It is one of components of integration of BD components, payments and compensations into economic arrangements for regulating sustainable use of biological resources. In this way, according to the Laws "On protection of fauna" and "On protection of flora", special use of animal and plant communities is performed for a fee based on issued permits. Permits for special use of fauna objects are issued by the SCEEP within the limits of approved annual quotas for catching wild animals. Permits for special use of flora objects are issued: by the SCEEP - for all species of wild plants not listed in the Red Book of the Republic of Uzbekistan growing on lands beyond state forestforest as well as for rare and threatened species of wild plans listed in the Red Book growing on whole territory of the Country, and by the State Committee on Forestry - for all species of wild plants not listed in the Red Book growing on lands of the state forestforest. The Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 290 dated 20.10.2014 "On regulation of the use of biological resources and on procedure of authorization procedures in the sphere of environmental management" approved the Regulations governing the procedure of use and authorization procedures in the sphere of management of animal and plant communities to streamline the use of these objects (<http://lex.uz/docs/2485767>). These regulations aim to approve the amount of payments for using flora objects and catching wild animals and for calculation of the amount of damage inflicted by violation of established procedure of use of animal and plant communities. According to these Regulations, based on the conclusion of the Inter-agency committee on use of biological resources and the Academy of Sciences of the Republic of Uzbekistan, annual quotas for catching game animals and procurement of wild and food plants are approved and distributed between users of natural resources.

Further development and introduction of national accounting of reserves of natural resources related to BD, for example, forests, fish reserves, will accelerate the achievement of NT 3. In this way, the Decree of the President of the Republic of Uzbekistan No. 5041 dated May 11, 2017 "On creation of the State Committee of the Republic of Uzbekistan on Forestry" defines accurate accounting and study of the forestforest, flora and fauna among main targets and directions of activity of the State Committee on Forestry.

In general, during the period under review, whole new economic instruments for BD management have not been introduced, but rules which establish the procedure for distribution of incoming payments and rules for calculation taking into account incentives and additional requirements for existing instruments have been changed.

National Target 4: Development and integration into state Environmental Impact Assessment (EIA) procedure of arrangements to evaluate impact of economic and other activities on biodiversity.

Currently, economic growth in Uzbekistan is ensured by the implementation of market reforms and attracting foreign investments, structural transformations in the economy, modernization and updating of production, creation of export-oriented production, development of small business and private enterprises in the industry, farming and service sector, improvement of monetary and fiscal policies. To achieve economic growth, the Uzbekistan actively uses its natural resources, including biodiversity and ecosystem services. Taking this into account, assessment of environmental impact of economic and other activities is relevant.

The Environmental impact assessment (EIA) is a safeguard instrument primarily intended to study environmental implications. This is completed through systemic identification, forecasting and assessment, mitigation and management of implications resulted from proposed activity and its viable alternatives before making decision and allocation of resources for this activity. The other purpose of EIA is to improve the project itself by the identification and mitigation of probable significant impacts.

The first national biodiversity strategy (1998) defined the development of arrangements for sustainable use of biodiversity as one of the priority directions. Moreover, it was planned to assess the influence of current and future recreational needs on biodiversity and to determine methods and arrangements for maximization of benefits and minimization of damage. To achieve this target, it was planned to perform an assessment of possible impacts of recreational activities on biological and landscape diversity, especially on PNA. To identify methods to limit recreational load on those territories which have particular value and are highly sensitive to various influences, and to develop recommendations on allowable level of recreational use for different natural areas and landscapes, including PNA.

Since 1998, a number of changes and amendments has been introduced into the environmental protection legislation, however, there are still some gaps, in particular, ones related to the application of EIA projects for economic and other activity which adversely affects biodiversity. Taking it into account, in the development of the updated NBSAP following the consultative process with stakeholders and based on the analysis of threats and causes it was recognized that one of priorities in the field of conservation and sustainable use of biodiversity is the creation of arrangements for assessment of the impact of economic and other activity on it.

Achievement of NT 4 promotes the balance between industry, infrastructure, development of cities and support of key ecosystems and BD values by the **prevention of impacts, mitigation of implications and compensation of losses**. Desire to find the balance between direct economic benefit and biodiversity value should become the key principle of any development. Any activity affecting biodiversity condition, natural facilities and complexes should be performed taking into account prevention and/or mitigation of adverse impact. Where necessary, measures for restoration of natural facilities and compensation of biodiversity losses should be taken. It is required, that optimal decisions based on biodiversity conservation issues are made at all levels and in all sectors.

Achievement of NT 4 suggests identifying and using arrangements which allow economic sectors to prevent (avoid), mitigate (minimize), restore and compensate any their impact on biodiversity. During implementation of any project which adversely affect the biodiversity, measures for prevention, mitigation of the impact, restoration of natural facilities and compensation of inevitable biodiversity losses should be taken.

NT 4 was developed following the consultative process with participation of official representatives of relevant ministries and agencies, academic community, representatives of HEIs, environmental NGO and economic sector representatives, taking into account priority issues in the sphere of biodiversity, social and economic conditions in the country and existing capacity. Corresponding indicators were developed to assess the progress in the achievement of

results of the target. Achievement of NT 4 relates to the national level, but the results will also be relevant at the national, regional and international levels.

The sources of information for the analysis of measures taken for implementing NT 4, assessment of their effectiveness and degree of progress were effective legal acts and draft resolutions being in the process of approval, materials of completed and effective national and international projects in the field of biodiversity, departmental materials of involved organizations, international experience and expert reviews.

National Target on the development and integration into state Environmental Impact Assessment (EIA) procedure of arrangements to evaluate impact of economic and other activities on biodiversity is not directly related to any of the Global Aichi Targets, but there is indirect relation with targets 3, 4, 5, 7 and 8 (Table 5). This interrelation is driven by the relevance of performance of procedures related to the obligatory assessment of adverse impact on biodiversity during economic development, creation and application of compensatory arrangements as an instrument for conservation and sustainable use of biodiversity. Application of arrangements for assessment of the impact of economic and other activity on biodiversity will allow for the avoidance, mitigation and compensation of adverse impact which, in turn, will reduce the pressure on biodiversity, slow down the rate of loss of all natural habitats and enable the development and use of positive incentives for conservation and sustainable use of biodiversity components.

Table 5. Correlation between the National target 4 and Global Aichi Goals and targets

National strategic goals / targets	Global Aichi Goals / targets
Indirect correlation	
STRATEGIC GOAL I. <i>Mainstreaming biodiversity across the state administration and governance bodies and society for sustainable development of the country</i>	AICHI STRATEGIC GOAL A: <i>Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society</i>
NT 4: Development and integration into state Environmental Impact Assessment (EIA) procedure of arrangements to evaluate impact of economic and other activities on biodiversity.	Aichi target 3: By 2020, at the latest, incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio economic conditions.
	Aichi target 4: By 2020, at the latest, governments, business and stakeholders at all levels have taken measures to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits.
	Aichi target 5: By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced;
	Aichi target 7: By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity;
	Aichi target 8: By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.

The EIA has been implemented in Uzbekistan since 1993. In the year of 2000, the Law “On Environmental Impact Assessment” (<http://www.lex.uz/acts/9760>), containing requirements for submission of EIA materials for state environmental impact assessment (article 15) was approved. Currently, issues related to the performance of the state environmental impact assessment are governed by the Law of the Republic of Uzbekistan “On Environmental Impact Assessment”, by the Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 949 “On Approval of the Regulation on State Ecological Expertise” dated November 22, 2018 (<http://lex.uz/ru/pdfs/4072893>). The Law “On Environmental Impact Assessment” governs public relations in the field of environmental assessment to prevent potential adverse impacts of economic and other activity on environment, living and health of population. According to the Resolution the specially authorized state body in the field of environmental impact assessment is the State Committee for Ecology and Environment Protection. The state environmental impact assessment is performed by specialized expert divisions of the SCEEP. The purpose of the environmental impact assessment is the identification:

- compliance with environmental requirements; predicted economic and other activities at the stages preceding the decision to implement it;
- of the level of environmental hazard of planned and performed economic and other activity which may impact or adversely affect the condition of the environment and health of citizens;
- of sufficiency and validity of stipulated measures for environmental protection and rational use of natural resources (<http://davekoekspertiza.uz/ru/expertise>).

The Regulation on state environmental impact assessment defines the List of types of activity subject to state environmental impact assessment. Objects in the List are divided into four categories by the degree of impact on the environment:

- the first category includes types of activity with high risk of impact;
- the second category includes types of activity with average risk;
- the third category includes types of activity with low risk;
- the fourth category includes types of activity with local impact.

The EIA procedure in Uzbekistan comprises three stages:

- Draft environmental impact statement (DEIS, it is prepared at the stage of concept development);
- Environmental impact statement (EIS);
- Environmental consequences statement (ECS, final stage, it is developed before commissioning of the facility).

Following the results of review of EIA material by specialized expert divisions of the SCEEP, a conclusion is developed. It contains all required information on the object of assessment, processes, organization of works and provided measures for environmental protection, adverse implications related to the activity (implementation) of the object, and conclusions on admissibility (positive conclusion) or inadmissibility (negative conclusion) of implementation of facility subject to expertise.

The Resolution of the Cabinet of Ministers of the Republic of Uzbekistan dated January 21, 2014 No. 14 approved “The Regulation on procedure of development and approval of environmental standardization projects” in relation to environmental impact by organizations and private entrepreneurs performing manufacturing of products and provision of services which imply generation of emissions, discharge of polluting substances and waste into the environment (<http://lex.uz/docs/2325223>). The Regulation was approved to streamline the system of environmental standardization by ensuring a unified approach to the development, registration and approval of draft environmental regulations. According to the Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 949, the “Provision on the procedure for the development and coordination of environmental regulation projects” dated November 22, 2018, made the appropriate changes and additions (<http://lex.uz/ru/pdfs/4072893>).

Observations of changes in the environment under the influence of economic and other activity is implemented by environmental control. To regulate relations in the field of environmental control, which main targets include, in particular, assessment of compliance of planned or performed economic or other activity with environmental requirements, the Law “On environmental control” (<http://lex.uz/docs/2304949>) was approved in 2013. To define the procedure of implementation of environmental control and legal frameworks for activity of state authorities implementing this control, the Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 216 dated 05.08.2014 “On approval of the Regulation on procedure of implementation of the state environmental control” (<http://lex.uz/docs/2443089>) was approved.

The existing EIA procedure in Uzbekistan works relatively efficiently, however, regulations on state environmental impact assessment have certain gaps reflected in the following;

1. Submitted EIA materials do not provide for the hierarchy of environmental protection requirements in its content. Namely, environmental protection activities should be aimed, at first, to prevention, and then on mitigation of adverse impact on natural facilities, and where it is impossible, restoration of natural facilities including rehabilitation of vegetation and fauna in other place (compensation of biodiversity loss).

2. Requirements in EIA documents do not cover all environmental protection requirements which doesn't ensure making environmentally-oriented decisions in full. In particular, requirements to EIA materials are focused on emissions and discharge of polluting substances, waste, and they do not include specific issues related to impact on biodiversity.

3. Alternative solutions for environmental issues are considered superficially, which doesn't facilitate making the most optimal decision in terms of both, environment and economical savings of the owner of EIA object.

4. A serious problem is the implementation of the conclusions of the state environmental impact assessment. In practice, not all solutions for environmental issues are accomplished. That is why, it is proposed to monitor the execution of EIA conclusions throughout the implementation of the project.

5. Only two paragraphs are dedicated to the Environmental Impact Assessment in the Regulation on Environmental Impact Assessment of the Republic of Uzbekistan and they do not determine in full requirements to the environmental impact assessment (EIA) and most importantly, they do not establish the procedure for preparation of materials for it. Absence of these norms leads, above all, to ambiguity and subjective interpretation of other general requirements.

Considering existing gaps in regulations on the state environmental impact assessment and the fact, that since approval of the Law “On Environmental Impact Assessment”, more than 17 years have passed, and taking into account economic and social reforms implemented in the country and changed requirements of international financial institutions for the natural environmental protection, the need in further improvement of arrangements for the assessment of the impact of economic and other activity on biodiversity has emerged.

STRATEGIC GOAL II. *Reducing the direct pressures on biodiversity and sustainable use of its components in productive landscapes*

National Target 5: *Development and commencement of implementation of the set of measures to reduce the rate of degradation and fragmentation of the most vulnerable natural ecosystems*

Maintenance and recovery of natural ecosystems and key components in productive landscapes were recognized as a necessary condition for continuous availability of ecosystem services required for food security, health, economic development of the country, and mitigation of possible effects of climate change. Therefore NT 5 was devised for development of measures to lower the rates of degradation and fragmentation of vulnerable natural ecosystems. Based on

its own experience, Uzbekistan recognizes the need of a sustainable use of natural resources and maintaining the balance between the preservation of the ecological balance and economy related goals.

NT 5 was developed and formulated following the consultations attended by official representatives of relevant ministries and government departments, various sectors of the economy, the academic community, higher education institutions, and environmental NGOs. Appropriate indicators were developed to measure the progress in the achievement of the target (Table 1). The achievement of NT 5 is a national goal, the results of which will be relevant on the national, regional and international levels.

Current legal acts and the departmental data from the State Committee on Forestry of the Republic of Uzbekistan served as information sources for the analysis of measures taken to achieve NT 5, and the assessment of their effectiveness and progress made.

According to the 5th National Report to CBD, the priorities in terms of conservation of biodiversity in Uzbekistan were, first of all, forest ecosystems and ecosystems that are used as pastures and are being degraded by unsustainable use.

Global Strategic Goal B and Aichi Targets 5, 7 and 15 focus on improving the situation with degradation and fragmentation of natural habitats including forests, which indicates the critical importance of this goal for conservation and sustainable use of biological diversity and contributes to mitigation of the impact of climate change, adaptation of ecosystems to such impact, and combating desertification (Table 6). That indirect correlation exists since the set of measures for reduction of ecosystem degradation rates facilitates provision of critical ecosystem services including those involving water and facilitating health protection.

Table 6. Connection of National Target 5 with Global Aichi Goals and Targets regarding land degradation

National strategic goals / targets	Global Aichi Goals and Targets
Direct correlation	
STRATEGIC GOAL II. Reducing the direct pressures on biodiversity and sustainable use of its components in productive landscapes AICHI STRATEGIC GOAL B: Reduce the direct pressures on biodiversity and promote sustainable use	
NT 5. Development and commencement of implementation of the set of measures to reduce the rate of degradation and fragmentation of the most vulnerable natural ecosystems	Aichi Target 5: By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced; Aichi Target 7: By 2020, areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity; Aichi Target 15: By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and recovery, including recovery of at least 15 percent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.
Indirect correlation	
NT 5. Development and commencement of implementation of the set of measures to reduce the rate of degradation and fragmentation of the most vulnerable natural ecosystems	Aichi Target 4: By 2020, at the latest, governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits; Aichi target 14: By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.

Uzbekistan is a forest-poor country; however, forest ecosystems play an important role in the economy and in terms of environment protection. The land of the state forestforest, as of 01.01.2018, occupied 11.2 million hectares which is 25.2% of the total area of Uzbekistan, with 3.26 million hectares covered with forests (forest rate: 7.3%). The largest areas of the forestforestare located in the Republic of Karakalpakstan, Bukhara province, Navoiy province and Kashkadarya province, while the smallest areas thereof still remain in Samarkand province, Syrdarya province and the Fergana Valley.

Forests of Uzbekistan vary considerably in terms of their natural composition, productivity and functions. They are limited to natural zones and mostly located in sand deserts (9.53 million hectares. - 84.6% of the total state forestforest area), mountainous areas (1.12 million hectares - 14.1% of the state forestforest), flood-plain areas (0.11 million hectares - 1% of the state forestforest), and valley areas (0.26 million hectares - 0.2% of the state forestforest).

The largest dispersed areas of tugay (riparian) forest ecosystems occupy some 30,000 hectares in the Republic of Karakalpakstan, comprising about 10% of the initial tugay forests in the delta of river Amudarya. These areas also account for 75% of all remaining tugay forests in Uzbekistan and 20% of tugay forests of the Central Asia. The shrinking of the tugay forest areas reduces the number of rare and endangered species that depend on those ecosystems. At present, there remain small narrow strips of tugay forests as well as individual tugay forest areas along river valleys, which are important ecological corridors for the wildlife.

The functions of such forests are mostly ecological (soil protection, water protection, sanitation and hygiene, health, and recreation) and socio-economic. In the dry continental climate, the forests protect river basins, provide protection from wind and dust, and ensure conservation of biological diversity. Non-timber forest products contribute to livelihoods of rural population, e.g. pistachio, almonds, nuts, fruit, berries, mushrooms and medicinal plants. Commercial use of timber forest resources is prohibited in Uzbekistan due to the small size of forest areas and the importance of their protective and ecological functions. Forests are natural long-term absorbers of carbon dioxide. The technical potential for carbon dioxide emissions in Uzbekistan is estimated at 2.53 million tons a year, of which 0.58 million tons result from forestation activities on lands of the State ForestForest and 1.95 million tons are generated on agricultural lands by potential deposition of carbon dioxide by protective planted forests. That potential opens up the door to explore opportunities that provide a value to standing forest and ecosystems such as the Reducing emissions from deforestation and forest degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries or REDD+. It has the objective of mitigating climate change through reducing net emissions of greenhouse gases through enhanced forest management in developing countries. The government should take active action to prepare funding proposals for financing adaptation mitigation activities in biodiversity conservation such as the ones promoted by REDD+ and other international initiatives

Besides, the reduction of areas covered with forests caused by unsustainable exploitation thereof is a factor in the low forest rate. The most powerful negative factor affecting the forest resources is excessive and unregulated grazing which leads to high death rates of sylvula, and the felling of trees and bushes for firewood. With the destruction of forest, habitats of wild animals disappear automatically.

On the other hand, the country has a significant potential for growing local types of wood in suitable areas in order to meet its demand for timber. In Uzbekistan, the area covered with forests is 3.26 million hectares.

The deforestation process is more pronounced in submontane and mountain districts of Tashkent province, Surkhandarya province, Samarkand province and the Fergana Valley, mostly due to road construction without local geotechnical conditions taken into account, the ploughing of steep slopes, and excessive grazing by livestock. Deforestation increases landslide and mudflow processes and aggravates erosion processes causing wash and degradation of topsoil.

Another significant impact on natural ecosystems is livestock husbandry which plays an important role in the country's economy and accounts for 40% of gross agricultural production in Uzbekistan. This increases pressure on the grazing land within the state forestforest (Table 7). Unsustainable rotation in high-mountain pastures is degrading the pastures. Unused pastures become overgrown.

Climate change intensifies land degradation and desertification processes and thus affects BD. These processes are the most intense in the Aral Sea region, the Ustyurt Plateau, the Kyzylkum Desert, and in mountain woodlands and submontane areas.

Table 7. Grazing land of the forestforest in the system of the State Committee on Forestry of the Republic of Uzbekistan

Administrative areas / regions	As of 01.01.2018					
	total area of the state forestforest (thousand hectares)	% of the total area of Uzbekistan	covered with forests		non covered with forests	
			total (thousand hectares)	forest rate (%)	total (thousand hectares)	including grazing land (thousand hectares)
Republic of Karakalpakstan	5752.7	51.0	1100.7	6.6	4133.1	689.3
Andijan province	8.0	0.07	1.7	0.3	6.0	2.0
Bukhara province	623.9	5.5	335.8	8.3	223.8	165.2
Jizzakh province	291.0	2.6	117.8	5.6	112.5	82.9
Kashkadarya province	330.2	2.9	132.0	4.6	160.7	114.0
Navoiy province	3098.2	27.5	1293.9	11.7	1549.8	1500.0
Namangan province	126.7	1.1	16.0	2.2	108.8	87.3
Samarkand province	57.9	0.5	9.9	0.6	43.2	28.3
Surkhandarya province	325.0	2.9	140.4	7.0	141.3	69.0
Syrdarya province	8.8	0.08	0.3	0.07	6.5	1.2
Tashkent province	538.0	4.8	81.8	5.4	419.5	188.7
Fergana province	15.9	0.1	5.6	0.8	8.0	1.1
Khorezm province	87.9	0.8	31.6	5.2	55.0	50.9
Uzbekistan total	11264.2	100.0	3267.5	7.3	6968.2	2979.9

Livestock husbandry is the major source of income and an important industry for investment in rural areas. The impeding factor is lack of a forage security mechanism for livestock owned by the population, low yield of pastures, and the increasing degradation thereof.

Lands of the fund which are not covered with forests (mostly deserts or submontane areas) are mostly used as pastures, which has caused a number of problems related to land degradation, such as:

- widespread prevalence and acceleration of issues that add to erosion including dune development in desert/semi-desert areas, sand/dust storms, quicksands, and soil wash and scouring in mountain and submontane areas;
- declining productivity, and degradation of pastures caused by excessive grazing by livestock;
- deforestation and deterioration of access to forest products caused by felling for firewood and to clear land for pasture;
- contraction of habitats and decline of all wild animal populations, especially rare and endangered species;
- reducing carbon sequestration level (in forests and on meadows);

- hydrological changes that increase the number and gravity of floods, landslides and similar disasters.

Livestock husbandry is the greatest threat to forest recovery both inside and outside the lands of the state forestforest. Forestry and pasture lands are also closely connected to other sectors. For example, extensive pastures depend on irrigation based agriculture in terms of fodder, and the current shortage thereof is the main limiting factor that leads to excessive grazing by livestock in autumn, winter and early spring. There is a correlation between forestry and the energy needs of the rural population in arid areas with regard to firewood production (for heating and cooking).

The state governance of protection, growing, reproduction, recovery, and boosting the productivity and use of forests is provided by the Cabinet of Ministers of the Republic of Uzbekistan, the State Committee on Forestry of the Republic of Uzbekistan, the State Committee of the Republic of Uzbekistan for Ecology and Environmental Protection, and local authorities within their competence.

The State Committee on Forestry of the Republic of Uzbekistan and the territorial offices thereof are the state forestry authorities.

Institutional control of security, protection, cultivation, reproduction, recovery, productivity improvement and use of forests is provided by the State Committee on Forestry of the Republic of Uzbekistan.

In-process control of security, protection, cultivation, reproduction, recovery, productivity improvement and use of forests is provided by state forestry stations and forest hunting facilities in their respective territories.

Public control of security, protection, cultivation, reproduction, recovery, productivity improvement and use of forests is provided by citizens' self-government bodies, NGOs and the citizens.

One of the basic tasks for forestry authorities is creation, reproduction, security and protection of forests from fire, pests and disease, illegal felling, and other violations of forest law.

Moreover, the State Committee on Forestry of the Republic of Uzbekistan is developing standards and time limits for the use of grazing land of the state forestforest.

There is a total of 109 business entities within the structure of the State Committee on Forestry of the Republic of Uzbekistan, including: 64 state-owned forestry stations, 5 forest hunting facilities, 5 national reserves (including 1 biosphere reserve), 3 national natural parks, 1 biosphere reserve, 8 specialized national forestry stations, 4 forest experimental research stations, 4 production facilities, 2 committees, 8 department administrations, and 5 national level institutions.

National Target 6: Ensuring sustainable use of biodiversity in water bodies within improved legal and methodological frameworks

Implementation of NT 6 requires legislation improvement as well as research and monitoring to ensure sustainable use of fish stocks.

NT 6 was developed and formulated following the consultations attended by official representatives of relevant ministries and government departments, various sectors of the economy, the academic community, higher education institutions, and environmental NGOs. Appropriate indicators were developed to measure the progress in the achievement of the target (Table 1). The achievement of NT 6 is a national level task, the results of which will be relevant at the national and international levels.

Current legal acts and the departmental data from the Biological Inspectorate served as information sources for the analysis of measures taken to achieve NT 5, the assessment of their effectiveness and progress.

NT 6 is directly related to Global Aichi Target 6 (Table 8) since the national fishing contributes to the world's economy and food production. Methods to control commercial fishing

are to be applied on a legal framework and take into account the impact of the use of fish stocks on ecosystem services.

Table 8. Connection of National Target 6 with Global Aichi Goals and Targets concerning sustainable use of fish stocks

National strategic goals / targets	Global Aichi Goals and Targets
Direct correlation	
STRATEGIC GOAL II. Reducing the direct pressures on biodiversity and sustainable use of its components in productive landscapes AICHI STRATEGIC GOAL B: Reduce the direct pressures on biodiversity and promote sustainable use	
NT 5. NT 6: Ensuring sustainable use of biodiversity in water bodies within improved legal and methodological frameworks	Aichi Target 6: By 2020, all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.

Uzbekistan has significant water resources which allow fishing industry development. Lakes and reservoirs of Uzbekistan that could be used for fishery occupy about 749 thousand hectares. There are over 500 lakes in Uzbekistan. These are mostly small water bodies occupying less than 100 hectares. 32 lakes have an area of over 1,000 hectares each. The origins thereof vary. Mountain lakes are normally of landslide or glacial-moraine origin while plain-land lakes are flood-plain, delta or end lakes which are now mostly fed with drainage water. The largest lake system in Uzbekistan is the *Aydar Kul – Arnasay* system taking up about 340 thousand hectares, its volume being about 37 km³, which is more than all the reservoirs have. At present, there are over 50 operating reservoirs in Uzbekistan, which are mostly used for irrigation purposes. Their total design volume is 18.8 km³, the useful volume being 14.8 km³. The Tuyamuyun, Tudakul, Kattagurgan, Sardoba, and Charvak reservoirs are the largest. They were built to regulate the river flow during the year, accumulate water for the irrigation period, and prevent extreme flooding. The reservoirs are being operated without any regard for the interests of the fish industry.

Fishing has been practiced in Uzbekistan since ancient times. In the first half of the XXth century, the main fishing source was the Aral Sea. The amount of fish caught in natural water bodies started declining in the 1960's due to the shrinking of the Aral Sea, while pond fish farming started developing at the same time. After the degradation of the Aral Sea, fishing mostly occurs on lakes and, to a small degree, in reservoirs since the latter are operated for irrigation purposes with the water discharged to the dead level in some years. It should be noted that nearly all lakes where there is fishing are artificial lakes fed by collector and drainage water.

The total area of fishery water bodies in Uzbekistan is 749.0 thousand hectares, of which lakes account for 602.5 thousand hectares and reservoirs – for over 146.5 thousand hectares.

By virtue of relevant resolutions issued by the Cabinet of Ministers of the Republic of Uzbekistan, most of the natural fishery water bodies were dedicated to commercial fishing and development of the fishing industry.

Lakes Zhaltyrbas, Sudochye and Rybachye that collectively occupy 39.3 thousand hectares in the Republic of Karakalpakstan were put under the jurisdiction of the State Unitary Enterprise Muinak Akva Sanoat.

The Aydar Kul - Arnasay lake system with the area of about 337 thousand hectares located in Jizzakh province and Navoiy province was put under the State Unitary Enterprise “Aydar Kul - Arnasay Lake System Directorate”.

Uzbekbaliksanoat Association was put in charge of 199.7 thousand hectares of the country's water bodies other than those referred to above.

All in all, 576 thousand hectares of water bodies were transferred to these three organizations for dedicated use.

Before 2017, commercial fishing was taking place in water bodies of the Republic of Karakalpakstan and 7 provinces: Bukhara, Navoiy, Jizzakh province, Kashkadarya, Surkhandarya, Samarkand and Khorezm provinces. Most of the fish harvest came from water bodies of the Republic of Karakalpakstan and the Aydar Kul - Arnasay lake system located in Jizzakh and Navoiy provinces, which accounted for over 60% of the fish caught in Uzbekistan.

In 2014, there were 319 operating fisheries engaged in commercial fishing, with 415.3 thousand hectares of natural water bodies leased to them.

Before 2017, assigning natural water bodies to fishing companies and commercial fishing were regulated by Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 350 dated 13.08.2003 “On activities for further demonopolization and privatization of fishing industry”. According to the resolution:

- natural fishery water bodies are to be assigned and leased to fishing companies via a bid procedure for at least 10 years;
- a lease agreement for sections of natural water bodies is entered into between the Council of Ministers of the Republic of Karakalpakstan, provincial *khokimiyats* and a fishing company that won the tender;
- fishing companies may catch fish in natural water bodies quota free, subject to the actual biological resources and demand, and with regard to preservation of productivity and reproduction of fish stocks on a proper level.

The Council of Ministers of the Republic of Karakalpakstan and provincial *khokimiyats* signed agreements with tender winning lessee companies, assigning the water bodies (parts thereof) to such companies and issuing commercial fishing permits, and were obligated to enforce the lessees' contractual obligations.

Resolution No. 124 dated March 7, 2017 of the Cabinet of Ministers of the Republic of Uzbekistan “On organizational activities to ensure rational use of biological resources of the Aydar Kul – Arnasay lake system” approved the Regulation for the Procedure for Providing Sections of the *Aydar Kul – Arnasay Lake System* to Fisheries, and Commercial Fishing.

According to said Regulation, a section of a water body is provided on the basis of the decision of the tender evaluation committee for fisheries' bids. The tenders are organized and run by the State Unitary Enterprise “Aydar Kul - Arnasay Lake System Directorate”. An agreement is concluded between the Directorate and the fishing company for a term of at least 10 years.

The Resolution of the Cabinet of Ministers of the Republic of Uzbekistan dated August 7, 2017 “On activities for providing lease of sections of natural water bodies to fisheries and creating a fish farming development fund” approved the Regulation for Leasing Sections of Natural Water Bodies to Fisheries for Commercial Fishing, the Calculation and Collection of Rent for the Use of Natural Water Bodies.

According to said Regulation, as of January 1, 2018, a lease agreement for a part of a fishery water body to be used for commercial fishing is to be concluded between the Uzbekbaliksanoat Association and the fishery enterprise that won the tender.

Starting from 2018, there has been commercial fishing in all regions of Uzbekistan save for Andijan province. At present, 247 companies are fishing in Uzbekistan, which have the lease of 385.1 thousand hectares of water bodies, with 80 of those companies fishing in the *Aydar Kul – Arnasay* lake system on 183.2 thousand hectares leased to them.

Leased commercial fishing areas are shrinking due to high rent and the resulting lack of profit to fishing companies. Moreover, 23.25 thousand hectares of lake Dengiz Kul are not fit for fishing on account of high mineralization and were never leased out.

No commercial fishing occurs in reservoirs such as the Charvak reservoir in Tashkent province and the Kuyumazar reservoir in Navoiy province, which are being used as drinking water sources.

After the Aral Sea crisis, fishing is mostly done on lakes and in reservoirs. The ecological condition of natural water bodies is the primary factor affecting fish stocks. For example, nearly all lakes used for commercial fishing are drainless end water bodies which are mostly fed with collector and drainage water. One example of that is the lakes of Bukhara province, among which the highest mineralization has been observed in Ayagagytma Lake – over 9 g/l, and Dengiz Kul Lake – over 20 g/l, which makes the lakes either partly or totally unsuitable for reproduction of commercial fishery species.

The mineralization of the *Aydar Kul – Arnasay* lake system is rising as well. It has doubled over the recent years, reaching 7 to 11 g/l. affecting the natural reproduction of fish stocks.

STRATEGIC GOAL III. *Developing the system of protected natural areas to conserve biodiversity and increase the scope of benefits from ecosystem services*

National Target 7: *Expansion of total area of protected natural areas in the country for creation of national environmental network (PNA of different categories), ensuring their efficient management*

One important condition for the development of Uzbekistan is the creation of a full-fledged network of protected natural areas (PNA) on the basis of a rich legacy and universal values, and achievements of contemporary culture, economics, science, engineering and technology for conservation of biological diversity. Implementation of NT 7 requires further expansion and improved management of the PNA system to conserve key natural habitats, areas with a high level of endemism, and rare and endangered species including agrobiodiversity wild relatives.

The main threats of natural landscapes land use change results from direct and/or indirect anthropogenic impacts on biodiversity. Anthropogenic impact factors caused a significant reduction of natural habitats and the populations of a large number of fauna and flora species.

In Uzbekistan, the biodiversity is fully protected in PNAs. In 1998, thanks to the preparation of NBSAP, Uzbekistan made its first analysis of the territorial form of nature protection. The analysis revealed that the Law of the Republic of Uzbekistan “On especially protected natural areas” was focused on tough protection as was the case in many CIS countries at the time. It was noted that such orientation in the protection may ensure BD conservation in long term. PNA categories with absolute protection cannot be massive for social and economic reasons. Moreover, the Law identified PNA categories with an indirect relevance to conservation of biodiversity (zoos, arboretum parks, botanical gardens), which are engaged in protecting exotic animals and plants they keep and are mostly operating as exhibitions. However, this Law was only effective till 2004.

On December 3, 2004, the Oliy Majlis of the Republic of Uzbekistan passed the new Law “On protected natural areas”. According to Article 5 of the Law, there are three categories of PNAs defined by their purpose and regime:

- state reserves;
- comprehensive (landscape) wildlife sanctuaries;
- natural parks (national parks, local natural parks);
- state national natural monuments;
- areas for conservation, reproduction and recovery of individual natural sites and complexes (wildlife sanctuaries, nurseries, fishery zones);

- protected landscapes (resort zones, recreation zones, water protection zones, coastline areas, water body sanitary zones, surface and subsurface water generation zones);
- areas for management of individual natural resources (forestry stations, hunting facilities).

One can say that the main achievements of the new law are the introduction of the first private PNA institution in CIS countries and the focus on the PNA category system of the International Union for Conservation of Nature (IUCN). On account of that, the Law included some of the forestry activities consistent with IUCN Category VI, which occupy close to a quarter of Uzbekistan's territory and play an important role in the conservation of biodiversity of the country. This is specially important to fulfill Aichi targets as corresponding target 11 states that at least 17 percent of terrestrial and inland areas should be under protection by 2020. Though a better level of protection is needed and the country should aim for the 10 percent of coastal and maritime protected areas as well.

The new PNA classification reflects the IUCN recommendations and will enable a unified PNA ecological network with various regimes which would take into account both environmental and economic interests. New PNA categories and types were introduced as well such as comprehensive (landscape) wildlife sanctuaries, resource management PNA, and natural nurseries. These categories suggest the creation of PNA types consistent with the tasks of protection of natural sites and landscape complexes, and interests of the population and business entities based in such areas. This will allow expanding PNAs and bringing Uzbekistan closer to the leading countries in this respect.

Making the concept of “biosphere reserves” a separate item with the establishment procedure and the regime determined by law for the first time and in line with the UNESCO requirements for biosphere reserves is of special significance. This will allow including biosphere reserves in the international network to present unique ecosystems of Uzbekistan therein, and creating real life operating models of sustainable use of biological resources.

The Law of the Republic of Uzbekistan “On introduction of changes and amendments to certain legal acts of the Republic of Uzbekistan”, which passed in August 2014 introduced amendments to the PNA Law concerning:

- PNA categories and PNA protection arrangements;
- operation of biosphere reserve and national parks;
- PNA funding.

Article 5 enables creation of state-owned biosphere reserves, national parks, inter-state and other PNAs. Logically, a new article was added which detailed the concept of “*national parks*”, as well as the procedures for organization and operation thereof.

Moreover, by virtue of the introduction of the new PNA type – national parks – changes were made to the articles on the organizing and funding procedures.

The amendments to said Law resulted in Resolution of the Cabinet of Ministers No. 144 dated 05.06.2014 which created the Durmen national park in Tashkent province.

Creation of a PNA eco-network involves all forms of territorial protection with PNAs being the main, key elements. Such a network would take a long time to build, but it would ensure conservation of species, their habitats, and good natural environment in the entire country, and provide the material basis for sustainable development in the form of renewable natural resources in the long term.

At present, Uzbekistan has: 7 operating reserves 7 (188 335 hectares), 1 comprehensive (landscape) wildlife sanctuary (628 300 hectares), 2 biosphere reserves (111 670 hectares), 3 national natural parks (558 209 hectares), 1 Durmen national park (32.4 hectares), 10 natural monuments (3 760.1 hectares), 12 wildlife sanctuaries (572 404 hectares), 1 Bukhara Specialized Nursery “Dzheiran” (“Persian gazelle”) (16 522 hectares), forestry stations and forest hunting facilities (about 11.2 million hectares). The total area of PNAs providing for sustainable conservation of biodiversity (without Category VI) is about 13.2 million hectares (Table 9). In

addition, the total area of all reserves and natural parks of Uzbekistan is 721 838 hectares or 1.79% of the country's area.

Currently, category VI protected areas: the area of water protection zones is 155.416 hectares along 8 major rivers; The total area of the zone of formation of fresh groundwater deposits is 269,949 hectares.

The PNA system of Uzbekistan has its limitations in terms of the overall size, representation degree, conceptual approach, and funding.

Until recently, the basis for conservation of biological diversity in Uzbekistan was a system of PNAs categorized as “reserves” and “natural parks”. However the more intense the socio-economic development of territories the more the “PNA system” turns into a multitude of small isolated islands. They do not ensure sustainable conservation and functioning of ecosystems on the whole and therefore cannot maintain the optimal condition of the environment.

Improvement of the PNA system including its environmental sustainability and versatility along with the catching at least 10% of the country's area was one of the targets of the first NBSAP (1998). However, the tasks were not fully completed, the ones implemented mostly concerning improvement of the legal base and some expansion of the total area of PNAs.

Therefore, improvement of the PNA system and creation of a representative PNA network remain relevant tasks in order to fulfill national needs and Aichi targets.

Table 9. Connection of National Target 7 with Global Aichi Goals and Targets regarding protected natural areas

National strategic goals / targets	Global Aichi Goals and Targets
Direct correlation	
STRATEGIC GOAL III. Developing the system of protected natural areas to conserve biodiversity and increase the scope of benefits from ecosystem services	AICHI STRATEGIC GOAL C: To improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity
NT 7. Expansion of total area of protected natural areas in the country for creation of national environmental network (PNA of different categories), ensuring their efficient management	Aichi target 11: By 2020, at least 17 percent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effective and equitable management, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integration of such system into the wider landscapes and seascapes. Aichi target 12: By 2020, the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained. Aichi target 14: By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.
Indirect correlation	
STRATEGIC GOAL III. Developing the system of protected natural areas to conserve biodiversity and increase the scope of benefits from ecosystem services	AICHI STRATEGIC GOAL B: Reduce the direct pressures on biodiversity and promote sustainable use

NT 7. Expansion of total area of protected natural areas in the country for creation of national environmental network (PNA of different categories), ensuring their efficient management.	Aichi Target 5: By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.
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The state governance of organizing, safeguarding and use of PNAs is provided by the Cabinet of Ministers of the Republic of Uzbekistan, local state authorities and special authorized bodies (the Law of the Republic of Uzbekistan “On protected natural areas”).

PNAs are established by the decision of the Cabinet of Ministers of the Republic of Uzbekistan and local state authorities in accordance with the procedure provided by applicable law. For example, depending on the importance and the establishment mechanism PNAs may be of national (created by the Cabinet of Ministers) or local (created by local state authorities) significance. PNAs of national significance: state-owned reserves, comprehensive (landscape) wildlife sanctuaries, national natural parks, wildlife sanctuaries of national significance, fishery zones, natural resort areas of national significance, water protection zones, coastline areas of national significance, water body sanitary protection zones, surface and subsurface water generation zones, as well as biosphere reserves and national parks. PNAs of local significance: natural parks, natural monuments, wildlife sanctuaries of local significance, natural nurseries, natural resort areas of local significance, recreation zones, water protection zones, coastline areas, water body sanitary protection zones and surface and subsurface water generation zones, hunting facilities and forest hunting facilities.

Issues related to development and improvement of the PNA system were included in the Environmental Action Plans approved by Resolutions of the Cabinet of Ministers of the Republic of Uzbekistan: No. 212 of 2008 and No. 142 of 2013.

National Target 8: Development of state program on conservation and sustainable use of biological diversity components used for food production and farming

Conservation and sustainable use of biological diversity components in food production and agriculture is a priority in the economic development of the country. This became the basis for development and adoption of NT 8.

The purpose of conservation of crop wild relatives (CWR) is the establishment of a national action plan for the implementation of the national policy of conservation of CWRs and their habitats, development of national and international cooperation in CWR conservation; investment and support from local and foreign sources; other actions contributing to CWR management in line to international agreements.

The correlation between NT 8 and the Global Aichi Goals and Targets (Table 10) is due to the fact that the declining genetic diversity of crop plants directly depends on conservation and sustainable use of their wild relatives.

Uzbekistan is the origin center to many plants of the modern flora, including multiple species that are wild relatives of crops (CWR) cultivated as food, medicinal, decorative, technical, etc. plants. Many of such plants have a major place in people’s live: apple trees, walnuts, barley, herbs, oil-bearing crops, onions, carrots, pistachios and many others – over 50 species in total.

Table 10. Connection of National Target 8 with Global Aichi Goals and Targets

National strategic goals / targets	Global Aichi Goals and Targets
	Direct correlation
STRATEGIC GOAL III. <i>Developing the system of protected</i>	AICHI STRATEGIC GOAL C: <i>To improve the status of biodiversity by safeguarding ecosystems, species and</i>

<i>natural areas to conserve biodiversity and increase the scope of benefits from ecosystem services</i>	<i>genetic diversity</i>
NT 8. Development of state program on conservation and sustainable use of biological diversity components used for food production and farming	Aichi Target 13: By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.
Indirect correlation	
AICHI STRATEGIC GOAL E: <i>Enhance implementation through participatory planning, knowledge management and capacity building</i>	
Aichi Target 18: By 2020, the traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels.	

The long list of crop wild relatives of Uzbekistan has species that are most significant for the human nutrition. Some of such species were prioritized and chosen for examination and subsequent preparation of proposals on their conservation under UNEP-GEF project “In situ conservation of crop wild relatives through enhanced information management and field application”. Such CWRs are Sievers’s apple trees (*Malus sieversii*) and Niedzwetzky's apple trees (*Malus niedzwetzkyana*) apple trees, five species of almonds (*Amygdalus* sp.), walnut (*Juglans regia*), pistachio (*Pistacia vera*), ornamental onion (*Allium pskemense*), and wild barley (*Hordeum spontaneum*).

The plants listed above are currently threatened and require that activities be developed and implemented to protect them.

At present, conservation of biological diversity in Uzbekistan, which includes CWRs though not as a separate aspect, is the responsibility of various organizations the main ones being the Ministry of Agriculture of the Republic of Uzbekistan and the State Committee on Forestry of the Republic of Uzbekistan. Each of those organizations applies its own management policy, builds its standards and methods bases and work process bases, often without aligning those to one another which prevents optimal decisions both at the national and the local level.

The problem of CWR conservation was never defined as a separate issue in any national or local legislation or regulation though the significance of CWRs for humans goes far beyond mere conservation of biodiversity and is directly related to sustainable development in a food crisis environment.

The Republic of Uzbekistan with its rich natural systems has a diverse and interesting flora. The largest number of species live in submontane areas and in the mountains. There is a certain pattern in terms of association with habitat types. Some of the species have large ecological amplitude – from sands and solonchaks (saline lands) through to rocky slopes of highland areas. These include multiple members of families such as: *Asteraceae*, *Apiaceae*, *Poaceae*, *Brassicaceae*, *Fabaceae*, *Rosaceae*, *Polygonaceae*, etc. However, there are more narrowly specialized species which only occur in certain belts and substrate types. For example, species of genera *Calligonum*, *Ammodendron*, and *Salsola* are typical for barkhan sands; *Halocnemum strobilaceum*, and *Salicornia europaea* – for solonchaks; individual species of genera *Rosa*, *Amygdalus* – for rock-and-crushed stone slopes; members of families such as *Lamiaceae*, *Apiaceae*, *Asteraceae* – for rock cracks; some species of genera *Anabasis*, *Otostegia*, *Eremostachys*, *Salsola*, and *Salvia* – for variegated soil.

Of special interest is the presence of crop wild relatives that are most important for creation of new and improvement of existing valuable plant species. These are walnut (*Juglans regia*), almond (*Amygdalus communis*), Bukhara almond (*Amygdalus bucharica*), date-plum

(*Diospyros lotus*), common fig (*Ficus carica*), pomegranate (*Punica granatum*), Turkmen Pear (*Pyrus turcomanica*), Sievers's apple tree (*Malus sieversii*), common grape vine (*Vitis vinifera*), jujube (*Ziziphus jujube*), pistachio (*Pistacia vera*), etc., which mostly grow in mountain areas of Uzbekistan.

It is believed that the most probable center of origin of cultivated varieties of some plants, in particular apple-trees (*Malus*), pear-trees (*Pyrus*), fig-trees (*Ficus*), mulberry-trees (*Morus*) and other fruit plants are mountain and submontane areas of Uzbekistan (Tashkent, Kashkadarya and Surkhandarya provinces).

There are extremely diverse wild original species and intraspecific taxons of fruit plants in Uzbekistan. The common species come from genres such as nut (*Juglans*), apple-tree (*Malus*), almond (*Amygdalus*), plum (*Prunus*), pistachio (*Pistacia*), hawthorn (*Crataegus*), barberry (*Berberis*), blackberry (*Ribes*), sea-buckthorn (*Hippophae*), etc. Vast habitats and polymorphism are typical for species of *Juglans* and *Malus*, *Amygdalus* and *Pistacia*.

Uzbekistan is also rich in vegetable species and is the birth place of onion (*Allium cepa*), carrot (*Daucus carota*), radish (*Raphanus sativus*), spinach (*Spinacia oleracea*), watercress (*Lepidium sativum*), coriander (*Coriandrum sativum*), basil (*Ocimum basilicum*), turnip (*Brassica campestris*), etc.

Herbs and aromatic plants which are used by the local population are highly valued in Uzbekistan. These are species of geerah (*Bunium*), *Berberis*, *Ziziphora*, *Origanum*, *Mediasia*, and mint (*Mentha*) (Table 11).

The state of CWRs in the PNAs is fairly good but there is habitat shrinkage and genetic erosion in other locations. Fruit is picked with no regard for the population recovery. The most valuable species with high quality fruit is especially vulnerable to uncontrolled fruit picking. This is the case in pistachio woodlands, walnut, apple and hawthorn plantations, etc. In addition to fruit picking, excessive grazing by livestock destroys the natural seeding of those plants. There is uncontrolled picking of medicinal herbs, wild onions and garlic.

The use of non-timber forest products by local communities is ubiquitous. There are companies that procure wild plant raw materials for pharmaceutical products and food, using local biological resources.

Table 11. Useful wild plants of the Uzbekistan flora

Application of plants by group	Families	Number of species
Food plants	<i>Rosaceae, Amaryllidaceae, Juglandaceae, Rhamnaceae, Apiaceae, Polygonaceae</i>	over 350
Forage plants	<i>Poaceae, Fabaceae, Amaranthaceae, Asteraceae</i>	1700
Medicinal plants	<i>Ranunculaceae, Lamiaceae, Rosaceae, Boraginaceae, Apiaceae, Asteraceae, Nitrariaceae u dp.</i>	1157
Essential oil bearing plants	<i>Asteraceae, Acoraceae, Lamiaceae, Apiaceae, Rosaceae, Cupressaceae, Geraniaceae, Iridaceae</i>	650
Alkaloid bearing plants	<i>Amaranthaceae, Solanaceae, Ephedraceae, Ranunculaceae, Berberidaceae, Papaveraceae, Euphorbiaceae</i>	over 200
Dye plants	<i>Malvaceae, Papaveraceae, Asteraceae</i>	150
Decorative plants	<i>Liliaceae, Asphodelaceae, Iridaceae, Amaryllidaceae, Rosaceae, Asteraceae</i>	270
Potherbs	<i>Lamiaceae, Apiaceae, Berberidaceae, Cupressaceae, Asteraceae</i>	200
Saponin bearing plants	<i>Fabaceae, Caryophyllaceae, Solanaceae, Astereaceae, Liliaceae</i>	100
Fiber plants	<i>Urticaceae, Cannabaceae, Malvaceae</i>	6

Among the prioritized CWR species, apple tree is represented in all mountain areas by sparsest populations, with low form diversity. The broadest variety of apple trees are to be found in the Ugam-Chatkal National Park located in the area of the Burchmulla Forestry Station.

Common almond, the forefather of all cultivated varieties of almond, is not represented in any reserve. Bukhara almond (*Amygdalus bucharica*) and *Amygdalus spinosissima* are to be found in all mountain reserves, but the Chatkal State Biosphere Reserve offers the best environment for their growth.

Walnut is only protected in natural phytocenoses in the Nuratau National Reserve, where the walnut population has to endure tough environment, lack of precipitation only allowing it to grow along river channels. The growing conditions there are not typical for walnut. The best walnut population is at the Burchmulla Forestry Station.

Natural pistachio populations are not protected in any reserves. All PNAs have either isolated pistachio trees or small groves, which is also the case with pear species. In Uzbekistan, there are isolated pear trees of various species without large populations.

The largest concentration of fruit and nuciferous species, save for pistachio and subtropical species is in the Ugam-Chatkal National Park which also has populations of plum-trees, hawthorn and berry shrubs – barberry, briar, cherry, etc. Large pistachio populations are only to be found at the Babatag, Uzun, Andijan and Forish forestry stations. The forestry stations fail to provide sufficient protection of CWRs, and there are major threats to their existence.

The largest concentration of CWR species, especially of the 6 prioritized ones, at the Burchmulla Forestry Station is observed in the Sijjak forest district. In the South Gissar area, it is the Sangardak forest area of the Uzun Forestry Station, and the basin of river Tupalant, while in the Babatag, as regards the natural population of pistachios, it is the Chagam or the Faizav forest area. Since the areas referred to above have large populations whose normal life depends on the use of CWR products it would not be practicable to create reserves there so as to better conserve CWRs while closing the reserves to the general public altogether. The best way recommended to conserve CWRs in those areas is to establish wildlife sanctuaries.

As regards forage plants of the Kyzylkum Desert, there are 908 known vascular species from 345 genres and 68 families. The leading families on the spectrum of the Kyzylkum forage flora are: *Chenopodiaceae* (148 species), *Asteraceae* (112), *Poaceae* (106), *Fabaceae* (67), *Brassicaceae* (67), *Polygonaceae* (59), *Boraginaceae* (37), *Caryophyllaceae* (33), *Lamiaceae* (24), and *Apiaceae* (21). The top of the spectrum of the leading genres are: *Astragalus* (40 species), *Calligonum* (34), *Salsola* (29), *Artemisia* (19), *Cousinia* (16), *Climacoptera* (15), *Suaeda* (15), *Polygonum* (15), *Atriplex* (12) and *Allium* (10), *Ferula* (10), *Halimocnemis* (10) and *Convolvulus* (10).

It has been established that the predominance of annual plants among forage plants is an alarming indicator of the increasing anthropogenic pressure on pasture vegetation of the study area.

When subdividing natural forage lands for economic purposes, it is expedient to distinguish another 2 families of plants – *chenopodiaceae* and *compositae* on account of their having a rich variety of species as well as their domination in the vegetation cover of natural pastures.

Inselberg plateaus have been found to have a high forage potential, being the place of concentration of 514 forage species which is 90.1% of the inselberg flora of the entire Kyzylkum Desert.

A large scale map of the southern dry floor of the Aral Sea (M 1:500000) has been produced. The most promising species in terms of stabilization of the shifting sands of the dry floor of the Aral Sea have been identified – *Salsola richterii*, *Ammodendron conollyi*, *Calligonum setosum*, *Astragalus villosissimus*, *Krascheninnikovi aeversmanniana*, and *Artemisia ferganensis*. The recommended species exhibit high survival ability, development of a large biomass, intensive growth and successful self-reproduction.

STRATEGIC GOAL IV. *Enhancing the effectiveness of conservation and sustainable use of biodiversity through participatory planning and capacity building*

National Target 9: Inclusion of provisions of the National Biodiversity Strategy and Action Plan as integral parts of the plans for national, territorial and sectoral development

Recovery and conservation of biological diversity in Uzbekistan is a reliable way of ensuring environmental stability and sustainable development of the country, and adapting to current trends as well as climate change and desertification processes.

All types of economic activities form a system of established nature management methods without the need to restore natural resources sufficiently taken into account. The main factors in the destruction of natural ecosystems are agricultural reclamation of land, redistribution of the surface flow, distant-pasture cattle rearing, development of energy and mining industry, and in mountain areas – infrastructure and growth of populated areas.

At present, the negative impact of most of those drivers on most ecosystems and therefore on the diversity of flora and fauna is remaining on the same level or growing.

Uzbekistan has developed a draft update of NBSAP aimed at achieve four key National Goals (activity lines) and nine targets. Long-term sustainable development requires that conservation and sustainable use of biological diversity become part of national development plans as well as development plans for all sectors of the economy, which is what implementation of NT9 involves. Moreover, the NBSAP should also be aligned to the country commitments for the achievement of the sustainable development goals and the national determined contributions providing synergies for the consecution of its main goals. The NBSAP should remain as a live document articulating its mandate with international commitments providing opportunities for bilateral and multilateral donors to invest in the country.

The correlation between NT 9 and the Global Aichi Goals and Targets (Table 12) is due to the fact that NBSAP is the basis for implementation of CBD provisions in Uzbekistan. It is important that NBSAP facilitate the integration of the BD issues as components into national, territorial and industry development plans, which would make for integration of efforts to ensure conservation and sustainable use of biological diversity of every country and the entire world.

Table 12. Connection of National Target 9 with 9 Global Aichi Goals and Targets

National strategic goals / targets	Global Aichi Goals and Targets
Direct correlation	
STRATEGIC GOAL IV. <i>Enhancing the effectiveness of conservation and sustainable use of biodiversity through participatory planning and capacity building</i>	
AICHI STRATEGIC GOAL E: <i>Enhance implementation through participatory planning, knowledge management and capacity building</i>	
NT 9: Inclusion of provisions of the National Biodiversity Strategy and Action Plan as integral parts of the plans for national, territorial and sectoral development	Aichi Target 17: By 2015, each Party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan.

Table 13. Correlation between sectors of the economy, ecosystems and Global Environmental Conventions

Ecosystems Sectors	Farm lands which replaced natural ecosystems	Forest ecosystems	Water ecosystems (rivers, lakes)	Water ecosystems of the Aral region	Arid and droughty desert ecosystems	Ecosystems used as pastures	Mountain ecosystems
Forest resources	CBD UNCCD	UNFCCC CBD UNCCD			UNFCCC CBD UNCCD	UNFCCC CBD UNCCD	UNFCCC CBD UNCCD
Agriculture	UNFCCC CBD UNCCD	CBD	UNFCCC CBD UNCCD	CBD UNCCD	UNFCCC CBD UNCCD	UNFCCC CBD UNCCD	UNFCCC CBD UNCCD
Land-based transport	UNFCCC	UNFCCC			UNFCCC		
Energy industry	UNFCCC	UNFCCC	UNFCCC				UNFCCC
Industrial sector	FCCC	FCCC	CBD	CBD			UNFCCC
Water management	UNFCCC CBD UNCCD		UNFCCC CBD UNCCD	UNFCCC CBD UNCCD	UNFCCC CBD UNCCD	UNCCD	CBD UNCCD
Land use	UNFCCC CBD UNCCD	CBD UNCCD			UNFCCC CBD UNCCD	UNFCCC CBD UNCCD	UNFCCC CBD UNCCD
Tourism		CBD	CBD	CBD	CBD		CBD
Fish industry and aquaculture			CBD	CBD			

The draft *National Biodiversity Strategy* is one of the legal foundations for: the development of national and local action plans for environmental protection, national and industry specific scientific and technical programs, fundamental and applied research, industry development plans focused on monitoring of natural environment; reduction of direct pressures on BD, development of the PNA system; improving effectiveness of BD conservation and sustainable use with ES and adaptation to climate change for development of forestry, sustainable pasture management, protection of water resources, etc. taken into account.

The draft *National Strategy* also involves integration into the process of national planning and other documents that are developed under international agreements of Uzbekistan regarding performance of CBD, UNCCD and FCCC obligations. All nature protection activities in Uzbekistan are focused on implementation of a set of tasks related to BD conservation and sustainable use, combating desertification, and mitigation of and adapting to climate change, since all the tasks are aligned together and with various sectors of the economy (Table 13).

SECTION II. IMPLEMENTATION MEASURES, ASSESSMENT OF THEIR EFFICIENCY, ENCOUNTERED OBSTACLES, SCIENTIFIC AND TECHNICAL NEEDS FOR IMPLEMENTING NATIONAL TARGETS

National Target (NT) 1: Improvement of the system of state monitoring of natural environment by inclusion of biodiversity monitoring into it.

To achieve the biodiversity conservation goals and understand environmental, social and economic implications of BD loss, the state natural environment monitoring system has to be improved by including biodiversity monitoring therein. The scarcity of contemporary scientific information on the condition and significance of biodiversity which is necessary for policy building and decision making is a generally recognized fact.

For implementation of NT 1, activities have been developed and included in the draft Action Plan for Implementation of the Updated NBSAP (filed with the Cabinet of Ministers of the Republic of Uzbekistan for consideration), including: Creation and development of a single monitoring system for biodiversity components which would establish the procedure for organization and performance of the monitoring of the plant and animal world; Creation of an information database on state cadastres and monitoring of sites in protected natural areas; improving the data collection system for cadastral information on protected natural areas; Inventory of natural stocks of wild species of medicinal, food and technical plants; Periodical geobotanical surveys of vegetation in natural pastures and hayfields – 2 million hectares a year; Recording the number of commercial game birds at water bodies of Uzbekistan; Putting the Kuyumazar and Tudakul reservoirs (Navoiy province) on the List of Wetlands of International Importance (The Ramsar Convention).

The activities developed are of legal (development of the draft Resolution of the Cabinet of Ministers of the Republic of Uzbekistan stipulating the procedure for the monitoring of the plant and animal world), regulatory and financial nature (organizing and performance of the state accounting of plant and animal world items; improving of the cadastral information collection system; and creation and maintenance of a web-site). Progress in the implementation of NT 1 would facilitate the achievement of all biodiversity related national goals as, being a source of necessary information on the state of biodiversity and BD related trends.

Since the National Goals and National Targets were developed, the country has taken certain measures in order to implement NT 1 and complete tasks of organizing systemic monitoring of biodiversity including the development of appropriate monitoring structures and the main monitoring aspects (for further details – see Section 1). To measure the progress with NT 1, indicators have been developed to provide accuracy in the consecution of the target outcomes, including indicators tracking the progress through 2020.

Indicator 1.1: By 2020, monitoring research and cadaster update of biodiversity components are included into the list of the State's priorities, which are reflected in planning processes.

Implementation of the target of development of the biodiversity monitoring system and building the cadastre information has become a government priority and is taken into account in the planning processes by being included (in part or in full) in the following program documents adopted in 2015-2018 (for further details – see Section I):

- The Program for State Monitoring of Natural Environments (SMNE) for 2016-2020;
- the Environmental Action Plan of the Republic of Uzbekistan for 2013-2017 (EAP);
- National Action Program to Combat Desertification and Drought (NAPCDD, 2015);

- the Third National Communication of the Republic of Uzbekistan under the UN Framework Convention on Climate Change (THC, 2016);
- Resolution of the President of the Republic of Uzbekistan No. 3256 dated 04.09.2017 “On measures for organizing the operation of the Institute of Botany and the Institute of Zoology of the Academy of Sciences of the Republic of Uzbekistan” (2017);
- Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 914 “On maintaining state accounting, accounting for use volumes and the state cadastre of flora and fauna objects of November 7, 2018.

It should be noted that in compliance with p. 2 of PKM No. 339 dated May 4, 2018, the SCEEP developed the “Procedure for monitoring of the natural progress of natural processes in benchmark ecosystems in national reserves of the Republic of Uzbekistan”, which established the procedure for monitoring within the reserves. The draft document has been submitted for approval.

Moreover, targeted monitoring is a component of the national procedure for pre-project planning of development programs and a mandatory aspect of environmental impact assessment (EIA); however, issues relating to impact on biodiversity are being treated superficially.

In accordance with the annual department program, the Hydrometeorological Service Center (Uzhydromet) has been engaged for many years in the regular monitoring of the quality and the ecological state of collector waters in the network of permanent observation points, with biological indicators used. The biological indicators are invertebrates – insects, worms, crustaceans, molluscs, leeches, ticks, etc. – populating the zoobenthos, as well as bacteria, mushrooms, protozoa, and algae which inhabit the periphyton.

Having become a government priority and part of the planning process, NT 1 constitutes an effective measure to implement NT 1 but requires extra efforts towards the practical achievement thereof. *Therefore, the measures taken were partially effective.*

Indicator 1.2: By 2020, the cadastral works are financed sustainably.

At present, biodiversity cadastres constitute one of the main biodiversity information sources. The legal base for establishing and maintaining the state cadastre in Uzbekistan is the Law of the Republic of Uzbekistan “On state cadastres” (<http://www.lex.uz/acts/19480>). At present, biodiversity component cadastres are being maintained in accordance with the laws and regulations on information collection processes: Regulations on the procedure for maintaining state accounting, accounting for use volumes and the state cadastre of fauna objects and Regulations for maintaining state accounting, accounting for use volumes and the state cadastre of flora objects (Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 914 dated November 7, 2018); the Regulation on the Procedure for Maintaining the State Wild Fauna Cadastre of the Republic of Uzbekistan (<http://www.lex.uz/acts/360546>); the Regulation on the procedure for maintaining the state cadastre of protected natural areas of the Republic of Uzbekistan (http://old.lex.uz/pages/GetAct.aspx?lact_id=775550). According to the Regulations, the state cadastres and the state records of wild flora and fauna are to be maintained with the government budget funding. The state cadastre of biodiversity component is maintained year after year by various government agencies using government budget and extra-budgetary funds and grants (Academy of Sciences) (for further details – see Section I).

Within the framework of applied and innovation research grant programs, the Academy of Sciences has been maintaining the state cadastre of wild flora and fauna listed in the national Red Book by administrative region since 2012. Cadastre related floristic research projects on rare and endangered species of vascular plants have been completed on government grants in Jizzakh, Kashkadarya, Samarkand, Surkhandarya and Khorezm provinces, and the Republic of Karakalpakstan. Cadastre related faunistic research projects on rare and endangered species of vertebrates conducted under applied and innovation grant research projects have been completed with regards to Tashkent, Jizzakh, Kashkadarya and Khorezm province, and the Republic of

Karakalpakstan. These projects produced up-to-date data on the occurrence, number and state of populations of rare and endangered species, and the occurrence maps of the regions referred to above with regards to such species. In addition, the first full cadastral flora lists were made for Jizzakh, Kashkadarya and Samarkand provinces. There is ongoing contractual monitoring of quota limited (medicinal, food) plant species which are in high demand on both the domestic and the international markets, and of resource animal species.

The Action Plan for Implementation of the Updated NBSAP (submitted to the Cabinet of Ministers of the Republic of Uzbekistan for consideration) provides for regular maintenance of state cadastres of PNA items, wild animals and plants in conformity to the Unified System of State Cadastres. At present, the science departments of the PNAs, with the support from the Academy of Sciences, are monitoring the following threatened (Red Book listed) species of wild animals:

1. Severtsova's sheep *Ovis ammon severtzovi* – the Nuratau National Reserve;
2. Goitered gazelle *Gazella subgutturosa*, *Equus hemionus*, and Przewalski's horse *Equus przewalskii* – the Bukhara Specialized Nursery "Dzheiran";
3. Markhor *Capra falconeri*, Bukhara sheep *Ovis vignei boharensis* – the Surkhan National Reserve;
4. Bukhara deer *Cervus elaphus bactrianus* – the Lower Amudarya State Biosphere Reserve and the Kyzylkum National Reserve;
5. Brown bear *Ursus arctos*, Turkestan lynx *Lynx lynx isabellina* – the Chatkal State Biosphere Reserve;
6. Turkestan white stork *Ciconia ciconia*, Central Asian Cobra *Naja oxiana*, snow leopard *Panthera uncia*, brown bear *Ursus arctos* – the Gissar National Reserve;
7. Brown bear (*Ursus arctos*), black stork *Ciconia nigra*, black vulture *Aegypius monachus* – Kitab National Geological Reserve. Monitoring of the flora is provided by specialists of the research department at the Gissar National Reserve.

The Action Plan for Implementation of the Updated NBSAP provides for regular recording of the number of game bird species at water bodies of Uzbekistan. As part of the research conducted under Program "Cadastre and monitoring of the fauna of Uzbekistan", the Biological Inspectorate jointly with the Academy of Sciences of the Republic of Uzbekistan conduct winter counts of wetland birds at major water bodies of Tashkent, Jizzakh, Navoiy and Bukhara province. The ecological and hydrological condition of water bodies Kuyumazar and Tudakul has been monitored as part of the SMNE implementation actions scheduled for 2016-2020. The Nomination Form has been prepared for water bodies to be put on the Ramsar List, the preliminary approval received.

The Action Plan for implementation of the updated NBSAP provides for inventory of natural stocks of wild medicinal, food and technical plants. At present, just over 100 medicinal plant species are for medical purposes in Uzbekistan, which is about 2.5% of the total quantity of the country's flora. Although medicinal plants have been collected in Uzbekistan for many years, there is an acute information deficit in this area as regards the current state of natural populations of the most relevant medicinal, food, technical and other raw material plants of Uzbekistan. The exception was just five plant species covered under business contracts with business entities and interested organizations (the State Committee of the Republic of Uzbekistan on Ecology and Environmental Protection, and the State Committee on Forestry of the Republic of Uzbekistan). At present, in accordance with the Resolution of the President No. PP-3256 dated September 4, 2017, within the framework of grant funded research, the Institute of Botany of the Republic of Uzbekistan is working on an interactive atlas of promising medicinal plants of Uzbekistan (resources, monitoring of and protection methods for the most vulnerable species).

A solid legal framework, vast experience and capacity for collecting factual material provide a certain but not yet sufficient quality of the maintenance of the state cadastre, and the inventory of wild fauna and flora. However, the funding being insufficient to support the tasks planned, systematic collection of cadastre information and compilation of relevant data resulting

from departmental (sectoral) inventory and monitoring programs are limited. *Therefore, the measures taken were partially effective*

Indicator 1.3: By 2020, the data bases on biodiversity are developed, systematized and regularly updated.

Building information databases on biodiversity which would be accessible to all stakeholders that provide data for the decision making as regards conservation and sustainable use of biodiversity would require an appropriate system to store and process information on biological resources. As the report was being prepared, there was some ongoing planning and partial implementation with regards to this aspect.

The existing environmental monitoring database is updated on a regular basis with data coming from departments involved in SMNE. However, it is hard to say how complete the information is since the access to the database is limited.

The UNDP/GEF/SCEEP project “Sustainable use of natural resources and forestry in key mountain regions which are important for globally significant biodiversity” involves development and introduction of a system for collection, processing and storage of information of the state of biodiversity in highland ecosystems of Uzbekistan in 2018-2021.

As part of a fundamental grant project, the Institute of Botany of the Academy of Sciences of the Republic of Uzbekistan developed the first detailed phytogeographical zoning map of Uzbekistan in a GIS environment. A new national summary of the country's flora featuring 4,364 wild species has been produced in the format of the database.

Under the grant applied project “Inventory and assessment of the current state of vertebrates in Tashkent province as the basis for building a biological resource monitoring system”, electronic databases are being created on the basis of state-of-the-art technology for systematization, storage and subsequent analysis of information on land vertebrates which will be available to interested users.

The existing level of progress in that area indicates that the measures taken were partially effective.

Indicator 1.4: By 2020, information exchange arrangements in the sphere of biodiversity and ecosystem services (Clearing House Mechanism) are functioning between all the stakeholders.

The necessary condition for development and full-scale operation of a system for biodiversity monitoring and the use of the data for management purposes, is creation of mechanisms for information exchange between all stakeholders, availability of monitoring results to authorities, the research community and the general public, as provided for by the goals and objectives of the national monitoring system. The integrated biodiversity data management system (the National Clearing House Mechanism – CHM) was created within the framework of the UNDP/GEF/UZB project “National Schedule in Biodiversity in Support of the Implementation of the Convention on Biological Diversity Strategic Plan in Uzbekistan in 2011-2020” (2013-2015). The CHM was to include available thematic databases and the National Biodiversity Information System in order to provide necessary information to decision makers, and the basis for long-term, sustainable development. A publicly available web-site (cbd.uz) was developed under the project, offering a certain range of information regarding biodiversity in Uzbekistan and the relevant international agreements. After the project related activities were finished, the web-site was operational for a certain period of time with the financial support from SCEEP. At present, the site is suspended on account of the ongoing reforms in the country including structural reforms at SCEEP.

Analysis of the degree of adequacy of the information used to monitor indicators, assessing the level of achievement of NT 1, showed that monitoring associated with this target is partial. This is due to the fact that the updated National Biodiversity Conservation Strategy and Action Plan for its implementation are at the stage of approval.

Obstacles in the achievement of NT 1

The analysis of the situation with regards to the achievement of NT 1, has revealed a number of problems. The integration of monitoring issues and the maintenance of biodiversity components cadastre into the program documents proves that the issues are prioritized in the government policies. However, at the time this report was prepared, the actual implementation of the monitoring system development measures was as follows:

- Lack of representativeness of the components of BD in the overall structure of the State monitoring of the environment;
- The Unified Coordinated System of Biodiversity Components Monitoring was under development;
- The main subjects for constant long-term monitoring – critical species and ecosystems – were also being selected and agreed upon;
- Methodological approaches – methods enabling data collection and analysis for each separate species or group of ecologically similar species within a certain time, in a certain area, and the list of indicator species for assessment of the state of ecosystems, were being developed and tested;
- The procedure for monitoring of the natural progress of natural processes in benchmark ecosystems in national reserves had been developed and was undergoing the approval stage.
- Insufficient coordination of interaction between organizations responsible for monitoring BD;
- The lack of regular and mandatory exchange of information about BD and free access to it;
- The lack of a unified information system - the National Clearing House Mechanism (National CHM);
- The lack of modern scientific information on the status and significance of the BD, which is necessary for policy making and decision-making.

Measures that could accelerate the achievement of NT 1

Following the consultations with stakeholders and the conclusions made by Global Biodiversity Outlook 4, measures were identified which could accelerate the achievement of NT 1:

- a) Further improvement of institutional and legislative basis for the implementing monitoring of BD;
- b) development, approval and introduction of a single monitoring system for biodiversity components;
- c) unification of monitoring methods and sites in Uzbekistan;
- d) development of selection criteria for indicative species for assessment of the state of natural ecosystems;
- e) development and improvement of the biodiversity monitoring database;
- f) integration of programs for conservation of biological diversity including monitoring, in corroboration with other development programs and plans;
- g) creation of mechanisms enabling information exchange between all stakeholders in the area of biodiversity and ecosystem services;
- h) development of a program to monitor changes in land use and provide information to decision makers;
- i) engaging local communities in collection and use of monitoring data and information;
- j) improvement of intersectoral coordination mechanisms – developing cooperation between ministries, departments, government agencies, NGOs, and all stakeholders with regards to issues of collection, processing and use of monitoring information;

- k) developing and maintaining a National CHM;
- l) making monitoring results available to authorities, scientific circles, and the general public;
- m) participation in development of regional and global biodiversity knowledge networks.

National Target 2: Increasing knowledge and awareness of state authorities and society of the value of biological diversity and ecosystem services

To achieve NT 2, actions were developed which were subsequently included in the Action Plan for Implementation of the Updated NBSAP (submitted to the Cabinet of Ministers of the Republic of Uzbekistan for consideration), including: integration of actions aimed at conservation of biological diversity and ecosystem services in sectors of the economy during 2018-2027; enhancement of the role of the media in making society aware of the significance of biodiversity; organizing an information campaign targeting local population and natural resource users in order to increase the significance of conservation and sustainable use of biological resources and ecosystem services.

NT 2 is a logical extension of the priority of increasing the awareness and strengthening of the information base for decision making officials, which has been identified since the first NBSAP was developed (1998). Some work has been done to achieve NT 2 since the 5th National Report was prepared. However, it is hard to tell precisely how effective those actions were and what progress was made since there is no systematic monitoring of results and no common methodology for such monitoring. In this section, the progress with the achievement of NT 2 is assessed using indicators developed, on the basis of reports, publications, Internet sources, and information provided by experts.

In this regard, it is currently not possible to quantify the progress in the implementation of the contribution to NT2 and ABT 1. In this section, in order to qualitatively assess the progress of the results of NT 2, the indicators specified in the Action Plan for the Implementation of the updated NBSAP are used (2.1 - 2.5). The analysis and assessment is done on the basis of available reports, publications, internet sources, as well as information provided by experts, including information provided during consultative meetings and interviews with representatives of stakeholder parties.

Indicator 2.1: By 2020, the majority of staff members of relevant ministries and agencies understand the importance of biodiversity and ecosystem services for future development of the country.

To make well-based and timely decisions practically in all spheres of the country's life, with due regard to caring treatment of nature, decision makers need to understand the significance of biodiversity and ecosystem services and the contribution thereof to wellbeing and development of the country. Producing competent analytical material and organizing focused press conferences with heads of government agencies in charge of environment conservation, are an important step towards integration of values and advantages of biodiversity in various sectors of the economy and development.

Recently, the legal base for nature protection was improving rapidly. The Government of the Republic of Uzbekistan adopted the following legal acts and regulations: Resolution of the Cabinet of Ministers of the Republic of Uzbekistan “On creation of the Ugam-Chatkal Biosphere Reserve”, Resolution of the Cabinet of Ministers of the Republic of Uzbekistan “On some issues of regulation of the visiting of protected natural areas”, “On the approval of statutory instruments for implementation of provisions of the Law of the Republic of Uzbekistan “On protected natural areas”, “On measures for regulating issues of implementation and management of comprehensive (landscape) wildlife sanctuaries”, “On measures for further improvement of operations of the Ugam-Chatkal National Park and its Chatkal State Biosphere Reserve, Akhangaran and Burchmulla forestry stations”, etc. Before these and other legal acts were adopted, there was active work on the preparation of documents to justify the necessity of adopting the legal acts for Uzbekistan. These activities fostered improved expertise of the relevant specialists of stakeholder ministries and departments with regards to the significance of

biodiversity and ecosystem services. According to SCEEP, 710 various events (briefings, press conferences, meetings) were organized over the last 5 years to advocate environmental protection legislation.

A major role in improving decision makers' awareness belongs to the Ecological Movement of Uzbekistan which is a public association founded by environment scientist and public actors, which has a faction at the legislative house of the Oliy Majlis. The Ecological Movement acts in 7 priority areas. These are: making the public more active in environmental protection and improving of environmental conditions; contributing to further improvement of the public health and environmental protection legislation; increasing the accountability of central and local government authorities as regards implementation of environmental protection programs and laws; improving the environmental culture of the population; development of the environmental education and training system; cooperation with foreign and international environmental organizations; coordination of environmental protection activities of NGOs.

SCEEP are playing a major role in working with employees of government ministries and departments. Its Information Service (IS) is actively engaged in issues of education and improvement of public awareness, as well as coordination of contacts with environmental public organizations. SCEEP IS are planning their activities and reports on the results annually.

Recognizing the necessity of a synergy based approach to implementation of global environmental conventions, the Hydrometeorological Service at the Ministry of Emergency of the Republic of Uzbekistan (Uzhydromet) which coordinates the country's activities under the obligations to UNCCD and UN FCCC, contributed to improving the awareness to a certain degree.

Products of the publishing firm CHINOR ENK founded/owned by SCEEP are most important for information of civil servants and decision makers. The Ekologia Khabarnomasi (Ecological Herald) magazine is published by this firm on a regular basis. The magazine is published in three languages – Uzbek, Russian and English and distributed across the country almost entirely through subscription. Therefore, it is available in libraries of various Ministries and government departments, and specialists can access the material. Moreover, employees of various government agencies publish there their articles on various subjects. A web-version of the magazine is also available, which accounts for its broad outreach and easy access to the information. Over the period from 2015, the magazine published over 60 research and popular science articles in Uzbek and Russian on conservation of biological diversity. 30 types of products were published from 2015 till 2018. The circulation of the Ecological Herald was 6000 copies in 2016 and about 3500 copies in 2017. At present, the circulation is 2040 copies. Various mass media play a major role in activities aimed at informing employees of relevant ministries and government departments as well as the general public of the importance of biodiversity and ecosystem services. Therefore, actions to enhance the role of the media in making society aware of the significance of BD were included in the Action Plan for implementation of the updated NBSAP.

Plans for cooperation between SCEEP and the National TV and Radio Broadcasting Company are developed every year. As part of such activities in 2016 SCEEP prepared 3540 radio and TV programs (in 2015 – 3172), published 2362 pieces of environmental material, including more than 672 publications posted in the Internet media and on social media on various topics regarding environmental protection and efficient use of natural resources. Over the period from 2013 to 2017, a total of 13770 appearances were organized on local TV and radio channels, where various environmental issues were discussed including conservation of biodiversity.

The range of nature and ecology related issues covered by the media is broad – from the government's and strategic vision to information on every element of the natural environment. Involvement of an increasing number of journalists in the coverage of issues regarding conservation of biodiversity, and their training is a necessary condition for improvement of public awareness. The National Environmental Journalism Competition has been taking place for

17 years in the Republic of Uzbekistan in order to support and develop environmental journalism and to raise public awareness of issues relating to the environment and rational nature management.

The environmental section in the structure of modern national media is represented by publications such as *the ECOHAYOT* (a socio-economic newspaper), *the EcoOlampress*, *the Daryo*, the *Olamni Asrash-Odamni Asrash*, and *the Sirli Tabobat*. There is the *Jamiyat* newspaper which started in 2006, co-founded by SCEEP and the Ecological Movement of Uzbekistan.

There are environmental radio and TV programs. The National TV and Radio Broadcasting Company (NTRBC) is preparing thematic sections on issues of ecology and nature protection to put into its broadcasting schedules. NTRBC has *the Ekopoytakht* program which has been broadcast for several years, while *the Dunyo bo'ylab TV* channel has programs such as *the Ecopark*, *the Expeditia*, and *the Ornitolog*. Radio stations “Uzbekiston”, “Toshkent”, “Maashal”, etc. are broadcasting news as well as individual thematic, special and authorial programs focusing on ecology.

The following contributing factors fostered the increase in the media attention to environment related topics: the development of the professionalism of environmental journalists by engaging young journalists in the coverage of environmental events, production of environmental TV videos, radio programs and other promotional, campaign and information material; and the work with students – future journalists, involving them in media tours and study trips. Female journalists traditionally have a pro-active position on environmental issues. The sincere concern and energy with which women advocate nature protection in their publications inspire genuine respect in society.

One of the most effective tools for raising awareness and achieving a better understanding of the value of biodiversity is study tours (media tours), field visits, experience exchange trips, information campaigns, and celebration of international milestones related to biodiversity. International projects that are being implemented in Uzbekistan organize such events and indicate that the results have been good. For example, participation of the press in such events makes for proper preparation of material and broad dissemination thereof in the media. Having taken part in media tours or experience exchange trips and having seen the mechanisms in use, decision makers normally become active at introducing knowledge of the value of biodiversity and ecological services into their respective fields.

Over the period from 2013 to 2017, 64 environmental media tours were organized, half of those in PNAs (reserves, national natural parks, sanctuaries, nurseries, etc.). *Therefore, the measures taken were partially effective.*

Indicator 2.2: By 2025, the majority of staff members of local authorities understand the importance of biodiversity and ecosystem services for future development of the country.

Starting from 2015, efforts have been made to improve the awareness of local authorities of the significance of conservation of biological diversity, which is necessary to proceed from action planning to specific actions at the local level. Most of the actions listed above while organized by SCEEP were implemented locally via SCEEP's divisions. The Ecological Movement and other NGOs play a significant role in the awareness activities in various regions of Uzbekistan.

One of the priorities of the Ecological Movement is to increase the accountability of central and local state authorities for implementation of environmental protection programs and laws. Thus it is important that staff not only receive training but actually understands the importance of biodiversity so the Ecological Movement is publishing *the Jamiyat* and *the Ekohayot* newspapers, and *the Rodnichok* monthly children's magazine. Acting through its local representative offices, the Ecological Movement is making a major contribution to improvement of the knowledge level with local authorities.

Over the last five years, the number of NGOs in the Republic of Uzbekistan increased 1.6 times exceeding 8240 entities in total. In 1991, there were just 95 NGOs in the country.

Moreover, notably 7783 (94%) of the NGOs are operating in regions of the country. 260 NGOs are the most active in the environmental sector and operate on the basis of the Program of the Ecological Movement of Uzbekistan.

Publications have been in Uzbek and Russian so as to maximize the audience outreach. For instance, according to SCEEP, over the period from 2013 to 2017, there were over 28 000 individual meetings and dissemination of information to entrepreneurs, farmers and other business entities, students, residents of mahallas and representatives of various NGOs in various regions of the country.

In addition, there are special publications in some regions, such as the *Tabiyat Va Hayot* (Navoiy province), the *Ecomuvozanat* (Tashkent province), the *Ecologia Va Salomatlik* (Surkhandarya province), and magazines such as the *Inson Va Tabiat*, the *EcoOlam*, the *Ekokharakat*, and the *Sikhat-Salomatlik*. *Therefore, the measures taken were partially effective.*

Indicator 2.3: By 2020, the majority of staff members of relevant educational institutions understand the importance of biodiversity and ecosystem services for future development of the country.

It is well known that teachers and professors have enormous opportunities for raising the new generation in the spirit of responsible and caring attitude to biodiversity. Therefore, improving the knowledge level of the faculty of higher and other education institutions is of the utmost importance in that respect.

At present, ecology and related disciplines are part of all curricula of higher education institutions in Uzbekistan. There are ten higher education institutions that offer degrees in environmental engineering, training about 320 ecologists every year. SCEEP are providing internships and industrial work placement, and supervising final year projects. Over the last 5 years, over 50 meetings, seminars and conferences took place within the secondary and vocational education system, with the aim of promoting and improving awareness of issues of continuous environmental education and education needed for sustainable development. A program for professors called “Sustainable management of natural resources” has been developed and disseminated, in which issues relating to the value of biodiversity have a major place.

Professors, scientists and experts are in a great need of expanding their knowledge to ensure their professional success. Exchange of experience and information expands every year in the expert community. The number of seminars, conferences, meetings and the quantity of special literature on various aspects of biodiversity is growing.

The Uzbek Biological Journal has been in print since 1958. The chemistry and biology department of the Academy of Sciences of the Republic of Uzbekistan run scientific seminars of various topics on a regular basis. To improve the public awareness, relevant events are included in scientific grants and implemented thereunder.

Over the period from 2015 to 2018, 10 biodiversity related conferences took place in Uzbekistan.

One of the most important special government publications on nature protection is the Red Book of Threatened Animal Species. On the one hand, it is documentary evidence of the process of extinction of animal species while, on the other hand, it serves as a basis for conservation action plans. The list is also meant to draw attention of government, public and scientific organizations and the general public to problems of protection of the fauna of Uzbekistan. Publication of the Threatened Species List is the basis for additional measures to organize protection and ensure reproduction of the fauna, as well as for research of species whose occurrence and numbers are not sufficiently well known. This publication is also commonly used by professors in their teaching activities.

The National University of Uzbekistan Named after Mirzo-Ulugbek has a sustainable development training center. The Ministry of Higher and Vocational Education created the Sustainable Development Education sector within the training methodology association for

production technology and environmental protection. *Therefore, the measures taken were partially effective.*

Indicator 2.4: By 2025, the majority of teachers of general education institutions understand the importance of biodiversity and ecosystem services for future development of the country.

The teachers of general education institutions serve for the future generations as guides into the knowledge about biodiversity. Ecological study groups, out-of-school activities, excursions, hikes and walks into recreation parks of the cities are organized in many schools of Uzbekistan. Female teachers play a major role in environmental educational process. It may be explained not only by the reason that female teachers prevail in quantity, but also by the fact that a woman initially feels being responsible for children's future; she puts her best efforts to do everything possible for future generations to live in harmony with nature, save and conserve the environment.

Teachers together with their students participate in organizing and carrying the events of international environment protection programs. For example, Spring Alive international project under BirdLife Partners program unites children, their teachers and parents involving them into observing five wide-spread and readily recognizable migrating birds. This project is aimed at encouragement of children's interest in nature and preservation of migrating birds as well as involvement of children in participating in various events aimed at preservation of birds and other animals. Within the framework of this activity 518 children and 1330 adults (145 of them were teachers) took part in bird count activities and other events in the Republic of Uzbekistan in 2016.

The teachers of general education institutions organize the children's participation in competitions and exhibitions devoted to biodiversity. Children participated in them with great pleasure and learned to be attentive and careful towards nature; they transferred it to the visitors of exhibitions through their works. Within the project of European Union *Forest and biodiversity governance including environmental monitoring (FLERMONECA)* a competitive on-line exhibition of children's drawings named *Wild nature of Uzbekistan* was organized in 2015. The works of the competition winners were used for preparing a colorful calendar which was published and widespread in educational institutions of Uzbekistan. *Therefore, the measures taken were partially effective.*

Indicator 2.5: By 2020, the educational programs in the sphere of biodiversity are included into the learning process in all educational institutions.

At present ecology and related subjects are included in all curriculums of higher education institutions of the Republic of Uzbekistan. Approximately 320 environmental professionals are prepared annually. Training and on-the-job practices as well as preparation of graduation works are carried out at State Committee for Environmental Protection.

The specialists carrying out activity in the sphere of environmental protection under State Committee for Environmental Protection and the employees of ministries and agencies, who are responsible for ecology, improve their ecological knowledge in Training and skills improvement center.

It is critically important to prepare and publish student's books, study guides, educational materials, educational movies and multimedia materials on a wide range of environment protection issues including the topic of biodiversity conservation. The following study guides are published: *Ecology* for students of vocational education institutions and vocational schools; *Conservation and sustainable use of biodiversity resources of main ecosystems of Uzbekistan*, *Ekologiya va Barkaror tarakkiyot ta'limi*, *Environmental law*, and *Theoretical foundations of ecology*. The following books are published: collection of research papers *Eksperimental biologiya va ekologiya*; *Saiga is a natural wonder*; study guide *Theoretical foundations of ecology*, monograph *Flora of Zaamin State Nature Reserve*, monograph *Sangzor daryosining usimliklar koplami* and many others. The following education materials are prepared and published: *Biodiversity conservation while developing oil and gas sector as well as other*

industrial and agricultural development of the territories and Guidelines on methods of biodiversity conservation in oil and gas sector of Uzbekistan arid ecosystem.

Alongside with the target groups, which are distinguished in the project as focal ones (decision-making people, managers of local administration, teachers of higher education institutions, teachers of secondary education schools) a variety of activities targeted at wide audience is carried out.

The work being performed by Tashkent botanic garden named after academician F.N. Rusanov serves for the purposes of consciousness of biodiversity value and development of love towards nature. The garden collection contains up to 6000 of plant species, types and varieties. Lately the botanic garden became a favorite recreation place of Tashkent residents and a popular place for running various ecological events with participation of students from various educational institutions.

There are several vast zoological collections in Uzbekistan. The zoological collection of National University of Uzbekistan and the zoological collection of the Academy of Sciences of Uzbekistan are ones of the largest scientific funds on the territory of Central Asia. For the purposes of increasing awareness of all stakeholders a web-site devoted to zoological collection of Uzbekistan <http://www.zool-col.uz> is created, where information about 7 zoological collections of the country is published.

The component on increasing awareness and level of knowledge of the natural resource users and decision-making people is necessary for implementation of tasks of application-oriented and innovation grants. Thus, information and awareness-raising poster named *Human impact on mountain ecosystems of Uzbekistan* was developed and published within the framework of implementing applied grant *Assessment of negative impact on terrestrial vertebrate species aimed at developing suggestions for their conservation and sustainable use under current conditions in Uzbekistan* (2015-2017). It was aimed at using the project outcomes in educational purposes, summarizing and visual presentation of gained data about anthropogenic danger to diversity of mammals in mountain ecosystems. The main types of human impact on fauna of mountain ecosystems: arable farming, animal-breeding, slashing plants, infrastructure development, poaching and recreation; the information on traditional habitats: foothill and low-mountain relief, middle altitude and high mountains, as well as the location of protected natural areas in mountainous areas of Uzbekistan are described in the poster. The target audience of the poster is a wide range of natural resource users, local residents, teachers, students of schools, vocational education institutions etc.

The number of web-sites devoted to environment protection issues closely related to biodiversity conservation expands: www.eco.uz, www.ecoforum.uz, www.sreda.uz, www.uzspb.uz, www.tashzoo.uzsci.net, www.sgp.uz, www.cwr.uz, www.bird.uz etc. Special interest communities are created in social media, where the information on environment protection issues, which they are interested in, is actively interchanged. It is easy to find interesting information, discuss problems and gather people for thematic events in these communities. For instance, there are such communities as Society for Preservation of Birds in Uzbekistan, Wildlife of Uzbekistan, Revival of Chimgan forest, Steppe clubs community, ECOLOGiYA (ECOLOGY and Me) etc. in Facebook, and annually their number and the quantity of subscribers go up.

Eco-tourism is one of the ecosystem services which contributes to sustainable use of natural resources. In particular, national tour operators offer the following programs within the framework of eco-tourism: visiting upland villages in Nuratau mountains, Zaamin nature park, Bukhara special purpose nursery “Dzheiran”, Amu-Bukhara channel, Tudakul lake and Sarmysh natural boundaries, where one can see cave drawings made in the Bronze Age, accommodation in Yanikazgan yurt camp and much more.

Such types of eco-tourism as observing birds, wildlife photography and botanic trips are very popular among tourists. Being rich in biodiversity Uzbekistan has a huge potential in eco-tourism sphere. For instance, visiting Bukhara special purpose nursery “Dzheiran” eco-tourists

may observe more than 250 animal and plant species, 257 species of birds, 1200 species of invertebrates, 39 mammalian species, 20 species of reptiles and 18 fish species.

Standard rules of visiting protected natural areas were defined by Resolution of the CM No. 13 dated January 8, 2018 for the purposes of ensuring the citizens' rights for recreational, eco- and other types of tourism on the territory of protected natural areas. This legislative act even more facilitates the educational outreach activity on the territory of protected natural areas.

Informational visitor centers are created and functioning on the territory of certain protected natural areas in Uzbekistan, the main purpose of which is raising awareness among local residents and guests, development of ecological education and tourism. The visitors are familiarized with the protected natural area, informational campaigns are carried out, thematic talks are held, walking through ecological paths with a guide, lectures as well as audio visual presentations are organized in such centers. Organization of environmental awareness-building activities for visitors is one more important task of the center, that is related to specific character of PNA as they are environment protection, research-and-development and environmental education institutions.

Within the UNDP/GEF project: *Creation of Nuratau - Kyzylkum biosphere reserve as a model for biodiversity conservation in Uzbekistan* a visitor center was created in Nuratau natural reserve in 2004. In 2011 this center was further developed with support from the project *Development of Nuratau - Kyzylkum regional ecological informational visitor center in Farish district* under the Small Grants Programme of Global Environmental Facility (SGP GEF). In 2012 a visitor center was also created in Surkhan natural reserve within implementation of the project *Strengthening the stability of national system of protected natural areas by way of focusing on natural reserves*.

Information resource centers were created in Tashkent and regional centers within the OSCE project *Facilitating the Ecological movement in Uzbekistan in implementing measures aimed at environmental protection - Phase II*. Their purpose: full-fledged increase of the community's participation in environment protection activities not only in the center but also in all regions of the country, improvement of ecological knowledge and culture of residents, rendering methodological assistance to NNO and other civil society institutions working in the sphere of ecology as well as facilitating in providing the mass media with ecological information.

It is well-known that biological species census is necessary for high quality monitoring. Often there is a lack of potential and manpower: specialists - biologists. The community is helpful in this case. Young people participate in census activities upon biologists' invitation. Thus, such measures were carried out repeatedly in the territory of Bukhara special purpose nursery "Dzheiran", in the course of which the awareness of young people about biodiversity value and their understanding that careful attitude towards nature is necessary, was increased. Young enthusiasts-volunteers, students, pupils as well as journalists and local residents participated in fall census carried out in special purpose nursery "Dzheiran".

With the purpose of attracting communities' attention to the issues of biodiversity conservation the following international ecological dates are celebrated in Uzbekistan: World Wetlands Day, Earth Day, Water Day, World Environment Day, World Biodiversity Day, World Day to Combat Desertification etc. The celebration of these dates is organized by SCEEP, NNO and international projects implemented in the territory of the country.

Numerous events on the community awareness raising are held in the Republic of Uzbekistan, but these activities are discrete, and some directions are in need of strengthening. Special attention shall be paid to working with decision-makers that will create a stable basis for including the issues of biodiversity conservation into state and sectorial action plans. This will lead to defining this direction as being strategically important for the country development. Thus, *measures taken towards achievement of NT 2 were partially effective*.

Analysis of the degree of adequacy of the information used to monitor indicators, assessing the level of achievement of NT 2, shows that monitoring associated with this target is

partial. Particularly, this is due to the fact that the updated National Biodiversity Conservation Strategy and Action Plan for its implementation are at the approval stage..

Obstacles in the achievement of NT2:

- Lack of public awareness about the measures people can take to conserve and sustainably use BD;
- Insufficient focus on raising awareness of decision makers as the basis for integrating biodiversity conservation issues into state and sectoral development programs and plans;
- Lack of a systematic, integrated approach to raising awareness of various target groups based on the developed programs and action plans.

Measures, which may accelerate the achievement of NT 2:

- a) further raising awareness of both the value of the BD and the measures that people can take to conserve and use it sustainably;
- b) carrying out activities aimed at increasing resident's awareness about biodiversity value and measures which may be taken by them for its conservation and sustainable use;
- c) implementation of a mechanism of involving the community into decision-making process related to conservation and sustainable use of biodiversity as well as nature reserves management;
- d) development and implementation of target-oriented communications strategies;
- e) development of an incentive scheme for citizens' participation in biodiversity monitoring and conservation measures;
- f) involvement of marketing and communications experts to development and holding of informational campaigns;
- g) development and implementation of a system of monitoring and assessment of social awareness level in order to estimate the results, reveal the problems and endure a better decision-making;
- h) focusing on methodologies aimed at alteration of people's behavior and motivation;
- i) development of behavior alteration assessment methods related to improvement of level of knowledge about the value of biodiversity and ecosystems;
- j) collection and distribution of information about the possible influence of loss of biodiversity on various gender groups as well as about the specific contribution which may be made by the gender groups to achieve the national strategic aims and Aichi targets.

All the above stated measures will help to implement consistently the activities on informing the community and creating their awareness as well as form the society being conscious of biodiversity value and its significance for sustainable development of the country. It will be possible to elevate the activities on informing and knowledge improvement to a qualitatively new and consistent level when the RUz Government Resolution *On National Strategy and Action Plan for Biodiversity Conservation for 2018-2027* is officially adopted, which is now at the stage of approval.

National Target (NT) 3: Development of economic value assessment mechanisms for biodiversity and ecosystem services and their introduction into planning process.

Basing on the experience gained since the time of preparation of the first NBSAP as well as by means of analysis of previous planning and implementation processes, the evaluative approach to economic use of BD and ES for recognition of their actual economic value was defined as one of the strategic directions for conservation and sustainable use of biodiversity.

The measures developed for achieving NT 3 which were included into Action Plan for implementation of an updated NBSAP (it is transferred for consideration to CM of the RUz) are

as follows: 1. Creation of BD and ES economic value assessment mechanism by way of development of methodological recommendations and performance of BD and ES economic value assessment via examples of pilot territories; 2. Development of incentive mechanisms for protection, sustainable use and reproduction of biological resources by means of preparing a corresponding draft Resolution of the Cabinet of Ministers of the RUz, where the procedure and incentive mechanisms, aimed at conservation and sustainable use of ecosystems, are stipulated for natural resource users through granting them tax, credit and other benefits for carrying out the activity having environment protection and environmental remediation effect.

The developed measures are of legislative and regulatory nature (preparing a draft Resolution of the Cabinet of Ministers of the RUz, where the procedure and incentive mechanisms, aimed at conservation and sustainable use of BD components, are stipulated for natural resource users). They also have a financial nature - creation of BD and ES economic value assessment mechanism. The progress in implementation of measures aimed at NT 3 achieving will facilitate achieving all national targets in the sphere of BD as it will let increase the internal investment into BD and support of ES through implementation of their economic value assessment.

During the time which has passed from development of National goals and targets, certain measures were taken in the country aimed at achieving NT 3 and solving the issues related to development of economic value assessment mechanisms for BD and ES and their introduction into planning process. The indicators were developed to assess the progress in achieving NT 3 results, including the ones tracking the progress up to the year of 2020.

Indicator 3.1: By 2020, methodology and approaches to conduct economic valuation of biodiversity and ecosystem services are selected and adapted to the national specifics.

Indicator 3.2: By 2025, methods of economic valuation of biodiversity and ecosystem services are developed, approved and adopted at the national level.

The first experience in developing national approaches to economic assessment of ecosystem services in Uzbekistan was achieved within the framework of implementation of the FLERMONICA *Forest and biodiversity governance including environmental monitoring* project. The methodological approaches to ES economic assessment in the sphere of tourism were tested via example of Beldersay pilot section (Ugam-Chatkal national natural park), which is a popular place for tourism all year round (FLERMONICA report 2015). Following the results of the carried out estimations the total ES economic assessment in the sphere of tourism in Beldersay natural boundaries amounted to 1.3 million US dollars. Herewith, the total ES economic value of this territory is estimated as exceeding 6.3 million US dollars as it takes into account regulating and supporting services of ecosystems. Beldersay is the only pilot territory in Ugam-Chatkal national natural park where the economic assessment of ecosystem services was carried out. According to the developers' opinion the approaches to the economic assessment were selected randomly. The main target of the performed work was to demonstrate that the ecosystem services have a certain value and the methods of their economic assessment are various and specific and depend on the conditions, on type of the ecosystem services and the interests of the people making decisions on changing the environmental management conditions (FLERMONICA report, 2015).

Some time before, there were performed the activities on introduction of Payments (incentives) for ecosystem services (PES) concept into environment management system. In 2011-2013 CAREC implemented the project *Incentives for economic services: innovative economic tool for conservation of Uzbekistan ecosystems*, which was performed with the assistance of SCEEP. The project was implemented in the territory of Ugam-Chatkal national park. Two analytical reports on implementation of incentives for ES in Uzbekistan following the legislative-institutional and social and economic assessment were prepared within the framework of the project. Furthermore, two national seminars were held under the project implementation: *Prospects for further development of new economic incentive mechanisms for sustainable use of natural resources in the Republic of Uzbekistan: incentives for ecosystem services*.

The project was targeted at protection of BD and local mountain ecosystems in Uzbekistan by means of introduction of PES concept into environment management system. The main outcomes of the project were summarized to the fact that PES, a new tool for solving environment protection issues, turned out to be complicated both for perception and for developing PES schemes. The originality of the approach, necessity in alteration of stereotypes while implementing PES and timeliness of thinking out-of-the-box will become the main challenges in expanding PES schemes in Uzbekistan. The customary financing scheme remains to be more acceptable, thus the support from the state shall be a significant and necessary condition while implementing PES. It is notable, that such support is to greater extent sufficient in the form of the corresponding regulatory framework and general political willpower (CAREC report, 2013). Notwithstanding the complexity of perception due to the concept novelty, the project specialists managed to generate the suggestions on potentially acceptable PES schemes for the future. During this it was noted that the suggested PES tool may not be implemented in all spheres of environment protection activities. Due to originality of the approach it was recommended to search certain PES elements and introduce this tool into customary forms of environment protection activities. Following the results of the performed work it is generally recommended to carry out additional awareness-raising activities focused on PES promotion at the state level. Simultaneously it is necessary to develop and implement pilot PES schemes.

The development of forecasting potential for effects of alteration of factors affecting BD and ES as well as improvement of BD assessment methods play a key role as a base for defining social and environmental status of ecosystems, their condition, characterizing their capability to provide/render ES. It is worth mentioning the methodological progress with regard to aqueous ecosystems, for which methodological approaches for assessment of water quality and its environmental status are developed following the results of taxonomic analysis of biodiversity of priority indicator biocenosis, that is stated in detail in Section VII. *Updated information on biodiversity of the county. Biodiversity profile of aqueous ecosystems in Uzbekistan.*

A bioindication method is used within the current practice of systemic hydrobiological monitoring implemented by Uzhydromet. The method is based on taxonomic analysis of biodiversity, defining the presence of indicator species/taxons, corresponding to “high”, “basic” or “poor” environmental quality, in aqueous ecosystems. It lets us assess the biological class of water quality for transit ecosystems of river type and Invariant Ecological State of indicator biohydrocoenosis (BHC) which can be in the state of “ecological progress” or “ecological regress” depending on the degree of antropogenic factors’ impact. It also lets us estimate the possibility of transit ecosystems usage for various types of water use and ensuring other ES (*Consolidated matrix for assessment of biological class of water quality, environmental status and ecosystem services of water courses following the results of taxonomic analysis of priority indicator BHC (Periphyton, Zoobenthos) in the hydrobiological monitoring system of Uzhydromet*, Section VII). Such analysis lets us get closer to the complex analysis of social and environmental status of a water body as a possible stage of transferring to a fee-based water use.

The complexes of indicator taxons for Periphyton and Zoobenthos as well as integral structure coefficients of these BHC are defined which may have negative or positive trends corresponding to “ecological regress” or “ecological progress” of irrigation-waste water lakes (IWWL) being widespread in the zone of intensive consumption of surface run-off (RICA). It is of prime methodological importance for assessment of their social and environmental status and possibility to ensure ES. *A framework evaluation scheme of permissible (conditionally satisfactory) state of IWWL judging by the characteristics of taxonomic composition and structure of BHC of Periphyton and Zoobenthos* is proposed. Such characteristics may serve as an indicator value for lake ecosystem assessment provided that there is no clear ranking of IWWL ecosystems into safe (having a satisfactory environmental state) and adverse (having a unsatisfactory environmental state). The indicator characteristics of taxonomic composition and structure of BHC of Periphyton and Zoobenthos are proposed as a framework draft version for

assessment of environmentally permissible state of IWWL ecosystems, providing conservation of main ES.

The revealed trends as well as tested monitoring indicators and characteristics may be also applied at other wetlands of the region, including natural lakes, IWWL and sewers as well as for assessment of their condition in view of planned reconstruction of hydrographic network or their supposed development and management.

Thus, basing on the results of consistent monitoring of BD of priority indicator BHC, regional indicator schemes for assessment of water quality and environmental status of diverse aqueous systems are proposed, which let us judge about their potential in providing various ES. This let us consider the achieved results as an initial stage of NT 3 implementation – in compliance with **indicator: 3.1:** By the year of 2020 the methodology and approaches for economic value assessment for BD and ES are chosen and adapted to national specifics.

Further development of this direction shall be quite likely implemented through the stages of generating: a) *classification* and b) *assessment schemes* for substantiating the ES value assessment and defining payment rate for ES (PES). *The First stage is ecological*, which supposes ranking/classification of ecosystems basing on their ranking to “high”, “basic” and “poor” quality. It is aimed at revealing their potential in ES providing. *The second stage is economic*, which supposes ES value assessment schemes being developed and PES level being defined by economists. In doing this it is possible to use general criteria of environmentally permissible state which were previously developed for aqueous systems, whereby three main categories of natural objects are defined: 1) conservation and preserved natural areas having “high” environmental quality; 2) natural areas experiencing a moderate human-induced impact which correspond to “basic” quality; 3) natural areas, the ecosystems of which are transformed to a great extent, experiencing intensive human-induced impact and characterized as having “poor” environmental quality.

Within the implementation of the UNDP/GEF project *Sustainable management of natural and forest resources in key mountain regions which are important for globally significant biodiversity species* (2018-2021) the activities on ES economical assessment of mountain ecosystems of Snow Leopard are planned. These activities include direct and indirect assessment of supporting services (food, wood, water), controlling services (climatic control, water control, soil preservation), culture services (cultural diversity, spiritual and religious values), backup services (soil production, soil preservation), within the habitat of Snow Leopard in Uzbekistan.

During the time which has passed from development of National goals and targets, the assessment of only certain ecosystem services at pilot territories were carried out under international projects implementation. The results of such experience are not summarized and implemented into the processes of conservation and sustainable use of BD and ES. *Therefore, the undertaken measures may be assessed as partially effective.*

Analysis of the degree of adequacy of the information used to monitor indicators, assessing the level of achievement of NT 3, shows that monitoring associated with this goal is partial. Particularly, this is due to the fact that the updated National Biodiversity Conservation Strategy and Action Plan for its implementation are at the stage of approval.

Obstacles in the achievement of NT 3

- The lack of a systematic approach to the economic assessment of BD and ecosystem services (ES) does not allow account the full scope of their benefits;
- Evaluation of only individual ESs in the pilot areas;
- The results of the developments are not generalized and not introduced into the processes of conservation and sustainable use of the BD;
- There are no plans to integrate the economic value of the BD into the national development strategy, planning processes, the national accounting system.

The analysis of main methodological approaches to BD economic assessment and their adaptation for implementation at the national and their application at subnational level continues to be relevant for formation of optimal management decisions on efficient use and maintenance of ES potential in Uzbekistan at all levels.

Measures, which may accelerate the achievement of NT 3

Following the advisory process with stakeholders and taking into account the conclusions drawn by the Global Biodiversity Outlook 4, the following measures which may accelerate achieving NT 3 were defined:

- a) Analysis of existing methodological approaches to ecosystem services economic assessment and evaluation of possibility of their implementation under conditions in Uzbekistan;
- b) Development of national approaches to economic value assessment of biodiversity and ecosystem services;
- c) Preparation of national experts for economic value assessment of components of biodiversity and ecosystem services;
- d) Identification of main ecosystem services, estimation of their economic value, identification of beneficiary of a service and formation of payment (compensation) mechanism for ecosystem services.
- e) Further increasing of awareness level and distribution of information about value of biodiversity and corresponding ecosystem services with the aim of expressing more complete idea of biodiversity in decision-making in all sectors of economy;
- f) Assessment of existing and planned state polity which exerts an impact and influence on biodiversity and defining the possibilities to take into account conservation and sustainable use of biodiversity;
- g) Monitoring of outcome of innovations in the sphere of application of economic mechanisms and BD economic assessment.

National Target (NT) 4: Development and integration of mechanisms to evaluate impact of economic and other activities on biodiversity into state Environmental Impact Assessment (EIA) procedure.

The measures developed for achieving NT 4 which were included into Action Plan for implementation of an updated NBSAP (at present it is under consideration) are as follows: 1. Improvement of legislation in the sphere of environment impact assessment where the issues of biological diversity and ecosystem services are included in the Environmental Impact Assessment (EIA) procedure; 2. Development of a legislative framework in the sphere of insurance against risks of ecological damage and economic loss in order to ensure a complex approach to ecological safety issues.

The developed measures are of legislative and regulatory nature: Preparing laws and regulations on introduction of alterations and amendments into legislation on environment impact assessment; Preparing a draft Law of the Republic of Uzbekistan *On environmental insurance*. They also have a financial nature as regulation of relations in the sphere of environmental insurance of liability of legal entities and individuals carrying out business operations and other activities will be stipulated in the law.

During the time which has passed from development of National goals and targets, certain measures for achieving NT 4 aimed at improvement of legislation in the sphere of environment impact assessment were taken in the country. The indicators were developed to assess the progress in achieving NT 4 results, including the ones tracking the progress up to the year of 2020.

Indicator 4.1: By 2020, the legislation that relate to the Environmental Impact Assessment (EIA) fully considers the issues of biodiversity and ecosystem services conservation.

The project is prepared with the aim of further improvement of the order of development, endorsement, and approval for carrying out state environment impact assessment as well as eliminating the possibility of divergent interpretation, wrong or inconsistent practical application. On November 22, 2018, the Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 949 “On approval of the Regulation on State Ecological Expertise” was adopted. The decree in the new edition approved the “Regulations on the State Ecological Expertise”, as well as amended the Regulations on the procedure for the development and coordination of draft environmental standards, approved by Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 14 of January 21, 2014. The document provides the procedure for the formation and functioning of the Commission and the Expert Council, clarifies the procedure for drawing up the conclusion of the state environmental review. Adopted an updated list of activities for which the state environmental review.

The regulation on environment audit was adopted by Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 286 dated October 8, 2015 *On approval of laws and regulations in the sphere of environmental monitoring.*

The experience in developing mechanisms to evaluate impact of economic and other activities on biological diversity and their introduction into state environmental impact assessment procedure was fulfilled by UNDP/GEF/SCEEP project *Integration of biodiversity conservation principles in oil and gas sector of Uzbekistan*. A list of recommendations related to improvement of environment impact assessment procedure was prepared under the project.

While designing and constructing the objects and implementing the activities the following environment protection measures shall be taken consistently:

- preventing negative impact on environment and citizens’ health;
- reducing such impact if it is impossible to prevent it partially or completely;
- remediation of natural objects and complexes if it was impossible to take partially or completely measures aimed at prevention and/or reducing negative impact on them;
- compensation of inevitable biodiversity losses if it is impossible to remediate the species of wild fauna and flora at the place of their growth (habitat) by and/or at the cost of legal entities the planned or performed activity of which leads to such losses. Compensation of inevitable biodiversity losses includes the measures on remediation of the species of wild fauna and flora and the place of their growth (habitat) at another territory(ies) with similar climatic and natural conditions. Compensation shall cover at least remediation of the species of wild fauna and flora and the place of their growth (habitat) at the territory(ies) of similar size or larger one(s) and the main species composition of wild fauna and flora growing (inhabiting) the degraded plot(s).

The indicated measures shall be taken into account while preparing the materials for environment impact evaluation and carrying out state environment impact assessment and environment audit.

Besides, within the framework of implementation of the above-named project *Guidelines on methods of biodiversity conservation in oil and gas sector of Uzbekistan arid ecosystem* was prepared and published. Types of environment impact, the whole operation cycle of oil and gas companies: starting from oil and natural gas exploration to their processing as well as possible environmental protection measures aimed at preventing their consequences, minimization of their impact and biodiversity remediation are stated there. The international best practices of environment impact evaluation and suggestions on EIA procedure improvement as related to biodiversity conservation in Uzbekistan are described in the *Guidelines*. The *Guidelines* is distributed among all interested ministries and agencies as well as industry-specific higher education institutions.

Actualization of issues related to NT 4 achieving, adoption of the resolution of the Cabinet of Ministers of the Republic of Uzbekistan, preparing recommendations on

improvement of environment impact assessment procedure and the corresponding legislative acts in this sphere are good indicators on the way to achieve this target, however these measures demand additional efforts on their practical implementation. *Therefore, the undertaken measures were partially effective.*

Indicator 4.2: By 2020, the schemes to regulate compensation principle for inevitable / residual damage to biodiversity are developed and pilot testing is conducted.

The experience on development of schemes for regulation of compensation principle for inevitable/residual biodiversity losses while designing objects and their further constructing as well as other economic activity was performed within the framework of project implementation. In the period when UNDP/GEF/SCEEP project *Integration of biodiversity conservation principles in oil and gas sector of Uzbekistan* was implemented, Ustyurt gas and chemical complex was under construction on Ustyurt Plateau. The customer of this project was UzKorGazChemical, a joint Uzbek-Korean company, which developed and approved an Action plan for biodiversity conservation for the construction period. Up to the end of the project implementation the funds were invested in biodiversity conservation on the territory of 625.5 ha, which was destroyed during construction. Furthermore the works on remediation of natural vegetation (sowing seeds) on the area of 50 ha of destroyed Ustyurt gas and chemical complex were performed under the project. The gained result showed that it is possible to remediate the vegetation at minimum expense with the suggested method which is most similar to natural processes.

One of the measures developed for NT 4 achieving is development of a legislative framework in the sphere of insurance against risks of ecological damage and economic loss in order to ensure a complex approach to ecological safety issues, and that will let us form environmental insurance system with due consideration of various risks for biodiversity. The environmental insurance system shall ensure the maximum compensation for damage caused to wildlife as a result of emergencies and other unforeseen consequences of economic activity, but such a system is not developed yet.

During the time which has passed from development of National goals and targets, the experience on development and implementation of schemes for regulation of compensation principle for inevitable/residual biodiversity losses was implemented within implementation of UNDP/GEF/SCEEP project *Integration of biodiversity conservation principles in oil and gas sector of Uzbekistan*. It is critical to such innovative approaches that legislative framework is further developed, and innovative approaches are tested collaboratively by SCEEP, oil and gas companies, responsible national state agencies and international technical assistance donors. The results of such experience are summarized, and a list of recommendations related to improvement of environment impact assessment procedure with due consideration of the international best practices was prepared on this ground. *Guidelines on methods of biodiversity conservation in oil and gas sector of Uzbekistan arid ecosystem* was prepared and published and it was distributed among all interested ministries and agencies as well as industry-specific higher education institutions which contributed to introduction of developments into processes of conservation and sustainable use of biodiversity and ecosystem services. *The undertaken measures were partially effective* as formation of environmental insurance system with due consideration of various risks for biodiversity is only indicated yet as a necessary condition for ensuring a complex approach to ecological safety issues.

Indicator 4.3: By 2025, payment for pollution of the environment and special use of natural resources on the basis of an estimate of their value is mandatory applied.

Indicator 4.3 is designed for the long term. Considering this, as well as the fact that the main methodological approaches to the economic assessment of BD and their adaptation for use at the national level in order to form optimal management decisions, are at the stage of development and testing (see the NT 3), this indicator was not used for the final assessment results for NT 4.

Obstacles in the achievement of NT 4

- The absence of mandatory requirements for assessing the impact on wild flora and fauna in the relevant legislation. Thus, the Resolution of the Cabinet of Ministers of the Republic of Uzbekistan “On Approval of the Regulation on State Ecological Expertise in the Republic of Uzbekistan” still does not fully take into account issues of biodiversity conservation and ecosystem services. In particular, the requirements for the materials of the environmental impact assessment focus, as in the previous edition, on emissions and discharges of pollutants, waste, do not reflect the impacts on the components of flora and fauna. In addition, the requirements for the submitted materials of the environmental impact assessment are still not provided for a hierarchy of environmental requirements. In particular, environmental measures are not aimed, first of all, at preventing, then at reducing the negative impact on natural objects, and if they are impossible - at restoring natural objects and, including, restoring flora and fauna in another territory (compensation for losses due to biodiversity). Currently, the EIA in Uzbekistan includes a detailed assessment of the impact on air, water and soil, however, the impact on biodiversity is considered superficial and provides the most general information about the biodiversity of the territory.
- The regulatory framework for the principle of compensation for inevitable / residual damage caused by the BD was developed and applied only within the framework of the project activities and was not widely used in environmental practice;
- Lack of an established environmental insurance system taking into account various risks for the BD.

Measures which may accelerate achieving NT 4

Following the advisory process with stakeholders and taking into account the conclusions drawn by the Global Biodiversity Outlook 4, the following measures which may accelerate achieving NT 4 were defined:

- a) Further improvement of legislation in the sphere of environment impact assessment where the issues of assessment of biological diversity and ecosystem services are included in EIA procedure;
- b) Development of a legislative framework in the sphere of insurance against risks of ecological damage and economic loss caused while performing economic and other activity;
- c) A base assessment of anticipated impact on biodiversity shall be included in environment impact assessment procedure for all the project where EIA is obligatory;
- d) Further development and implementation of international experience and foreign practices of legal regulation of relations in regards to environment impact evaluation and environment audit at a national level.
- e) Practical application of Performance Standard No. 6 (PS 6) of International Finance Corporation (IFC, the Republic of Uzbekistan became a member of IFC on September 30, 1993), which includes the concept of hierarchy of measures aimed at mitigation of impact on biodiversity: firstly, to prevent the impact; minimize it where it is impossible; further, remediate the disturbed biodiversity and compensate the residual biodiversity losses where it is impossible to minimize the consequences.

National Target 5: Development and start of implementing a set of measures aimed at cutting down pace of degradation and fragmentation of most tender natural ecological systems

Since the time when 5th National Report has been prepared, the changes which happened in the sphere of degradation of lands and forest resources were analyzed.

Since the end of 2016 a range of reforms was put in place in the sphere of forestry which resulted in significant enlargement of the volume of the forestry fund land area. At present this

indicator is 25.2% whereas in the first years of independence the state forestry fund land was not more than 5.3%.

Nevertheless, there is a necessity in implementation of effective measures ensuring enhancement of this industry efficiency: large-scale implementation of system of arboriculture, protection and efficient use of forests; creation and enlargement of plantations for growing ornamental and fruit trees and bushes, especially seedlings and transplanted plants of common jujube, pistachio, walnut-tree and other types of trees on an industrial scale.

Special priority shall be accorded to creation of institutions specializing in growing medicinal herbs, processing their raw materials and ensuring their working with full loading.

The following does not satisfy modern requirements: the scale and efficiency of undertaken measures on growing transplanted plants of ornamental trees and brushwoods, which are adapted to edaphoclimatic conditions of regions of the country, development of scientific-based promising technologies, creation of new exportable cultivar of transplanted plants, arranging selection activities.

Besides, the development of the industry, including as it relates to the activities on selection, protection and efficient use of forests, is also hindered by obsolete and worn-out material and technical foundation of the industry, insufficiency of works on its modernization and attracting grants from International Financial Institutions and donor organizations, insufficient number of qualified specialists in the industry, low motivation level of the specialists working in the industry, staff turnover as well as presence of regulations, having no action-oriented content and mechanism for implementation, in forestry legislation.

The following measures were developed for achieving NT 5, the efficiency of which was evaluated by the following indicators:

Indicator 5.1: By 2020, the processes of degradation and fragmentation of the most vulnerable natural ecosystems are studied and a set of measures to reduce the rate of these processes is developed;

There will be a prioritization of ecosystems studied in order to obtain empirical information from the field from most vulnerable and threatened areas

Indicator 5.2: By 2020, a set of measures to reduce the rate of degradation and fragmentation of the most vulnerable natural ecosystems is included in the process of sectoral planning;

Resolution of the President of the RUz No. 5041 dated May 11, 2017 *On creation of State Committee on Forestry of the Republic of Uzbekistan* and Resolution of the President of the RUz No. 2966 dated May 11, 2017 *On organizing the activities of State Committee on Forestry of the Republic of Uzbekistan* was issued. It aims to ensure efficient implementation of state policy, improvement of public administration system in the sphere of forestry, rational use of forest resources as well as to complete other tasks stipulated in National program of Action Strategy on five priority areas of development of the Republic of Uzbekistan in 2017-2021 and with the purposes of elimination of existing challenges and further development of forestry..

In compliance with the Resolution the industry management structure was improved by means of transforming the Main forestry directorate under the Ministry of Agriculture and Water Resources of the RUz into autonomous State Committee on Forestry of the Republic of Uzbekistan.

Indicators 5.3 and 5.4 are long-term indicators and the assessment of their completion is was not carried out.

In order to address the challenges related to degradation of lands in the country, Urmonkurilish state unitary enterprise was created within the structure of State Committee on Forestry by Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 422 dated June 5, 2018 *On measures aimed at creation and reconstruction of protective forest planting for protection of irrigated land from erosion and protection of waterworks facilities from sanding.*

Table 14. Indexes of area of forests created under the system of State Committee on Forestry

Year	Total area of created forest (thous. ha)					Harvesting of seeds for growing seedlings (tons)	Annual growth of propagation material (Mln. pcs.)
	Total	including					
		forest sowing	forest planting	facilitating natural regeneration	Including: on the bottom of the Aral Sea		
2014	44	6.4	20	17.6	16.8	136.0	52.1
2015	44	7.4	18.3	17.8	18.0	138.3	48.6
2016	44	9.3	19	15.2	18.2	176.3	49.1
2017	45	17.9	18.7	7.96	18.8	181.8	49.2
2018	47	20.8	19.75	6.25	19.04	288.9	52.9

Following the results of assessment of implementation degree of measures on forest creation, such measures may be evaluated as *efficient* (table 14).

Nevertheless, there is a certain potential for forest breeding by way of creating of industrial plantations, but at present it is limited by shortage or lack of water for forest industry.

Analysis of the degree of adequacy of the information used to monitor indicators, assessing the level of achievement of NT 5, shows that monitoring associated with this goal is partial. Particularly, this is due to the fact that the updated National Biodiversity Conservation Strategy and Action Plan for its implementation are at the stage of approval.

Obstacles in the achievement of NT 5

The following challenges shall be noted in the sphere of conservation and development of forestry fund of the country:

- absence of forestry legislation focused on stipulating the site standard for grazing (permissible quantity of hectares per 1 small ruminant and large cattle and other domestic animals) and durability of the season of grazing areas use (how many years it is permitted to use certain grazing areas and how much time it takes to remediate such place);
- insufficient level of control and monitoring over creation and protection of forest and forest resources, meeting international requirements;
- poor financial and technical base;
- insufficient number of qualified staff;
- absence of regularly updated database on forest resources (the last inventory of state forestforest was carried out in 1988);
- low level of interaction between holders of forestforests, other economic sectors and government agencies.

Measures, which may accelerate the achievement of NT 5

- a) Further improvement of institutional and legislative framework of forestry;
- b) Development of forest resources management system;
- c) Further development of financial and technical base of forestry;
- d) Improvement of integrated planning mechanisms for processes of sustainable management of forest resources;
- e) Integration of efforts for collaboration between government agencies, holders of forestforests and other economic industries.
- f) Supporting measures are taking to have active action in the preparation of funding proposals for financing adaptation-mitigation initiatives in biodiversity conservation to reduce ecosystems fragmentation

- g) Exploration of funding mechanisms such as REDD+ that will specifically target the forest sector

National Target 6: Ensuring sustainable use of biological resources of water bodies basing on improved legislative and methodological framework

During the time which has passed from development of National goals and targets, certain measures for achieving NT 6 aimed at ensuring sustainable use of biological resources of water bodies were taken in the country. The indicators were developed to assess the progress in achieving NT 6 results, including the ones tracking the progress up to the year of 2020.

The legal and regulatory framework on fishing industry was substantially changed in the country and that contributed greatly to achieving NT 6. There was adopted 1 law, 3 decrees of the President of the RUz and 4 Resolutions of the Cabinet of Ministers.

Indicator 6.1: By 2020, the amendments and adjustments are introduced into the regulations on the fishery activity in comparison to 2015.

1) The Law of the RUz No. ZRU-408 dated September 19, 2016 *On protection and use of wildlife* was adopted in a new edition.

The articles related to fishing are extended in the law. The Article *Terms of conducting fishing* is introduced, where it is stated:

“Sport and amateur fishery in water bodies is permitted for free or for a fee on assigned areas of hunting and fishing entities, provided that permits (vouchers, hunting cards) are issued by these entities, excluding the water bodies located on the territory of state nature reserves, protected areas of natural parks and state biosphere reserves.

Sport and amateur fishery in natural water bodies, fishery reservoirs and pond fish farms assigned to fishing and fish-farming organization is permitted only provided that permits (vouchers, hunting cards) are issued by these entities.

Commercial fishing on natural water bodies (excluding fishing and fish-farming organizations, pond fish farms, main channels, collectors and small rivers) is permitted for legal entities and individuals in the procedure stipulated by the Cabinet of Ministers of the Republic of Uzbekistan.

By the decision of SCEEP the periods when fishing is prohibited are set for the spawning season.

The application of tools and methods of catching, prohibited by the rules in the sphere of protection and use of wildlife, is not permitted for fishing.”

2) Ubekbaliksanoat Association was created by Resolution of the President of the RUz No. PP-2939 dated May 1, 2017 *On measures for improvement of fishery industry management system*. The main targets of the Association are as follows:

- facilitating the institutions and entities of fishery industry in organizing reproduction of valuable fish species for further stocking natural and artificial water bodies with fish;
- rational use of resources of natural and artificial water bodies;
- increase of fisheries catching volume by means of large-scale implementation of up-to-date intensive technologies, including cage culture fishery, and yield enhancement in natural and artificial water bodies;
- coordinated implementation of project measures on fishery industry development, consistent implementation of a uniform research and development, technological, investment and export policy as well as monitoring of prices on internal and external markets;
- conducting scientific research for further implementation of developed innovative technologies into the process of fish production and processing.

The natural water bodies are assigned to Ubekbaliksanoat Association for dedicated use on a permanent basis to develop the fishery industry.

3) By Resolution of the President of the RUz No. PP-3505 dated February 3, 2018 *On additional measures for increase of fish breeding volumes in 2018* the priority tasks in the sphere of industry development are defined as follows:

- organization of fishery on a scientific basis, construction of hatching areas and fishing and fish-farming organizations, modernization and enlargement of existing reservoirs;
- increase of fish breeding volume in the country by means of large-scale implementation of up-to-date intensive technologies, including installation of cage culture fishery tools, creation of artificial water bodies and constructions with closed water supply circuit as well as organization of fishing on rice paddies;
- strengthening of fishery fodder resources by means of organization of new production facilities and modernization of old ones for production of complete and enriched feed for fishes;
- organization of commercial fishing, introduction of up-to-date technologies on processing and packaging fish products, building the export capacity of the industry;
- providing the fish-farms with current assets aimed at strengthening their material and technical foundation, attracting bank loans, foreign investment and other sources permitted by legislation for implementation of measures on increase of production of fish and fish products.

The following projected parameters for the year of 2018 are approved by the same resolution: stocking water bodies with fish, breeding and catching of fish, creation of modern constructions and tools for fish breeding, supply of combined feed and artificial fertilizers, organization of fishing and fish-farming organizations, breeding stocking material and creating new facilities for fish storage and processing.

4) “Balik ishlab chikaruvchi” (Fish Producer) free economic zone was created in Quyi Chirchiq district of Tashkent province and Program of measures for facilitated innovative development of fishery industry in the country for the years of 2018-2023 was approved by Resolution of the President of the RUz No. PP-3657 dated April 6, 2018 *On additional measures for facilitated development of fishery industry*.

Furthermore, by Resolution of the President of the RUz No. PP-3671 dated April 17, 2018 *On measures for organization of activity of the Ministry of Agriculture of the Republic of Uzbekistan* a Fisheries Office was created within the structure of the central administration of the ministry and Fisheries departments were created at its local agencies.

5) By the Decree of the President of the Republic of Uzbekistan dated November 6, 2018 No. PP-4005 “On additional measures for the further development of the fish industry” for 2019 the following were approved:

- forecast parameters of production and fish catch;
- forecast parameters of the construction of buildings and facilities for the production of fish;
- predict parameters for the provision of fish farms with compound feed and mineral fertilizers (ammophos);
- predict parameters for the creation of reproductive pools, the production of fry, as well as the processing and storage of fish products.

Approved the proposal to create fish clusters, specializing in integrated production (hatcheries, fish and fry production, fish food with high protein content, processing and storage) in the fish industry.

Exempted from November 1, 2021 from customs duties (except for customs clearance fees) according to the lists formed in the prescribed manner:

- breeding fish stock, breeding fish caviar, as well as equipment, inventory, mechanisms and spare parts not produced in the republic, necessary for incubation, laboratories, intensive fish

farming, fish catch, fish processing, fish cooling and storage, equipment for providing alternative energy, specialized equipment for land reclamation and vehicles for transporting live fish;

- Feed and mineral fertilizers (ammophos), imported from abroad by foreign organizations and their subsidiaries, brand stores, dealer network and business entities for the needs of fish farms.

In addition, by the Decree of the President of the Republic of Uzbekistan No. PP-3671 "On measures to organize the activities of the Ministry of Agriculture of the Republic of Uzbekistan" dated April 17, 2018, a fishery department was established in the structure of the central office of the ministry, and fishery departments in territorial bodies of the ministry.

6) By Resolution of the Cabinet of Ministers of the RUz No. 124 dated March 7, 2017 *On organizational measures for ensuring rational use of biological resources of Aydar-Arnasay lake system* the state unitary enterprise Directorate of Aydar-Arnasay lake system was created, to which Aydar-Arnasay lake system, located on the territory of Jizzakh and Navoiy provinces, was assigned for dedicated use on a permanent basis to develop the fishery industry. The Regulation on procedure for providing the fisheries with areas of Aydar-Arnasay lake system and commercial fishing was approved.

A Set of measures for development and rational use of biological resources of Aydar-Arnasay lake system was approved by the same resolution.

7) The Regulation on giving the areas of natural water bodies in rent to fisheries for commercial fishing as well as calculating and collecting rent for the use of natural water bodies was approved by Resolution of the Cabinet of Ministers of the RUz No. 593 dated August 7, 2017 *On measures for giving the areas of natural water bodies in rent to fisheries and creation of fishery development fund*.

In compliance with this resolution the commercial fishing on natural water bodies is carried out under the contract concluded between the fishery and Ubekbaliksanoat Association.

8) Resolution of the Cabinet of Ministers of the RUz No. 719 dated September 13, 2017 *On measures for overall development of fishery industry*. A comprehensive plan for fishery industry development for the years of 2017-2021 as well as targeted parameters for fishery industry development for the years of 2017-2021 were approved by this resolution.

The undertaken measures were effective, but their practical implementation demands further additional development.

Indicator 6.2: By 2025, the productivity of water bodies is increased in comparison to 2015.

In 40s-50s years of the XXth century the fish catching from natural water bodies amounted to 22-24 thousand tons per year, in 1990 the catching amounted to only 6.1 thousand tons, but in pond fish farms 20.5 thousand tons of fish was bred. Starting from 1990s there is a general decline in fishery industry of the country in terms of decreasing volume of both fish catching and breeding. In the years of 1988-1992 fish catching in the country amounted to from 6134.2 to 8184.5 tons, that is 6389.2 tons per year on average, and in the years of 2001-2007 the catching amounted to from 1927.8 to 3161.8 tons, that is 2550.7 tons per year on average. Wherefrom it is apparent that the catching volume for this period decreased by two and a half times.

The catching volume increased in a way from the year of 2008 till 2011. The average catching in these years amounted to 4439.6 tons per year. As compared to the years of 2001-2007 the catching volume increased by 1.7 times, but it was still less by 1.4 times as compared to the years of 1988-1992. Starting from 2012 there is an increase in figures showing the catching of fish in natural fishery reservoirs. According to statistics the catching volume amounted to 10662 tons in 2012 (in 2011 this figure was 5790 tons). In 2014 the catching volume amounted to 16153 tons; it is by 2.8 times more than in 2011. In 2016 the catching of fish in natural water bodies amounted to 27097 tons.

By Resolution of the President of the RUz No. PP-3505 dated February 3, 2018 the projected parameters for fish breeding in 2018 are approved, where the estimated catching of fish

in natural water bodies is 33815 tons, 16685 tons of which is for Aydar-Arnasay lake system and 3030 tons is for water bodies in Bukhara province. But according to the experts from the Academy of Science the permissible catching of fish in Aydar-Arnasay lake system is 7100 tons and 310 tons for water bodies in Bukhara province.

The undertaken measures were partially effective, as in 2016 the fish catching increased by 1.7 times as compared to 2014, mainly due to more intensive catching and implementation of supporting measures on certain water bodies (stocking with fish and regulating the structure of fish school). A heavy increase of fish catching in natural water bodies in recent years may adversely impact on the state of fishery resources.

Indicator 6.3: By 2025, the sustainable activity to restore fish stocks is being implemented.

Measures on implementing the program for protection and sustainable use of biological resources of fishery reservoirs

The following projects were under implementation in compliance with Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No.142 dated May 27, 2013 *On Environmental Action Plan for 2013-2017*:

1) Development of technologies for reproduction of threatened and endangered species of fish.

The works within the project were carried out by Khorezm Mamun Academy. The technology of breeding and feeding of large Amu Darya shovelnose under basin conditions is perfected. The formulation of feed specific for this fish is prepared. The development of artificial reproduction technology was impossible due to lack of mature adults.

2) Assessment of state of main commercial fish schools and defining quotas for annual permissible catching.

The assessment of state of main commercial fish schools in water bodies of Jizzakh, Navoiy, Bukhara and Samarkand provinces is performed. The recommendations on quotas for annual permissible catching in natural water bodies are prepared. Thus, the quota for annual permissible catching in Aydar-Arnasay lake system is 7100 tons, 320 tons for water bodies in Bukhara province and 170 tons for Samarkand province.

3) Development and implementation of cage culture fishery technology.

The cage culture fishery technology for plain reservoirs of Uzbekistan and a method of feeding fish with granular balanced feeding stuff are developed in the framework of the project. The formulation of feeding stuff, produced out of components available at the local market, is developed. The economic calculation of creating and carrying out activities of a cage culture fish-farm with the modal capacity of 20 tons of marketable carp per year is performed.

The guideline *The cage aquaculture is a promising fish-breeding system in Uzbekistan* is prepared and published for fish farmers.

In compliance with *A Set of activities for ensuring a stable environmental situation of natural water bodies of the country and rational use of biological resources*, approved by the Prime Minister of the Republic of Uzbekistan (No. 03-21-1 dated August 15, 2014), the project *Development of science-based recommendations for enlargement of fodder resources of Aydar-Arnasay lake system by way of introduction of forage organisms* was performed by Institute of Flora and Fauna Genofond (Gene Pool).

The undertaken measures were partially effective, as their practical implementation demands further additional development.

Analysis of the degree of adequacy of the information used to monitor indicators, assessing the level of achievement of NT 6, shows that monitoring associated with this goal is partial. Particularly, this is due to the fact that the updated National Biodiversity Conservation Strategy and Action Plan for its implementation are at the stage of approval.

Obstacles in the achievement of NT 6

In the area of ensuring the sustainable use of biological resources of water bodies, the following challenges shall be mentioned:

- Fishing in natural waters is performed on a quota-free basis, mainly based on the emerging demand;
- Reduction of water areas leased for commercial fishing, which is mainly caused by the high rent and, accordingly, non-profitability of the fishing enterprise;
- Lack of legislatively fixed economic incentive for fishing enterprises which protect and sustainably use fish resources in the form of concessionary payments for the use of fish resources;
- Absence of a monitoring service on the state of fishery water bodies and their biological resources on the territory of the regions engaged in fishing.

Measures, which may accelerate the achievement of NT 6

In order to sustainably use the fish resources of natural water bodies of the country, it is necessary to correct the existing legal acts, in particular:

- a) further improvement of the legislative and institutional framework for the use of fish resources;
- b) transfer the Aydar-Arnasay lake system from the State Tax Committee to the Association “Uzbekbaliksanoat”;
- c) to perform commercial fishing in natural waters bodies on the basis of quotas, to prevent overfishing and depletion of fish resources;
- d) to replace the rent for the water bodies, use with the fee for the fish resources use, i.e. for the amount of fish caught;
- e) provide for economic incentives for fishing enterprises that protect and sustainably use fish resources, improve the state of the fish habitats, in the form of benefits when paying for the use of fish resources;
- f) in order not to undermine the reserves and use of fish resources rationally, it is necessary to annually stock water bodies at the rate of not less than 50 pieces of young fish per 1 ha, as stipulated by the Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 593 dated August 7, 2017. To achieve this goal, it is necessary to increase the capacity of fish hatcheries for growing fish seed.
- g) for the Association “Uzbekbaliksanoat” and the SUE “Directorate of Aydar-Arnasay Lakes System” to strengthen control over the performance by all leased enterprises of their contractual obligations regarding protection, reproduction and rational use of fish resources;
- h) for the Association “Uzbekbaliksanoat” and the SUE “Directorate of Aydar-Arnasay Lakes System” to organize the provision of fishing enterprises with high-quality fishing gear, boats and motors. This requires its centralized supply. At present, fishing gear is delivered to the country illegally, the quality of the nets is very low, which greatly increases the risk of littering the water bodies with fishing line nets.
- i) stocking of natural water bodies to produce high-quality, durable planting material according to scientifically-based standards, with those fish species that are industrialized in a particular water body;
- j) it is necessary to establish a monitoring service on the state of fishery water bodies and their biological resources on the territories of the regions engaged in fishing. This service shall continuously monitor the state of natural water bodies and the rational use of their biological resources in order to discover changes, assess and forecast the state of ichthyofauna, food resources, hydrological and hydrochemical regime of water bodies.

National Target 7: *Expansion of the total area of protected natural areas in the country in order to create a national ecological network (PNAs of various categories), ensuring their effective management*

To implement the NT 7, some relevant measures were developed, and their effectiveness was assessed using indicators.

Indicator 7.1: By 2020, the necessary changes and amendments are introduced into the legislation on PNA.

Bylaws on implementation of the Law of the RUz “On Protected Natural Areas”:

1) In accordance with the Law, “Regulation on the Procedure for Developing Management Plans for Protected Natural Areas” was developed, approved by the Resolution of the Chairman of the State Committee for Nature Protection of the RUz (SCNP) dated January 5, 2012 and registered by the Ministry of Justice of the Republic of Uzbekistan No. 2325 dated February 6, 2012. This Regulation establishes the procedure for the development of management plans for protected natural areas and includes the Annex “The Format of a Management Plan for PNAs of the Republic of Uzbekistan”. In accordance with this Regulation, management plans have been prepared for reserves, national parks, biosphere reserve and “Dzheiran” nursery. The management plans for these areas have passed the State Environmental Impact Assessment in the established manner.

2) To regulate the maintenance of the state cadastre for PNA of the country, the specialists of the SCNP have created “Guidelines for Maintaining the State Cadastre of Protected Natural Areas of the Republic of Uzbekistan”. “Guidelines for Maintaining the State Cadastre of Protected Natural Areas of the Republic of Uzbekistan” were approved and put in force by the Resolution of the SCNP No. 89-TK dated April 05, 2011.

3) In accordance with the Law, the Resolution “On the Procedure for Maintaining a Passport of Protected Natural Areas” of the Cabinet of Ministers of the RUz No. 137 dated June 2, 2014 was adopted. In order to comply with this Resolution, there were prepared passports of all PNAs of the country in compliance with the requirements of the Resolution, and their register is posted on the website of the SCEEP (SCNP).

4) The measures to expand the existing and create new PNAs are also included in the PKM RUz “On the Comprehensive Program for Mitigation of Consequences of Aral Catastrophe, Rehabilitation and Social-Economic Development in the Aral Sea Coastal Area for 2015-2018” No. 255 dated August 29, 2015. The program includes such activities as creation of new PNAs in the Aral Sea region (creation of wildlife sanctuaries in the Republic of Karakalpakstan, in the Navoiy province, and the creation of PNAs with a stricter protection regime in the southern and northern parts of Ustyurt), expansion and development of existing PNAs.

Within the framework of the PKM RUz No. 142 and this Resolution, the complex (landscape) wildlife sanctuary “Saygachiy” has been created on the South Ustyurt plateau.

5) In order to organize access of citizens to the PNA, the PKM RUz “On Some Issues of Regulation of Visits in Protected Areas” No. 13 was adopted on January 8, 2018, which provides for:

- approval of the Model Rules for visiting PNAs and the Regulation on the procedure of charging for access of citizens to separate PNAs and services provided;
- stating payment for access to separate PNAs for recreational cultural, educational, health-improving, aesthetic, research and other purposes in the amount of 5 percent of the minimum wage per visitor per day.

6) To implement the norms of the Law, there was adopted the PKM RUz No. 339 dated May 4, 2018 “On approval of Legal Acts Aimed at Implementing the Regulation of the Law of the Republic of Uzbekistan “On Protected Natural Areas”, which is aimed at elimination of gaps in the legal regulation of certain PNA issues, provision of amenities to state bodies, legal entities

and individuals in preparation of documents in the course of formation of certain types of PNAs, and also in organization of their protection. The Resolution also approves:

- The Regulation on state reserves;
- The Regulation on state natural monuments;
- Model regulations on the natural park (national natural park and natural park of local significance); public (private) wildlife sanctuaries with and without the creation of a legal entity; public (private) natural nurseries with and without the creation of a legal entity;

These model regulations determine the status, goals, objectives, types, territory, regime, management, conditions of research, recreation and other activities on the territories, as well as their protection.

- The regulation on the procedure for ensuring the regime and organization of protection of protected natural areas establishes objectives and forms of protection. This includes the powers of legal entities entrusted with the protection, particularities of protection of certain PNA types, standards for limiting, suspending and terminating (prohibiting) activities and seizing products of illegal use of plant and animal wildlife on PNAs.

Thus, the regulatory basis for the development of the PNA system will be improved. A number of PKM RUz aimed at the creation of new PNAs, as well as their development, was adopted. However, in order to develop and improve the PNA system, it is necessary to adopt regulatory documents aimed at conducting research and monitoring, financing of PNAs, the procedure of creation of a PNA, and improving the staffing of PNAs. In this regard, the measure for implementation of the NT 7 can be assessed as *partially effective*.

Indicator 7.2: By 2020, the effectiveness of management of the PNA system is assessed in accordance with international practice

The new PNA classification takes into account the IUCN recommendations and allows to create a unified ecological network of PNAs of various regimes that provide a combination of environmental and economic interests. Such new categories and types of PNAs as complex (landscape) wildlife sanctuaries, PNAs for resource management, natural nurseries have been introduced. These categories allow to create such PNA types that will meet the objectives of protecting natural objects and landscape complexes and the interests of the population and economic entities on these territories. This will increase the total area of PNAs and help to approach to the requirements of Global Aichi Goals by this indicator.

Institutional measures

In accordance with the Decree of the President of the RUz No. UP-5024 dated April 21, 2017 "On Improving the System of Public Administration in the Field of Ecology and Environmental Protection", the State Committee on Nature Protection was transformed into the State Committee on Ecology and Environmental Protection. The Resolution of the President of the RUz No. PP-2915 dated April 21, 2017 approved the organizational structure of the SCEEP. In accordance with this Resolution, the structure of the Committee includes the Gissar State Reserve, the complex (landscape) wildlife sanctuary "Saygachiy" and the Bukhara specialized nursery "Dzheiran".

On October 3, 2018 the President of the RUz issued the Resolution "On Additional Measures to Improve the System of Public Administration in the Field of Ecology and Environmental Protection." No. PP-3956 According to this Resolution, the Inspection for the Control of the Protection and Use of Biological Diversity and Protected Natural Areas was abolished and included in the State Committee of the Republic of Uzbekistan on Ecology and Environmental Protection as the Directorate for Biodiversity and Protected Natural Areas. Moreover, in accordance with this Resolution, one more PNA, the state wildlife sanctuary "Saykhun", is included under the jurisdiction of the SCEEP. Thus, the SCEEP supervises 4 PNAs of the I, II and V categories.

In accordance with the Resolution of the President No. PP-2966 dated May 11, 17 "On the Organization of Activities of the State Committee of the Republic of Uzbekistan on Forestry" Ugam-Chatkal State National Natural Park and Chatkal State Biosphere Reserve are transferred to the system of State Committee of the Republic of Uzbekistan on Forestry (SCF). Thus, the SCF supervises 5 reserves and 3 national natural parks.

The State Committee on Geology and Mineral Resources supervises one PNA - the Kitab State Geological Reserve.

Reserves and national parks, being independent legal entities, are funded from the state budget. National parks, besides this, have additional funds received in the form of payment for rendered services. However, these funds are not enough to implement effective management at the appropriate level.

Problematic issues are those of staffing and training personnel. Reserves and national parks lack workers and, first of all, specialists and researchers. There is a need for training specialists of all levels.

At this stage, the institutional measures for implementing the NT 7 can be assessed as *partially effective*.

Indicator 7.3: By 2025, the total area of protected natural areas (I-IV categories) is increased.

Efforts will be aligned with Aichi target 11 so to promote at least 17 percent of terrestrial protected areas and 10 percent of coastal and marine protected areas in the period of the NT

Measures to create a new PNA

1) On the basis of the existing wildlife sanctuary "Saygachiy" in the Republic of Karakalpakstan in the Southern part of the Ustyurt plateau, a new protected natural area of the second category was created in accordance with the Law of the Republic of Uzbekistan "On Protected Natural Areas" - a complex (landscape) wildlife sanctuary.

The complex landscape wildlife sanctuary "Saygachiy" was created by PKM RUz No. 238 dated July 22, 2016 in the Republic of Karakalpakstan on an area of 628300 ha.

The complex (landscape) wildlife sanctuary "Saygachiy" (Ib category IUCN) became the first PNA of this category in the country. The PNA was created in the Northern part of the Ustyurt Plateau instead of the previously existing state wildlife sanctuary "Saygachiy" (IV category IUCN), which was without a legal entity.

2) In the Tashkent province by the Order "On Measures for the Further Development of the Ugam-Chatkal National Natural Park" of the President of the RUz No. P-4765 dated December 20, 2016, the Ugam-Chatkal wildlife sanctuary was created and transferred for permanent use to JSC "Uzbekistan Temir Yollari". The structure of the wildlife sanctuary includes Bashkizylsay section of the Chatkal State Biosphere Reserve, but with preservation of the borders and the reserve regime of this area. The total area of this protected natural area is 42952.81 ha. The territory of the wildlife sanctuary also includes forestry lands Parkent, Burchmulla and Shovvozsoy.

The creation of the Ugam-Chatkal wildlife sanctuary contributed to increasing the total area of the PNA in Uzbekistan, enhancing protection and developing the territories included in it, including the Bashkizylsay section.

However, the fact that there is an area with the reserve regime on the territory of the wildlife sanctuary contributed to the emergence of some contradictions to the existing national legislation. Due to the fact that on the territory of the established wildlife sanctuary there was a section of Bashkizylsay with a reserve regime, it was later decided to reorganize the sanctuary into a biosphere reserve.

PKM RUz No. 367 dated May 16, 2018 created Ugam-Chatkal State Biosphere Reserve created on the basis of the wildlife sanctuary.

The creation of a biosphere reserve does not create contradictions to the Law of the Republic of Uzbekistan "On Protected Natural Areas", and also contributes to the performance

by the Republic of its obligations to the UNESCO MAB program under the Regulation on the World Network of Biosphere Reserves.

In 1993, the Chatkal State Biosphere Reserve, which consisted of two sections Bashkizylsay and Maidantal, was included in the World Network of Biosphere Reserves in the prescribed manner. But until today, Chatkal, being a reserve, does not meet the requirements of biosphere reserves, due to the absence of additional buffer and transition zones. Due to the creation of the Ugam-Chatkal biosphere reserve around the Bashkizylsay site, there will be a buffer and transition zones.

The Chatkal State Biosphere Reserve today consists of the Maidantal section, also included in the World Network of Biosphere Reserves. Today, works are performed to create a protected area of the reserve. This will also contribute to the performance by the country of its obligations in accordance with the Regulation on the World Network of Biosphere Reserves.

3) In February 2018, PKM RUz No. 82 dated February 7, 2018 created the Zarafshan National Natural Park on the basis of the previously existing Zarafshan State Reserve in the Samarkand province. Previously, the reserve area was 2325 ha, currently the total area of the national park is 2462 ha, of which 1,777 are the reserve area.

The reorganization of the reserve into a natural park was determined by the fact that its area was insufficient for performing its functions as a natural benchmark. However, given that this area was created to protect such rare animal species as Bukhara deer and Zarafshan pheasant, as well as various plant species, it was decided to reorganize it into such a PNA type, which provided for an area with the reserve protection regime.

Also, the presence of a nursery for breeding of Bukhara deer on the territory of the reserve contradicted the Law of the Republic of Uzbekistan “On Protected Natural Areas”. Today, the nursery is located in the recreational zone of the park.

Three new PNAs have been created, the area of PNAs of I-IV category has been increased (complex wildlife sanctuary “Saygachiy” and Zarafshan National Nature Park). Biosphere reserve is not included in any of the 7 categories of PNAs, but is a separate type of PNA along with national parks.

Although the total number of PNAs has increased, the number and size of separate state reserves are decreasing. For example, the area of the Chatkal State Biosphere Reserve decreased by 11 thousand ha, the conserved area of the Zarafshan Park occupies a smaller area (1777 ha), compared to the one occupied by the Zarafshan Reserve (2325 ha), i.e. the territory with the reserve regime has decreased by 548 hectares.

It should also be noted that the 12 sanctuaries in the country without a legal entity, occupying 572,404 ha, do not fully perform their functions in conserving, reproducing and restoring certain natural objects and complexes, due to the absence of the corresponding staff responsible for its functioning in these wildlife sanctuaries. The protection of such sanctuaries is assigned to the territorial divisions of the SCEEP.

Thus, in order to conserve biodiversity and develop the PNA system, along with the creation of new PNAs, it is also necessary to pay attention to the development or reorganization of existing state wildlife sanctuaries by giving them the status of a legal entity with appropriate management and protection.

At this stage, the measure for implementing the NT 7 can be assessed as *partially effective*.

Indicator 7.6: By 2025, the number of rare and endangered species of plants covered by territorial protection (PNA of I-IV categories) is increased to 70%.

152 out of 321 species of higher plants listed in the Red Book of the RUz (2009), which is 47.4% of the total number of the Red Book species, are protected in reserves and national natural parks of Uzbekistan (PNAs of I-II IUCN category).

Territories on which a significant number of rare plant species is concentrated - the Tupalang, Sangardak and Shakhimardan river basins, the Baysuntau and Chulbair mountains, the

Kelif-Sherabad ridge, the residual lowlands of Kuldzhuktau, Tamdytau and Bukantau are not covered by the PNA system. *The undertaken measures are partially effective.*

Indicator 7.7: By 2025, the number of rare and endangered species of animals covered by territorial protection (PNA of I-IV categories) increased to 90%.

At the time of preparation of this report, the number of rare and threatened vertebrate species covered by territorial protection (PNAs of I-IV IUCN categories and biosphere reserves) is on average 77%. Thus, 72.2% of fish species, 71.4% of reptiles, about 88% of birds (about 50% are protected in plain wildlife sanctuaries), 75% of mammals, listed as rare and threatened, have been found on protected natural areas (I-IV IUCN categories and within biosphere reserves).

In order to conserve threatened species of animals and plants, their habitats, as well as to prevent land degradation, it is necessary to increase the area of state reserves and/or reserve areas (organization of natural parks and biosphere reserves).

Moreover, the organization and establishment of protected areas of state reserves is necessary.

The measure for implementing indicators 7.4 and 7.5 are reviewed in section 4 of NT 7.

At this stage, this measure for implementing the NT 7 can be assessed as *partially effective*.

Areas of international importance for the conservation of globally threatened biodiversity

Some PNAs are recognized as internationally important for bird species that are threatened with global extinction. 17 (35.4%) out of 51 important bird areas (IBA) of Uzbekistan fully or partially coincide with the existing PNAs.

On the territory of Uzbekistan there are 36 Key Biodiversity Areas (KBA) that are important for biodiversity conservation. 12 of these areas partially or completely overlap with existing PNAs.

Since 1993 the Republic of Uzbekistan has been a Party of the UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage. The Western Tian-Shan transnational serial object declared from three countries of Kazakhstan, Kyrgyzstan and Uzbekistan was included in the UNESCO World Cultural and Natural Heritage List at the 40th session of the UNESCO World Heritage Committee, held on July 17, 2016 in Istanbul (Turkey).

The World Heritage Committee unanimously recognized the uniqueness of the natural resources of this region, which is characterized by a high level of endemism and the presence of rare threatened species of flora and fauna, among which the Menzbier's marmot, the snow leopard, the Tian-Shan mountain sheep, and many others can be mentioned.

The object is nominated to the UNESCO World Heritage List by criterion No. 10 - natural habitats of the greatest importance and significance in terms of the conservation of biological diversity, including habitats of threatened species, representing outstanding global heritage from the point of view of science and nature conservation.

The territory represented by Uzbekistan is constituted by 2 sites of the Chatkal State Biosphere Reserve - Maidantal and Bashkizylsay (at the time of inclusion).

Implementing its international obligations under the Convention Concerning the Protection of the World Cultural and Natural Heritage, it plans to include the following natural sites in the list:

- Cave drawings Sarmishsay - Navoiy province;
- Shakhimardan - Fergana province;
- Zaamin Mountains - Jizzakh province;
- Gissar Highland - Kashkadarya province (Gissar reserve);
- Baysun - Surkhandarya province.

Today, the following protected natural areas of the country have international status:

1. Chatkal State Biosphere Reserve (Maidantal area) - the status of the biospheric, included in the World Network of Biosphere Reserves of the UNESCO MAB (1993); World Heritage site, included in the UNESCO World Heritage List (2016).

2. The conserved area of the Ugam-Chatkal Biosphere Reserve (Bashkizylsay area) - the status of the biospheric, included in the World Network of Biosphere Reserves of the UNESCO MAB (1993); World Heritage site, included in the UNESCO World Heritage List (2016).

3. Kitab State Geological Reserve is the owner and custodian of the world stratigraphic benchmark. The stratotype was elected by the International Subcommission on Devonian Stratigraphy in 1989 and ratified in 1996 by the International Union of Geological Sciences. Thus, the Zinzilbán section provided the Kitab Reserve with the international status (2004).

4. Dengizkul Wildlife Sanctuary - the status of a wetland of international importance, mainly as a habitat for waterfowl, is included in the Ramsar List of Wetlands of International Importance (2001).

Uzbekistan is implementing a joint project of UNDP/GEF and SCEEP ““Sustainable natural resource use and forest management in key mountainous areas important for globally significant biodiversity”” (2017-2021). It is planned to build and enhance the capacity for managing key protected areas and forests with particularly valuable biodiversity, located within the two target snow leopard landscapes (Chatkal and Gissar ridges).

Within the framework of the project, measures are being taken to develop existing PNAs in the pilot sites - the Chatkal State Biosphere Reserve, the Ugam-Chatkal Biosphere Reserve, the Ugam-Chatkal State National Natural Park (Tashkent province), and the Gissar State Reserve (Kashkadarya province). Along with this, assistance will be rendered in organization of security (buffer) zones of the Chatkal and Gissar state reserves. Moreover, recommendations will be developed for expanding the existing and organizing new PNAs in Tashkent, Kashkadarya and Surkhandarya provinces. Also, within the framework of the above-mentioned project, the development of a Program and an Action Plan for the Conservation of the Snow Leopard in the Republic of Uzbekistan for 2019-2029 is being performed.

Analysis of the degree of adequacy of the information used to monitor indicators, assessing the level of achievement of NT 7, showed that monitoring associated with this goal is partial. Particularly, this is due to the fact that the updated National Biodiversity Conservation Strategy and Action Plan for its implementation are at the stage of approval.

Obstacles in the achievement of NT 7:

- Insufficient development of the regulatory framework aimed at conducting research and monitoring in the PNA;
- Inadequate financial security for protected areas;
- Insufficient provision of qualified personnel - staffing the PNA's and training of specialists;
- Lack of buffer zones of state reserves
- Insufficient faunistic and floristic representativeness of existing protected areas;
- Lack of legal status of existing state sanctuaries (zakazniks);
- The absence in the national environmental legislation of concepts and definitions for a number of territories of international importance for the conservation of globally threatened biodiversity.

Measures, which may accelerate the achievement of NT 7:

- Further improvement of the legislative and institutional framework of the PNA system;
- Adoption of regulatory documents for research and monitoring activities, financing of protected areas, and the procedure for creating protected areas;
- Preparation and provision of PNA by specialists of all levels;

- Increasing the area of state reserves and/or strict protected zones, the organization of natural parks and biosphere reserves;
- Development and / or reorganization of existing state sanctuaries (zakazniks) by giving them the status of a legal entity with appropriate management and protection;
- Introduction to the national environmental legislation concepts and definitions for territories of international importance for the conservation of BD.

National Target 8: Development of a state program for the conservation and sustainable use of components of biological diversity used for food production and agriculture

During the period since the development of the National Goals and Targets, the country has taken certain measures to implement the NT 8 to conserve and sustainably use the components of biological diversity used for food production and agriculture. To assess the progress of the achievements of the NT 8 results, indicators have been developed, including those monitoring the progress of their achievement for the period up to 2020.

At this stage, this measure for implementing the NT 8 can be assessed as *effective*.

Indicator 8.1: By 2020, the national database on biodiversity components used for food production and farming is developed and updated on a regular basis;

Within the framework of the project of UNEP-GEF and the Republic of Uzbekistan “In situ Conservation of Crop Wild Relatives by Strengthening Information Management and its Practical Application”, the National Information System on Wild Relatives of Crop Plants has been created and is currently being expanded.

At this stage, this measure for implementing the NT 8 can be assessed as *effective*.

Indicator 8.2: By 2020, the main habitats of wild relatives of cultivated plants are identified;

2 apple species (*Malus sieversii*, *M. niedzweckiana*), 5 almond species (*Amygdalus communis*, *A. spinosissima*, *A. petunnikovii*, *A. buchariña*, *A. kalmikovii*), 1 species of onions (*Allium pskemense*), 1 type of walnut (*Juglans regia*), 1 type of pistachio (*Pistacia vera*) and 2 types of barley (*Hordeum spontaneum* and *Hordeum bulbosum*) from the list of CWR were selected as priority for the country.

Habitats of CWR have been forming in the process of evolution throughout the entire period of growth on the territory of present-day Central Asia, including, on the territory of Uzbekistan, which is estimated in millions of years. They have adapted to changing conditions of growth and are currently concentrated in the areas suitable for the ecology of these species.

However, the ongoing process of adaptation to the conditions of life determines the presence of a large number of forms that differ from each other in various characteristics. The set of these characteristics in each species is unlimited and is a gene pool that can be used to select the varieties that a man needs for growing in changing environmental conditions.

Wild apple populations in Uzbekistan are formed by **Sievers apple** (*Malus sieversii*) and occupy small areas (very rarely up to 1-2 ha), and more often presented as inclusions in deciduous forests of mountain valleys and lower parts of slopes and less often in juniper forests. The main apple populations are located in the Western Tian-Shan within the Tashkent province. It is rarely found in single trees or small groves in the rest of the mountainous regions of Uzbekistan. The species habitat covers almost all mountain ridges, excluding Babatag, within altitudes from 800 to 2500 m.a.s.l. on the slopes of the Northern expositions.

The apple tree has considerable plasticity, which is reflected in its adaptation to various soil conditions, and relative xerophilia. The variability of aggregate characteristics provides great opportunities for the selection of new cultivated varieties with lots of different properties.

On the territory of the Ugam-Chatkal State National Natural Park, there is another species, Niedzwetzky's apple (*Malus niedzweckiana*), close to Sievers apple. Trees of this species are occasionally found in small quantities. The species is included in the Red Book of

Uzbekistan and needs to be conserved and reproduced. The species is very valuable for breeding new varieties.

The **Bukhara almond** (*Amygdalus bucharica*) is the most common among all the almond species in the country. The species belongs to xerophytic and along with pistachio, it is widespread in submontane and lowland areas on the slopes of all expositions, including Southern ones, forming assemblages together with xerophytic shrubs above the prickly almond belt and sometimes with it. It grows on both fine and stony soils. Due to its unpretentiousness, it is spread over almost all mountain ridges of the country, more often in sparse populations. There are many forms, differing mainly in the shape, size, taste of fruits, as well as the outlet of the kernel, yield, phenology, resistance to diseases and so on. They can be used to breed new varieties.

Walnut (*Juglans regia*) is a typical mesophyte, growing in conditions with good moisture. There are several such habitats in Uzbekistan. Therefore, the nut is preserved only in three isolated populations on the mountain slopes in the Western Tian-Shan and along the valleys and lower parts of the northern slopes of the Nuratau Ridge (about 200 ha) and the southern spurs of the Gissar Ridge in the Surkhandarya province (50 ha). The largest ridges (about 1,400 ha) are preserved in separate small populations in all mountain ridges of the Uzbek part of the Western Tian-Shan, where they form either pure walnut forests or, more often, mixed walnut-fruit forests mixed with fruit species that are also wild relatives of such cultural plants as apple, cherry plum, cherry-horticulture, hawthorn, berry bushes, and in the floodplains with willow, poplar in the medium-altitude belt. Walnut forests constitute the richest foundation for breeding new varieties.

Pistachio (*Pistacia vera*) has the largest habitat of all priority species of wild relatives. It grows on all mountain ridges of the country from the submontane areas with extremely dry conditions. It has been preserved in the form of extremely sparse plantings or single trees, separate populations, but it is also found in small groves, and in separate massifs. The largest of them are in the Babatag Ridge (about 21,000 ha) in the form of sparse pure plantings, the Southern spurs of Gissar (more than 1,100 ha), the submontane area of the Alai Ridge near Andijan (about 400 ha), the Eastern part of the Nuratau Ridge (over 100 ha). There is also a large population of pistachio forest crops around the Kattakurgan reservoir with an area of about 3,000 ha from the gene pool of the Babatag population.

As a wild relative, it is of great value due to the rich gene pool for the selection of high-yielding varieties with large, revealing drupes, which have good taste and nutritional properties, resistant to diseases. According to these characteristics, a wide variety of forms in all populations is present in pistachio plantations.

Pskem onion (*Allium pskemense*) is one of the wild relatives of onion cultivars. Endemic of the Tian-Shan. It is widespread in separate small populations in the middle-height belt along the ridges of the Talas Alatau - Karzhantau, Ugam, Pskem, Chatkal, Kuramin, rocky areas and scree. It used to be widespread much more widely, but because of its good taste and medicinal qualities it was eliminated by the population. It also represents a valuable gene pool for breeding new varieties.

Wild barley (*Hordeum spontaneum*) is a wild relative of cultivated barley. In the conditions of Uzbekistan, it is a typical ephemeral. It is widely widespread in the valley, submontane and lowland zones of the country on fine soils. It has a large shape variety. Barley populations suffer from grazing, land development by men, fires.

Because of the impossibility to develop measures for the conservation of all types of CWR, 12 priority species of 6 genera have been chosen, on the basis of whose example the methods of conserving all other types of CWR in the country can be applied.

At this stage, the measures for implementing the NT 8 can be assessed as *effective*.

Indicator 8.3: By 2025, the state program of measures for conservation and sustainable use of biological diversity components used for food production and farming is developed and being implemented.

In order to conserve the places of growth and expansion of the habitats of CWR, the Government of the country takes urgent measures to conduct in-depth economic reforms and introduce innovative methods of plant growing and gardening.

In order to implement these activities, such plants as apple, pear, plum, sweet cherry, cherry, dwarf and semi-dwarf seedlings of peach trees are purchased and selected.

For example, Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 120 dated March 19, 1998 approved the “Program for Deepening of Economic Reforms in Agriculture”, which determined that in order to increase the efficiency of irrigated lands, the area of cultivation of non-traditional salt-tolerant crops - peanuts, chickpeas, amaranth, sunflower, shall be expanded. On lands with low water availability and rainfed ones, it is planned to increase the area of sowing of oil crops (safflower and flax) and papaya (melon tree). When re-sowing in the cotton complex, corn for silage and grain, soybean, sunflower, sesame and millet (taryk) will be cultivated. Sowing of intermediate crops will increase. Specially created seed farms, tenants and independent farmers, who will receive state support, will produce seeds for non-traditional crops.

The Resolution of the Cabinet of Ministers of the RUz No. 490 dated June 30, 2018 approved measures on organization of tea production and providing the population with high-quality tea and tea products of domestic production. Within the framework of this Resolution, there was adopted the proposal of Uzbekozikovkatholding Holding Company and the Ministry of Agriculture of the Republic of Uzbekistan to establish a Research and Production Center for the Development of Tea Production in the form of a limited liability company with the participation of scientific institutions, farms and other entrepreneurs. A specialized organization for the production of tea and tea products was organized in Zaamin district of Jizzakh province. Tea cultivation is planned in Navoiy, Jizzakh, Surkhandarya and Tashkent provinces.

By the Resolution of the President of the Republic of Uzbekistan No. PP-3586 dated March 06, 2018, the Association of Lemons Producers and Exporters was established to grow lemon seedlings in the country and accelerate the development of greenhouse farming for the cultivation of lemons, further increase the export potential of this sphere and increase in employment and incomes of the population, especially formation of a united organizational system providing a mechanism for creating new jobs in rural areas, as well as the development of the lemons cultivation on the basis of innovative technologies.

In Uzbekistan, the seeds of five improved salt- and drought-resistant varieties of quinoa (*Chenopodium quinoa*) have been first tested in different agro-ecological areas: starting from the Tashkent province, Syrdarya basin to the sandy soils of Kyzylkum. Special attention was paid to the introduction of quinoa to the marginal lands of the Aral Sea region as a region with low-yielding and highly saline lands. The aim of the introduction was to evaluate quinoa in dry, saline and lands unsuitable for agricultural use as a profitable and nutritious crop. 70-80% of the land in Karakalpakstan is saline. Quinoa is an unpretentious and low-cost culture that does not require a lot of water, and tolerates difficult agrarian and ecological conditions. Cultivation of this non-traditional culture may become available to the general population. Quinoa green biomass can be a nutritious pet food and stems can be used as fuel.

The creation of modern plantations and active introduction of scientifically proven methods and intensive technologies for growing walnuts, with active attraction of foreign investors as the basis, the President of the Republic of Uzbekistan adopted the Resolution “On the Establishment and Organization of Activities of the Association of Producers and Exporters of Walnuts” No. PP-3025 dated June 01, 2017. This was completed with a view to further stimulate the efficient use of rainfed lands, increasing the volume of walnut production that are competitive in both domestic and foreign markets. In order to achieve the tasks set forth in the above-mentioned decisions of the Government, a number of measures has been taken in the country to create forests and grow planting material in the state forest. According to the analyzed data, in general in the country the creation of forests is planned for the period from 2017 to 2019 on a total area of 120680.28 ha, including for sand strengthening measures -

101256.00 ha, planting walnuts - 3831.3 ha, pistachios - 8768 ha, almonds - 4004.3 ha, fruit - 631.6 ha. Production of planting materials - 112499 thousand pieces, including walnut - 1291000 pieces, unabi - 570000 pieces, lemon - 1527000 pieces.

At this stage, these measures for implementing the NT 8 can be assessed as partially effective.

Analysis of the degree of adequacy of the information used to monitor indicators, assessing the level of achievement of NT 8, showed that monitoring associated with this goal is partial. Particularly, this is due to the fact that the updated National Biodiversity Conservation Strategy and Action Plan for its implementation are at the stage of approval.

Obstacles in the achievement of NT 8

- In Uzbekistan, there is no clear plan for inventory taking wild relatives of cultivated plants maintained *in situ*. *Ex situ* conservation collections also require inventory:
- A large number of CWR species also grows on the mountain ridges of the Southern Gissar in the Surkhandarya province, including, besides the species growing in Ugam-Chatkal, figs, pomegranate, persimmon and other. They are not sufficiently protected and subject to genetic erosion:
- A large massif of pistachios in the Babatag ridge is without appropriate protection and is quickly deteriorating from irrational use.
- All woody species of wild relatives of cultivated plants of the country are constantly exposed to a strong negative anthropogenic impact, manifested in unregulated cattle grazing, destroying self-sowing and undergrowth, as well as in the destruction of established phytocenosis.
- The cutting of trees for firewood, the annual total harvest of fruits, and mowing are also performed. Abiotic factors — spring frosts killing the crop, summer droughts weakening trees — have a noticeable effect.

All of the above leads to a permanent reduction in the area of populations, thinning of plantations, deterioration of their sanitary condition, replacement of wild relatives by competing species.

Measures, which may accelerate the achievement of NT 8

Based on the existing practice of CWR usage, analysis of their current state and social factor in the areas adjacent to the places, where CWR are widespread, measures are proposed to conserve them, taking into account the full ridge of anthropogenic factors on the population of CWR in nature:

- it is necessary to strengthen protection of CWR species, especially of the priority ones that are most significant for humans, in the places of their greatest concentration, where the conditions for their growth are most favorable - in the Ugam-Chatkal State National Natural Park on the territory of the Burchmulla forestry, in the Southern Gissar in the Uzunsky forestry and Babatag on the territory of the Babatag forestry.
- to improve institutional arrangements aimed at improving the management of CWR;
- to improve the legal framework aimed at improving the management of CWR;
- to conduct a strictly controlled business activities in a sparing mode in the places of growth of CWR. Grazing of livestock shall be completely prohibited or, as a least, strictly limited, any cutting of tree and shrub types of CWR, including sanitary, is prohibited, with only dried trees being harvested;
- to perform incomplete harvesting of CWR to improve seed recovery;

- to take measures to promote the natural renewal of CWR, both under a forest cover of a different composition, and open zones in areas out of the forest, which used to include CWR;
- to lease out forest areas with CWR for long-term lease on the terms of its conservation and restoration;
- to take measures to increase the employment of local population in order to reduce its dependence on the exploitation of forest resources;
- to provide the local population on a regular basis with alternative energy sources to stop deforestation;
- to increase the outreach among the population and students of the need to conserve CWR

The following recommendations are proposed for the conservation of CWR:

- rigorous legislation on the protection of CWR from anthropogenic impacts is needed, as well as the provision of advisory and practical assistance in the conservation and restoration of wild relatives of cultivated plants in in situ conditions;
- it is needed to develop economic support for in situ conservation of CWR;
- it is necessary to develop training programs, methodologies, recommendations in cooperation with the Ministry of Agriculture, SCF, research institutes, Farmer associations and other departments based on practical knowledge and materials in order to provide practical assistance to state and non-state (farm) enterprises and the local community on conservation and use of CWR;
- it is necessary to take care of CWR and conserve them from over-exploitation and destruction, to implement artificial seed reproduction of wild species of cultivated plants in order to expand and restore their habitats;
- inclusion of threatened species of CWR in the Red Book.

National Target 9: Inclusion of the provisions of the National Biodiversity Strategy and Action Plan as part of national, territorial and sectoral development plans

The implementation of the draft *National Strategy* shall be performed through the full and timely implementation of the 31 activities that are provided for in the *Action Plan* and are assigned to specific executive agencies, which also potentially provides the regulatory framework for successful implementation of international commitments under the CBD, as well as on the UNCCD and the UNFCCC, thematically related to planned activities in the *Action Plan*. The NBSAP is aligned with NDCs and SDGs framework providing the environment and grounds for supporting the country commitments. It complements activities with the support of multilateral and bilateral organizations.

At the same time, executives ensure the implementation of measures in accordance with established deadlines, by developing and introducing specific measures for their implementation, ensure the effective use of targeted funds, as well as the annual submission of reports on the implementation of measures over the past year to the Cabinet of Ministers. The SCEEP coordinates the work and monitors its implementation. If necessary, it submits proposals to the Cabinet of Ministers in order to adjust the events and the board of their implementers, creates interagency coordination groups and councils.

To assess the progress of the achievements of the NT 9 results, indicators have been developed, including those monitoring the progress of their achievement for the period up to 2020.

Indicator 9.1: By 2020, activities within the framework of NBSAP are included into the plans for national, territorial and sectoral development.

All-natural ecosystems of the country are ecologically and economically important for Uzbekistan and significant in the context of the implementation of the Rio Conventions. They cover highlands, mountain and floodplain forests, submontane and lowlands, deserts and semi-deserts, wetlands, where they form specific habitats.

Activities for the conservation and sustainable use of the diverse functions of these ecosystems are the main requirement of the global environmental Conventions, which, in connection with their signing and ratification, stimulate the development and implementation of various national strategies, programs and development plans in Uzbekistan that are common to the three Conventions. As part of the CBD commitments, the first NBSAP (1998) was developed and adopted, and its actions and activities are reflected in such national strategic program documents as:

- National Action Program to Combat Desertification (NAPCD, 1999);
- The National Framework Program (NFP, 2006) and the Supplement to the NFP (2009), prepared in the framework of the Central Asian Countries Initiative for Land Management (CACILM) and fulfilling the obligations of the UNCCD;
- National Action Program of the Republic of Uzbekistan to performing Desertification and Drought (NAPCDD, 2015), prepared on the basis of the decision of the Conference of the Parties (13/COP.9) of the UNCCD on reviewing/updating national action plans/programs and align them with the ten-year UNCCD strategy (2008-2018);
- Recommended actions for mitigation and adaptation to climate change for ecosystems and economic sectors, as reflected in national documents such as the Second and Third National Communications of the Republic of Uzbekistan under the UN Framework Convention on Climate Change (SNC, 2008 and TNC, 2016);
- National Strategy of the Republic of Uzbekistan to reduce greenhouse gas emissions for 2000-2010 (PKM RUz No. 389 dated October 09, 2000) in the Low-carbon Development Strategy of the Republic of Uzbekistan and the medium- and long-term Roadmap (2015);
- In the Main Directions of Transition to a Resource-Efficient Development Model.
- Vision 2030 (2016);
- National Strategy for Sustainable Development (NSSD, 1999);
- Agenda for the XXI century for the Republic of Uzbekistan (A-21, 2002);
- The Strategy for improving the welfare of the population of the Republic of Uzbekistan for 2013-2015. (2013) and others.

These documents reflect a comprehensive approach to creating conditions for sustainable development, also taking into account the need to take broad policy measures in the field of environmental protection, the sustainable use of natural resources, and solution of global and regional environmental problems. The practical implementation of the conceptual directions recorded in these documents was reflected in the Implementation Activities for the Environmental Action Plan (EAP) of the Republic of Uzbekistan for 1999-2005 (1999), 2008-2012 (2008) and 2013-2017 (2013) and in the Programs of State Monitoring of Natural Environments in the Republic of Uzbekistan (SMNE) for 2011-2015 (2011), 2016-2020 (2016). Moreover, the Additional Measures for the Implementation of the UN Millennium Development Goals in Uzbekistan for 2011-2015. (PKM RUz No. 21 dated January 26, 2011), the UN Development Assistance Framework for the Republic of Uzbekistan for 2016-2020, development and adoption of the above mentioned program documents determine the actualization of problems and the need to implement measures to solve them. However, the practical implementation of the measures provided for in the first NBSAP was not fully performed for various reasons.

Developed and adopted policy documents show a certain level of implementation of measures within the NT 9, which, in accordance with indicator 9.1, are assessed as *partially effective*.

Indicator 9.2: By 2025, activities to conserve biodiversity and maintain ecosystem services is being implemented in relevant economic sectors according to the Action Plan of the National Strategy.

Indicator 9.2 is designed for the long term and cannot yet be taken into account for a final assessment of the results of the NT 9.

Analysis of the degree of adequacy of the information used to monitor indicators, assessing the level of achievement of NT 9, showed that monitoring associated with this goal is partial. Particularly, this is due to the fact that the updated National Biodiversity Conservation Strategy and Action Plan for its implementation are at the stage of approval.

Obstacles in the Achievement of NT 9

- Updated National Biodiversity Strategy and Action Plan for its implementation are not approved

Measures, which may accelerate the achievement of NT 9

- Approval of the updated NBSAP by the government.

SECTION III EVALUATION OF PROGRESS IN ACHIEVING NATIONAL TARGETS

National Target (NT) 1: Improving the system State Monitoring of Natural Environments by incorporating monitoring of biological diversity.

Over the period since the development of National Goals, some progress has been achieved in meeting National Target 1, which is assessed using relevant indicators (Section II).

In addition to the results of the implementation of the Biodiversity Action Plan, , the most objective assessment of the achievement of the NT 1 can be obtained by analyzing the implementation of measures in such program documents as the EAP (<http://lex.uz/docs/3327014>) and SMNE (<http://www.lex.uz/docs/3019801>), representing the regulatory framework for the implementation of the national monitoring system (Table 15). However, this is yet to be officially approved.

Table 15: Practical implementation of measures provided for by EAP and SMNE concerning NT 1

The content of activities/measures	Information on implementation progress
EAP (2013-2017)	
1. Ecological improvement of the Aral Sea region by conducting forest reclamation measures on the dried bottom of the Aral Sea on an area of 80 thousand hectares	To improve the ecological condition in the Aral Sea region, to prevent sand deflation and desertification, as well as to restore biodiversity on the dried sea bottom, since the beginning of the activities tree planting and phytoreclaiming works have been performed on more than 90,089 thousand ha, including 18,644 ha in 2016; 19043 ha in 2017. During the implementation period, the survival rate, which amounted to 44% in 2013, 2015 and 2016, 41% in 2014, 37% in 2017 was ensured.
2. Creation of a comprehensive information base of state monitoring of natural environments using geographic information systems (GIS technologies)	In order to improve the system for collecting and processing information based on the results of environmental monitoring, works have been performed to improve the software of the electronic database for monitoring pollution sources (MPS). As a result, the process of collecting, systematizing, processing and storing information about the state of the environment has been simplified and automated. Stable operation of the information system online (with limited access) has been ensured. Works on collecting and processing data are also underway. based on modern GIS technology To ensure further improvement of the environmental assessment system, together with the relevant ministries and agencies, work has been performed to revise the list of ecological indicators, and an Agreement on the joint use of the database of ecological indicators has been approved. Data collection and analysis is conducted on a regular basis.
5. Creation of a cartographic basis for protected natural areas - zones of formation of fresh groundwater deposits.	Electronic maps have been created for 9 protected areas on a scale of 1: 25000. Works on the regional study and mapping of the ecological and geological state of areas of fresh groundwater formation at the Kitab-Shakhrisabz deposit, and on creation of maps of total soil contamination by substances of hazard class 1–3 have been performed. Local foci of plant contamination with toxic metals of hazard class 1–3 with excess of MPC

	from 1 to 3 or more times have been revealed. The mapping has been performed and computer GIS-maps of the natural environments state have been created: soil - 46, plants - 7, surface and groundwater - 7. Pollution maps are brought to 10 summary maps of environmental pollution. Recommendations for the conduct of the state monitoring of groundwater have been developed.
14. Creating a complex landscape wildlife sanctuary "Saygachiy" on the Ustyurt plateau.	The complex (landscape) wildlife sanctuary "Saygachiy" was created by the Resolution "On Measures to Streamline the Issues Related to the Creation and Organization of Complex (Landscape) Wildlife Sanctuary" of the Government of the Republic of Uzbekistan No. 238 dated July 22, 2016.
19. Assessment of the gene pool of the Uzbekistan plant world, as the basis for maintaining the state cadastre of the plant world (including the estimating floristic resources for individual botanical and geographical areas and administrative territories and the formation of an electronic database of the plant world)	Research on the establishment of a modern list of the flora of vascular plants in Uzbekistan have been completed. Work has been performed on the administrative and natural distribution of species in Uzbekistan. According to the results of the audit, the flora of Uzbekistan consists of 4343 species. Regional cadastral lists of vascular plants were compiled by administrative regions. In 2015, the cadastral list of the Jizzakh province was compiled. Work in the Samarkand province is underway. The lists of plants in the Uzbekistan part of the Western Tian-Shan, the Nuratau Mountains, the Prinuratinsk Residual Mountains, the Malguzar Mountains, the Baysun Mountains, the Bukhara oasis, and the geophytes of the Fergana Valley have been compiled. An assessment of the diversity of alien flora elements has been performed. According to the data obtained in the Bukhara oasis, this fraction of flora consists of more than 112 species (23.5% of the flora). More than 40 species of adventive species are registered on the territory of the Bukhara province.
20. Development of technology for the reproduction of rare and threatened fish species.	The Khorezm Mamun Academy has developed a technology for keeping and feeding an Amudarya sturgeon in basin conditions. Special food forage for these fish has been prepared. Due to the lack of mature individuals, the development of artificial reproduction technology was not possible.
21. Assessment of the status of the main commercial fish shoals and determination of the norms of annual allowable catch	Research have been conducted in Aydar-Arnasay lakes system. The dynamics of fish catches has been analyzed. Guidelines for monitoring the status of fish stocks in Uzbekistan have been developed. Work has been done to determine the state of fish shoals in inland waters. Recommendations on the norms of annual allowable fishing in these reservoirs have been given. The state of main commercial fish shoals of water bodies of Jizzakh, Navoiy, Samarkand and Bukhara provinces has been assessed. Recommendations on the norms of the annual allowable catching of fish in natural water bodies have been prepared. Thus, the annual allowable catching rate for the Aydar-Arnasay lakes system is set at 7100 tons, for water bodies of the Bukhara province - at 320 tons, for water bodies of the Samarkand province - 170 tons.

22. Development and implementation of cage culture fishery.	A technology for cage culture fishery in water bodies of Uzbekistan and the method of feeding fish with granulated balanced feed have been developed. Recipes of forages made from ingredients available on the local market have been created. Economic calculations for the creation and operation of a cage farm with a conventional capacity of 20 tons of commercial carp per year have been made.
58. Preparation and publication of the next edition of 2 volumes of the Red Book of the Republic of Uzbekistan	Materials on species of plants and animals, for inclusion in the new edition of the Red Book have been collected and analyzed. In order to ensure high-quality preparation and maintenance of the Red Book of the RUz, an order of the SCEEP No. 20 dated July 14, 2016 was adopted. "On approval of the Regulation on the Red Book of the Republic of Uzbekistan". In course of the order execution, an Interagency Commission on the Maintenance of the Red Book of the RUz has been formed. Together with specialists from the Academy of Sciences, drafts of 2 volumes of the Red Book have been prepared. An electronic version of the Red Book has been created.
63. Inclusion of the Convention on wetlands of international importance in the international list of wetlands, mainly as habitats of waterfowl (The Ramsar Convention), Kuymazar and Tudakul reservoirs	Monitoring of the ecological and hydrological state of the Kuymazar and Tudakul reservoirs has been conducted. A nomination form has been prepared for inclusion of water bodies in the Ramsar list, and preliminary approval has been completed.
SMNE (2016-2020) as of July 01, 2018	
IX. Monitoring of the state of lake ecosystems and adjacent territories	
25. Monitoring of hydrobiological indicators in 10 water bodies of the Tashkent province, including 27 sections for assessing the biological class and the ecological status of water courses, according to the annual schedule of Uzhydromet	A monthly (March-November) selection and taxonomic analysis of hydrobiological samples of priority indicator biocenoses (periphyton and zoobenthos) is performed, followed by an assessment of the biological class of water quality and the ecological state of water bodies at monitoring points, which is reflected in the monthly Environmental Bulletins provided to concerned agencies.
51. Monitoring the biological diversity of Lake Dengizkul (Bukhara province), Aydar-Arnasay system of lakes (Jizzakh and Navoiy provinces), reservoirs Tudakul and Kuymazar (Navoiy province) with the subsequent introduction of monitoring data into the state cadastre of animal and plant communities and developing recommendations for conserving biological diversity in the areas of the lakes under research.	a. Monitoring of biological diversity in the Ramsar territory "Dengizkul" with a focus on hydrophilic bird species; b. Inclusion of monitoring data into the system of the state cadastre of objects of animal communities and their use for making decisions on the conservation and sustainable use of biological resources. The results of monitoring research are included in the state cadastre and are the basis for reducing the negative impact of project activity on significant bird species. c. Introduction of monitoring data into reports and performance of obligations under the Ramsar Convention: The monitoring data is included in the report on the Ramsar territory - Lake Dengizkul. The monitoring data are included in the international database of the WBDB (World Bird Data Base), which is important for monitoring and maintaining the components of the IBA network. d. Conservation of plant and animal species, including those listed in the Red Book. As a result of the monitoring of Lake Dengizkul, data were obtained on 8 species listed in the Red Book of the RUz, on 9 globally threatened species belonging to high threat categories EN, VU, NT.

	Monitoring of the ecological and hydrological state of the Kuymazar and Tudakul reservoirs has been conducted.
X. Monitoring of animal and plant communities	
54. Local monitoring of animal and plant communities of the PNAs listed in the Red Book. Expected Result: Obtaining basic data on species of plants and animals listed in the Red Book of the Republic of Uzbekistan, including those living on the territory of 8 state reserves, 2 national natural parks, biosphere reserve, Bukhara specialized nursery "Dzheiran", for the purposes of conservation and restoration populations of rare and threatened animal and plant communities. In accordance with the annual plans of SCEEP and SCF.	Currently, there is performed monitoring of animal communities listed in the Red Book of the RUz for the following types of animals by scientific departments of protected areas with the support of the Academy of Sciences of the Republic of Uzbekistan: 1. Severtsov argali - Nurata State Reserve; 2. Persian gazelle, onager, Przewalski's horse - Bukhara specialized nursery "Dzheiran"; 3. Markhor, Bukhara ram - Surkhan State Reserve; 4. Bukhara deer - Lower Amudarya State Biosphere Reserve, Kyzylkum State Reserve; 5. Brown Bear, Turkestan lynx - Chatkal State Biosphere Reserve; 6. Turkestan white stork, Central Asian cobra, snow leopard, brown bear - Gissar State Reserve; 7. Brown bear, black stork, black vulture - Kitab State Geological Reserve. For flora objects, monitoring is conducted by specialists from the scientific department in the Gissar State Reserve.
55. Monitoring of flora and fauna on the state forestry lands and forest-hunting facilities, of animal and plant communities (hunting animal species) on the lands of the forestforest with the subsequent development of recommendations for the conservation of important animal and plant communities inhabiting the forest lands. In accordance with the work plan of SCEEP and SCF.	The state cadastre of animal and plant communities on the lands of the state forestforest is conducted annually, including (including data in the context of regions and forestries and forest-hunting facilities) for: - animal-pests of forestry plants; - 6 types of food and 1 type of industrial plants; - species of mammals; - species of birds (including geese, ducks, partridges, sandpipers); - species of reptiles (including lizards and non-venomous snakes); - species of amphibians; - 4 groups of invertebrates (including scorpions, spiders, scolopendrae, wasps). Sports societies of hunters and fishers annually present data on the results of counting the number of game animals living in 41 hunting and fishing farms, including waterfowl (geese and ducks), pheasant, partridge, as well as certain species of mammals, hare, boar, mountain goat. The information is entered into the geo-information database and is transmitted to the SCLRGCC in the manner prescribed by law.
56. Conducting local monitoring of the state of ecological systems on the territory of state reserves, national parks, the biosphere reserve and Bukhara specialized nursery "Dzheiran".	An osteological gathering is held annually on the territory of the Bukhara specialized nursery "Dzheiran". Both nursery staff and volunteers take part in the event. Based on the results of the collection of osteological materials, mortality is assessed and the total number of animals is defined. The total number of animals in the Bukhara specialized nursery "Dzheiran" in 2017 was defined and amounted to: Persian gazelles - 985., onagers - 125, Przewalski's horses - 23. In the SCF system, the main scientific researchresearch are conducted on the study of ornithofauna, ethnic fauna, reserves, as well as on monitoring of rare threatened animal

	species (Bukhara deer, Severtsov argali, markhor, and Persian gazelle). In the Kitab State Geological Reserve, scientific works are conducted in the field of geology, moreover, records are taken of the number of major representatives of the animal world, as well as monitoring of plant communities. The Gissar State Reserve is studying the biological family of the feline, as well as plants listed in the Red Book of the Republic of Uzbekistan growing in the reserve. Photo traps are used to study the fauna and conduct phenological observations on the territory of the Gissar State Reserve. The data obtained as a result of annual records and observations are entered into the unified state cadastre of animal and plant communities.
60. Formation of an electronic database of environmental monitoring and presentation of data in a convenient for the consumer form, with the subsequent transfer of materials to the information center of the SCEEP for the formation and replenishment of an electronic database of environmental monitoring results.	According to the results of departmental monitoring, Uzhydromet annually transmits to the SCEEP information on environmental indicators assigned to it for inclusion in the national database.
XIV. Improving the metrological basis and methodological basis for monitoring the environment.	
70. Development of a unified methodology for monitoring animal and plant communities.	We study international experience in monitoring methods, as well as foreign experiments on the development of a unified methodology for monitoring animal and plant communities. In cooperation with the Research Institute of the SCEEP and participation of specialists from relevant ministries and agencies, proposals are being prepared for the inclusion of animal and plant communities into a unified monitoring methodology. Work in this direction continues.

*Based on the assessment of NT 1 achievement results, it can be concluded that **there is a progress, but with insufficient speed.** All available data was used to monitor the information used to assess the level of achievement of the NT. Information monitoring associated with this NT is adequate.*

Thus, on the basis of the information provided (Section II), significant progress was determined in planning measures that determine the objects of environmental monitoring and obtaining information on the state of the most important elements of the environment, ecosystems and species - components of biological diversity (*on the way to achieve the goal*). At the same time, the analysis of the implementation of such strategic national program documents as the EAP and SMNE (Table 3) shows that some important measures, for example, on the practical implementation of biodiversity monitoring, are still at the initial stage of implementation, i.e. *there is some progress, but its pace is insufficient*. Consequently, there is a need to use a set of effective control mechanisms for the implementation of planned activities, timely reporting and analysis of the causes of non-compliance and the ways to eliminate them. This was recorded, including in the “Regulation on the Procedure of the State Environmental Control”, in the implementation of which representatives of the Ecological Movement of Uzbekistan and NNOs can participate, which will provide an opportunity to ensure the necessary independent level of control over execution by public organizations.

National Target 2: Expanding knowledge and awareness of the state administration and governance bodies and the whole society of the value of biodiversity and ecosystem services

Over the period since the development of National Goals, some progress has been achieved in meeting National Target 2, measures for implementation and effectiveness of which are assessed in Section II on the basis of the indicators developed (Section II).

The Action Plan for the conservation of biodiversity (currently at the stage of approval) formulates the following actions aimed at implementing the National Strategy for the Conservation of Biological Diversity for 2018-2027: integration of measures for the conservation of biological diversity and ecosystem services into the economic sectors for the period of 2018–2027; increasing the role of mass media in the field of public awareness of the importance of biological diversity; organization of an information company for the local population and nature users, with the aim of increasing the importance of the conservation and sustainable use of biological resources, as well as their ecosystem services.

As was shown above (Section I, II), activities in this direction are underway. Other key environmental documents that can be used to analyze the process of achieving the NT 2 are EAP and SMNE. (Table 16).

It should be noted that, as a rule, the data in the reports are presented without separating down into target and subject groups, and the quality of work is not assessed - that is, methodologies for determining the level of awareness of various target groups (decision makers, heads of local authorities, teachers of higher educational institutions, teachers of secondary schools) are not developed. In the future, it is necessary to observe progress on a systematic basis; this requires developing a methodological basis for monitoring the NT 2, possibly involving the scientific community or international projects.

Table 16: Practical implementation of measures provided for by EAP and SMNE concerning NT 2

The content of activities/measures	Information on implementation progress
EAP (2013-2017)	
53. Implementation of the Strategy of the UN Economic Commission for Europe (UNECE) and the Concept of the Republic of Uzbekistan on Education for Sustainable Development (ESD)	To implement the Strategy of the United Nations Economic Commission for Europe and the Concept of the Republic of Uzbekistan on Education for Sustainable Development (ESD) in 2015, the Deputy Prime Minister of the RUz approved an Action Program for the Phased Implementation of the Principles of Education for Sustainable Development in the Educational System of Uzbekistan for 2015-2017.
54. The study and outspread of best practices of non-governmental non-profit organizations in the implementation of projects on ESD - "Green Schools", "School Local Agenda 21", "Green Consumption", etc.	The best practices of NNOs in the implementation of projects on ESD - "Green Schools", "School Local Agenda 21", "Green Consumption", etc - have been studied and outspread. To increase environmental awareness, networks of environmental or "Green Schools" have been created around the world. In order to promote a consumption model based on harmonious human interaction with the environment as an alternative to wasteful consumption ("Green consumption") in RUz, relevant thematic recommendations and teaching aids have been developed and distributed to general education schools. 2 projects on ESD were included into the Republican Nature Protection Fund, developed jointly with NNOs - "Bilim Karvoni" and IOF "ECOSAN", aimed at developing the training module "Green Pack", 4 training seminars on ESD were

The content of activities/measures	Information on implementation progress
	conducted. Representatives of the Ministry of Public Education (MPE) and the SCEEP spoke at the third National Forum of NNOs of Uzbekistan with reports and presentations on the development of cooperation between government agencies and NNOs and other civil society institutions in the field of environmental education and ESD.
55. Creation of the Educational and Methodological Center for ESD under the Ministry of Higher and Secondary Specialized Education	An educational center on sustainable development goals operates at the National University of Uzbekistan. In the Ministry of Higher and Secondary Specialized Education, the Education for Sustainable Development sector has been established as part of an educational-methodological association for production technologies and environmental protection. Over the past 5 years, more than 50 meetings, seminars and conferences have been organized in the system of secondary and specialized education to promote and raise awareness on issues of continuous environmental education and education for sustainable development.
57. Preparation and publication of textbooks, teaching aids, educational materials, educational films, multimedia materials on education for sustainable development.	A multimedia training program for teachers "Sustainable Management of Natural Resources" has been prepared and distributed. Methodical manuals "Ecology" for students of colleges and lyceums have been published; "Conservation and Sustainable Use of Biodiversity Resources of the Main Ecosystems of Uzbekistan", "Ecology and Sustainable Education"; "Environmental Law"; "Theoretical Foundations of Ecology". Books - Collection of Scientific Works "Experimental Biology and Ecology"; "Saiga is a Wonderful Natural Creature"; Textbook "Theoretical Foundations of Ecology." Monograph "Flora of Zaamin State Reserve", Monograph "A Replica of the Sangzor River", etc.
58. Preparation and publication of the next edition of 2 volumes of the Red Book of the Republic of Uzbekistan - Preparation of the book-album "Protected Natural Areas"	Materials on species of plants and animals, for inclusion in the new edition of the Red Book have been collected and analyzed. In order to ensure high-quality preparation and maintenance of the Red Book of the RUz, an order of the SCEEP No. 20 dated July 14, 2016 was adopted. "On approval of the Regulation on the Red Book of the Republic of Uzbekistan". In course of the order execution, an Interagency Commission on the Maintenance of the Red Book of the RUz has been formed. Together with specialists from the Academy of Sciences, drafts of 2 volumes of the Red Book have been prepared. An electronic version of the Red Book has been created. A photo album "Living Treasures of Reserves in Uzbekistan" was prepared and published with a circulation of 1000 pieces from the series "Protected Natural Areas"
59 Increase public awareness in environmental protection and sustainable development.	Plans for joint work of the SCEEP and the National Television and Radio Company are developed annually. 3540 radio and television broadcasts were produced in 2016 (3172 in 2015), 2362 environmental materials were published, including more than 672 publications in the

The content of activities/measures	Information on implementation progress
	Internet media and social networks on various topics in the field of environmental protection and rational use of natural resources. During the period of 2013-2017, 13770 performances in total were organized on the republican and local TV channels, as well as radio, on various environmental issues, including biodiversity conservation. Over the past 5 years, 710 various information events have been organized (briefings, press conferences, meetings) to promote environmental protection legislation.
SMNE (2016-2020) as of 07/01/2018	
X. Monitoring of animal and plant communities	
68. Creation and support of an information web-portal of the SCEEP on environmental monitoring in order to inform the general public about the state of the environment through the official website (www.uznature.uz) and increase public activity in environmental protection measures.	The official website of the State Committee of the Republic of Uzbekistan on Ecology and Environmental Protection www.uznature.uz is one of the main mechanisms for the outspread of environmental information, including information on biodiversity. Every year the number of visitors of the site grows, as well as the quantity and quality of information posted on the site. On the site, you can find articles on various environmental issues directly or indirectly related to the conservation of biodiversity, publications on the most significant problems of BD conservation and sources of information.

Thus, the progress on the implementation of the NT 2 is assessed as on the way to achieving the goal. All available data was used to monitor the information used to assess the level of achievement of the NT. Information monitoring associated with this NT is adequate.

National Target (NT) 3: Development and integration of arrangements of economic valuation of biodiversity and ecosystem services into the planning processes.

Over the period since the development of National Goals, some progress has been achieved in meeting National Target 3, which is assessed using the relevant indicator (Section II). Progress in the implementation of this National Target by the **Indicator 3.2** (By 2025, methods of economic valuation of biodiversity and ecosystem services are developed, approved and adopted at the national level) has not been evaluated due to the long-term results.

Based on the assessment of the NT 3 achievement results (Sections I, II), we can conclude that there is **some progress in implementation of this NT, but the pace is not sufficient**. There has been some **progress in actualization** of issues of economic assessment of BD and ES in Uzbekistan. However, **progress in the practical implementation of measures** for the development and introduction of the economic assessment mechanisms for BD and ES in the planning process is hampered by the absence of necessary methodological developments and approaches in this field, and therefore, the measures taken can be assessed as insufficiently effective.

All available data was used to monitor the information used to assess the level of achievement of the NT. *Information monitoring associated with this NT is adequate.*

Based on the available information obtained in the process of analyzing measures for implementation of the NT 3 and consultations from stakeholders, it can be stated that economic assessments are performed only for separate ecosystem services either in local pilot areas carried out as a part of international projects, or as a part of departmental monitoring. (conducting hydrobiological monitoring Uzhydromet).

Moreover, attempts have been made to develop and practically apply approaches of providing incentives for ES and introducing the concept of payments for ecosystem services into the environmental management system, which was also performed as a part of the project activities implementation. The results of these developments are not compiled and not

incorporated into the processes of conservation and sustainable use of biodiversity and ecosystem services.

National Target (NT) 4: Development and integration into state Environmental Impact Assessment (EIA) procedure of arrangements to evaluate impact of economic and other activities on biodiversity.

Over the period since the development of National Goals, some progress has been achieved in meeting National Target 4, which is assessed using relevant indicators (Section II): **Indicator 4.1:** By 2020, the legislation that relate to the Environmental Impact Assessment (EIA) fully considers the issues of biodiversity and ecosystem services conservation.

Indicator 4.2. By 2020, the schemes to regulate compensation principle for inevitable / residual damage to biodiversity are developed and pilot testing is conducted.

Based on the assessment of results of the planned measures for achieving the NT 4 and the analysis of information obtained in the process of consultations with stakeholders, it was concluded that ***there is a progress in the implementation of measures for achieving this Target, but the pace is not sufficient.*** Thus, based on the analysis of the information provided (Sections I, II), the *progress in actualization* of issues in the development and implementation of mechanisms for assessing the impact of economic and other activities on biological diversity in Uzbekistan into the state Environmental Impact Assessment can be assessed as *on the way to achieving the goal*. However, given the fact that currently the EIA in Uzbekistan includes a detailed assessment of the impact only on air, water resources and soil, and the impact on biodiversity is still estimated superficially, and also taking into account that the schemes for regulating the principle of compensation for inevitable/residual damage to biodiversity has been developed and applied only as a part of the project activity implementation, ***progress in the practical implementation of measures for implementing the NT 4 can be assessed as without substantial changes.***

All available data was used to monitor the information used to assess the level of achievement of the NT. Information monitoring associated with this NT is adequate.

National Target 5: Development and commencement of implementation of the set of measures to reduce the rate of degradation and fragmentation of the most vulnerable natural ecosystems

In the Republic of Uzbekistan, the strategic direction in this activity is the fight against land degradation, as well as the conservation and sustainable use of biological resources. The 5th National Report of the Republic of Uzbekistan on the conservation of biological diversity (2015) noted that Uzbekistan is doing a lot to prevent the degradation of forest lands.

Since 2015, efforts to combat forest lands degradation and the rational use of forest resources have intensified (Sections I and II).

It should also be mentioned that in order to move from planned activities to concrete actions on sites, it is important that the SCEEP, the SCF and representatives of local authorities have relevant knowledge and understanding of the importance of land degradation and the use of forest resources.

In the Republic of Uzbekistan, all stakeholders contribute to the fight against land degradation, to the conservation and sustainable use of forest resources, have basic knowledge and well understand the need and importance to expand activities to create, reproduce, preserve and protect forests from fires, pests and diseases, illegal felling and other violations of forest legislation, involving all new modern approaches in it and attracting investments, innovative technologies and international experience.

Activities to create, reproduce, preserve and protect forests from fires, pests and diseases, illegal felling and other violations of forest legislation are included in the sectoral plans, work has begun at a proper level. Decision makers do not consider environmental issues as a priority, although they understand the importance of integrating them into their activities. ***Thus, the progress in implementing the NT 5 can be assessed as on the way to achieving the goal.***

All available data was used to monitor the information used to assess the level of achievement of the NT. Information monitoring associated with this NT is adequate.

National Target 6: Ensuring sustainable use of biodiversity in water bodies within improved legal and methodological frameworks

Over the period since the development of National Goals, some progress has been achieved in meeting National Target 6, which is assessed using the relevant indicator (Section II).

Based on the assessment, performed with the help of the indicators, of the NT 6 achievement results (Sections I, II), we can conclude that ***there is progress in implementation of this NT, but the pace is not sufficient***. Significant **progress** was mentioned in the actualization of the issues connected with the need for the sustainable use of biological resources of water bodies on an improved legal and methodological basis in Uzbekistan. This is evidenced by the changes and additions that have already been made to the existing legal acts on fishing in comparison with the figures of 2015. However, it is necessary to ensure further implementation of measures for implementing programs on conservation and sustainable use of biological resources of fishery water bodies and to additionally correct the existing legal acts (Section II) to have **progress in practical implementation of measures** for ensuring the sustainable use of fish resources in the country.

All available data was used to monitor the information used to assess the level of achievement of the NT. Information monitoring associated with this NT is adequate.

National Target 7: Expansion of total area of protected natural areas in the country for creation of national environmental network (PNA of different categories), ensuring their efficient management

The area ofPNAs in the country, belonging to the I-IV categories of IUCN, and biosphere reserves, which are directly important from the point of view of biodiversity conservation, amounts to 4.63% of the total area ofthe country. The total area ofPNAs (I-VI categories of IUCN and biosphere reserves) ensuring conservation and sustainable use of biodiversity is 13.2 mln ha, or 29.4% of the total territory of the Republic of Uzbekistan.

On this basis, the level of progress in implementing the NT 7 can be assessed as ***on the way to achieving the goal***. *All available data was used to monitor the information used to assess the level of achievement of the NT. Information monitoring associated with this NT is adequate.*

National Target 8: Development of state program on conservation and sustainable use of biological diversity components used for food production and farming

Given that a unified state program on conservation and sustainable use of the components of biological diversity used for food and farming has not been developed, and only separate measures for implementing the NT 8 are being performed, the level of achievement of the goal in this direction can be assessed as ***progress, but with insufficient pace***. *All available data was used to monitor the information used to assess the level of achievement of the NT. Information monitoring associated with this NT is adequate.*

National Target 9: Inclusion of provisions of the National Biodiversity Strategy and Action Plan as integral parts of the plans for national, territorial and sectoral development

In accordance with the Global Aichi Goals, and taking into account the main lessons learned from the implementation of the first NBSAP (1998), the country has identified four national strategic objectives, including nine national targets for the conservation and sustainable use of BD equivalent to the Aichi targets. According to the set national goals and targets, the main strategic directions for the conservation of the BD of Uzbekistan are: support and

restoration of ecosystems and key components in productive landscapes to provide ES; integration of issues related to the BD conservation in the economic sectors; assessment of the economic value of BD and ES; development of the PNA system and improvement of their management efficiency; raising awareness of stakeholders and the general public about the importance of BD and ES, as well as about the contribution they can make to the process of national development and improving the welfare of the population.

Based on the analysis of planning for conservation and sustainable use of biodiversity in Uzbekistan, it can be stated that the country is highly committed to performing on most of its obligations in the field of environmental protection and sustainable nature management, including research on BD, challenges of desertification and climate change, preparation of strategies, programs and action plans in these thematic interrelated fields, which was reflected in the most important national strategic conceptual documents, such as NFP, NAPCD, NAPCDD, SNC, TNC. This reflects the integration of efforts for conservation and sustainable use of the BD of all three Conventions in the draft of the updated NBSAP. The practical implementation of the conceptual directions set forth in the above-mentioned national program documents is partially reflected in the Implementation Activities for the Environmental Action Plan of the RUz (EAP 1999, 2005, 2008, 2013) and in the Programs of State Monitoring of Natural Environments in the RUz (SMNE 2003, 2006, 2011, 2016).

It may be noted that each successive EAP and SMNE program is a logical continuation of the previous programs. In the structure of these documents, there is a positive trend of increasing the thematic sections and the planned directions of activities directly related to the ecological aspects of nature management and protection of the BD. The latest EAP was planned for the period 2013-2017. (PKM RUz No. 142 dated May 27, 2013) and contained specific measures directly or indirectly related to conservation and sustainable use of the BD. In connection with the status of the NBSAP as a project document, an assessment of the level of progress achieved in implementing the NT 9 can be assessed as ***progress, but with insufficient pace.***

All available data was used to monitor the information used to assess the level of achievement of the NT. Information monitoring associated with this NT is adequate.

SECTION IV. DESCRIPTION OF NATIONAL CONTRIBUTION TO IMPLEMENTATION OF EACH OF THE GLOBAL TARGETS FOR THE CONSERVATION AND SUSTAINABLE USE OF BIODIVERSITY ADOPTED IN AICHI

Based on the experience and challenges connected with resolving practical biodiversity targets, a renewed Strategic Biodiversity Conservation Plan was adopted at the COP held in Nagoya in 2010 (Aichi Prefecture, Japan), which includes 5 Global Strategic Goals and 20 Targets for the period of 2011-2020. The purpose of the Global Goals is to intensify actions of the CBD Parties in conservation and sustainable use of biodiversity. The strategic plan is designed to provide a flexible structure for setting national goals and targets, and enhancing coherence in the implementation of the Convention and decisions of the COP.

Based on national and global trends, the priorities of Uzbekistan in the field of conservation and sustainable use of biodiversity are summarized and formulated in 4 national strategic goals and 9 targets. National goals and targets are based on a flexible approach to the implementation of the CBD Strategic Plan and are adapted to the national development context and priority needs of biodiversity conservation in Uzbekistan, i.e. equivalent to Global Aichi Goals. The NT solution will provide a comprehensive approach to conservation and sustainable use of biodiversity as a strategically important resource and guarantor of the country's environmental stability, taking into account political, social and economic, environmental, legal, educational, nature protection aspects.

The updated National Biodiversity Conservation Strategy, once approved, will serve as one of the legal bases for:

- development of national and local environmental action plans;
- development of a biodiversity monitoring system;
- state and sectoral scientific and technical programs, fundamental and applied research, sectoral development plans related to environmental monitoring;
- reducing direct burden on biodiversity;
- developing a system of protected natural areas, improving efficiency of conservation and sustainable use of biological diversity, taking into account ecosystem services;
- climate change adaptation;
- development of forestry, sustainable pasture management, protection of water resources, and others.

National Target (NT) 1: Improvement of the system of state monitoring of natural environment by inclusion of biodiversity monitoring into it.

Connection between NT 1 and global Targets adopted in Aichi

The Republic of Uzbekistan developed the NT 1 for the development of a system for monitoring biodiversity components, which is directly related to the Aichi Target 19: “By 2020, knowledge, scientific base and technologies related to biodiversity, its value and functioning, its status and trends in this field, as well as the consequences of its loss, are improved, widely shared, transferred and applied”. The Aichi Target 19 focuses on improving, sharing and applying scientific knowledge and research. For the development and full operation of the biodiversity monitoring system and the use of the obtained data for management purposes, it is necessary to create mechanisms for exchanging information on biodiversity and ecosystem services among all stakeholders, ensuring that monitoring results are available for authorities, academia and the public to get acquainted with.

The national contribution to the achievement of the Aichi Target 19 is determined by the development of the process of international information exchange and participation of Uzbekistan in international projects of priority directions in the field of environmental protection

and ensuring ecological safety. Monitoring data and scientific information on the status and trends in biodiversity obtained at the national level are used in reports on multilateral agreements, by incorporating monitoring the results into international databases, national reports on the implementation of the UN Framework Conventions, etc.

The achievement of the national target for the development of the monitoring system will enhance coherence in the implementation of the CBD and decisions of the Conference of the Parties in monitoring biodiversity at the global level, and synergies in related issues of all three Rio conventions.

Exchange of information on biodiversity and its use at the global level

Activities under international environmental conventions, protocols, agreements and memorandums of understanding nowadays are one of the main instruments for exchanging and sharing data, experience, information and technology in the field of biodiversity. The data of monitoring researchresearch obtained at the national level are provided by Uzbekistan in the framework of global agreements, including reporting requirements, replenish international databases, are used to identify areas of international importance for biodiversity conservation, to develop joint action plans for the conservation of globally threatened species:

A. Use of data in the framework of obligations under multilateral conventions and agreements. The data of monitoring researchresearch are used in the preparation of national reports within the framework of international commitments on: The Convention on Biological Diversity (CBD); Convention Concerning the Protection of the World Cultural and Natural Heritage (UNESCO); the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES); the Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar); the Convention on the Conservation of Migratory Species of Wild Animals (CMS) and the Central Asian Mammals Initiative (CAMI); the Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa (UNCCD); the African-Eurasian Migratory Waterbird Agreement (AEWA); the Agreement on the establishment of the International Fund for Saving the Aral Sea (IFAS).

B. Monitoring data replenish international databases.

Since 2005, Uzbekistan has been participating in the International Waterbird Census (IWC) Program, a long-term monitoring program aimed at collecting information on the number of birds and the state of their habitats in wintering grounds. The goal of the IWC is to study wetlands, gather information on wetland birds, inform the public, and stimulate interest in caring for wetlands and birds. Currently, more than 100 countries participate in the census, and more than 30 million waterbirds are counted each year.

The census observations are used to assess the state of populations of waterfowl and tugay birds of the European-Central Asian region, register changes in their number and highlight valuable wetlands, including the Ramsar ones. The Ramsar areas of Uzbekistan are Aydar-Arnasay lake system (area of 527,100 ha) and Dengizkul lake (area of 31,300 ha). Dengizkul Lake is of international importance as a key ornithological area on the flyway of hydrophilic birds, as well as a place for wintering and nesting of species listed in the Red Book of Uzbekistan. On the Dengizkul Lake specialists of the Academy of Sciences annually monitor the state of plant and animal world when oil and gas operations of “LUKOIL Uzbekistan Operating Company” LLC are conducted. The results of monitoring researchresearch are the basis for reducing the negative impact of project activity on significant bird species.

In Uzbekistan the IWC Program has been running since 2005. The monitoring dynamics performed over 7 years is shown in table 17. In Uzbekistan there have been identified 26 water bodies of international importance for the conservation of birds and biodiversity (IBA), with 24 globally threatened IUCN species (75%) and 20 species of the Red Book of Uzbekistan (41.6%). Not less than 18 water bodies of Uzbekistan are important for wintering of 58 bird species (12% of the entire ornithofauna). Nine of these water bodies conduct annual waterbird monitoring as

part of the IWC program. For 12 years of IWC in the country 10 reservoirs of 5 regions have been covered. IBA records are conducted: reservoirs Tuyabuguz, Kattakurgan, Tudakul, Kuymazar, Talimardzhan, Chimkurgan, Hadicha, Zekra, Dengizkul lakes; data on the types of the International Red Book have been obtained: stiff-tails *Olexura leucocephala*, lesser white-fronted geese *Anser erythropus*, white-eyed *Aythya nyroca* and red-headed pochards *Netta rufina*. In September-October 2015, the largest in the whole history of ornithological research flying cluster of the sociable lapwings was discovered in the Talimardzhan reservoir - 4,225 birds (<http://uzspb.uz/>).

Table 17: IWC results in Uzbekistan

Year	Number of species	Number of individuals
2017	45 species	94941 birds
2016	52 species	106603 birds
2015	41 species	3860 birds
2014	32 species	34035 birds
2013	29 species	22989 birds
2012	32 species	72014 birds
2011	32 species	83279 birds

C. Monitoring data is used to determine areas of international importance for biodiversity conservation.

1). In the framework of the joint project of the SCEEP and the Regional Environmental Center for Central Asia, funded by AUSAD “Protection, Rational Use of Wetlands of the Sudochoye Lakes system on the Ustyurt plateau”, an inventory of the reservoir has been conducted. Following the results of the work done, a draft Management Plan and a preliminary nomination for the inclusion of Lake Sudochoye in the list of reservoirs of the Ramsar Convention were prepared.

2). By 2018, the program “Important Bird Areas of Uzbekistan” (IBAUz) has identified and described 52 IBAs in the country - territories of international importance for conservation of birds and the entire biodiversity. These territories are confirmed by the BirdLife International secretariat and are included in the international IBA network (http://www.uzspb.uz/iba_map.html). 9 IBAs are regularly monitored. The IBAs are monitored in the framework of international programs: OSME (Ornithological Society of the Middle East) and CADI (Central Asian Desert Initiative) programs. In 2018, monitoring is planned for 12 IBAs with the support of the Nurobad breeding center, CADI and IWC programs.

3). In 2016, at the initiative of the Critical Ecosystem Partnership Fund (CEPF) and its partner the Zoi Ecological Network, there was started identification and description of key biodiversity areas (KBA) of the Central Asian mountain territories important for conservation of biodiversity components (www.cepf.net). This work is conducted in the framework of the “World Consultative Process for Harmonizing Methodologies that Allow Countries to Identify Key Biodiversity Areas” initiated by the IUCN Species Survival Commission (SSC) and the World Commission on Protected Areas of IUCN (WCPA). (www.keybiodiversityareas.org). The main goal of the work is to identify key areas important for the preservation of globally threatened components of biodiversity of various taxonomic groups. One of the principles of the KBA program is active participation of local experts.

Currently, in the Uzbek part of the project area, in the course of the work of national experts of UzSPB and the Institute of Zoology of the Academy of Sciences, 36 KBAs, important for the conservation of fauna and flora diversity, were identified and described, 12 of them overlap with protected natural areas. Five out of the 36 allocated KBAs of Uzbekistan were identified by the CEPF fund as priority (<https://www.cepf.net/sites/default/files/mountains-central-asia-ecosystem-profile-rus.pdf>).

D. Monitoring data are used to identify priority directions for conservation of globally threatened biodiversity.

1). The data of field research of the International Integrated Ecological Expedition to the South Ustyurt, conducted in 2012-2014 within the framework of cooperation between the SCEEP, the SCF and the Michael Succow Foundation (Germany) with the participation of the Central Biodiversity Network (CABNET), funded by the German Academic Exchange Service (DAAD), formed the basis for obtaining new information on a number of globally threatened species. The distribution was studied and data on the number of rare hoofed species was obtained. Some of these, such as a globally threatened species as the Turkmen onager *Equus hemionus kulan*, was considered extinct in the country's wild nature before this time, on another species - the Ustyurt ram *Ovis vignei arcal* - there has not been any reliable information for the past 30 years. The data on Persian gazelles *Gazella subgutturosa* have been limited to some short messages. Four species, including the saiga *Saiga tatarica* are transboundary for Uzbekistan, Turkmenistan, and Kazakhstan, three of which, the saiga, Persian gazelle, onager, are included in the list of The Convention on the Conservation of Migratory Species of Wild Animals (CMS) (www.cms.int/), as well as to the list of The Central Asian Mammal Initiative (CAMI) of CMS.

2). In 2015–2018, conducting transboundary observations of flight of a sociable lapwing *Chettusia gregaria* on the Talimardzhan site in Uzbekistan and Turkmenistan made it possible for the first time to obtain important data on spatial distribution, daily movements, biology features and possible threats to the species during the migration period. According to the results of the monitoring, at the end of 2016, the Talimardzhan territory was included in the international list of Key Biodiversity Areas (KBA) as a priority within the framework of the “Critical Ecosystem Partnership Fund (CEPF)” (<https://www.cepf.net/sites/default/files/mountains-central-asia-ecosystem-profile-rus.pdf>).

3). As part of the implementation of the Central Asian Mammals Initiative (CAMI), the main measures for conservation of globally threatened migratory species, undertaken by Uzbekistan since 2014, are:

- Providing a territorial form of protection for rare and threatened wild migratory animals, such as the snow leopard *Pantera uncia*, Severtsov argali *Ovis ammon severtzovi*, the Turkmen onager *Equus hemionus kulan*, the Bukhara deer *Cervus elaphus bactrianus*, the Persian gazelle *Gazella subgutturosa*, the saiga *Saiga tatarica*.
- Conservation of snow leopard, victim species and ecosystems within the framework of the joint UNDP/GEF/SCEEP project “Sustainable Use of Natural Resources and Forestry in Key Mountain Regions Important for Globally Significant Types of Biodiversity”. Participation in the Global Snow Leopard & Ecosystem Protection Program (GSLEP). Development of a Program and Action Plan for the Conservation of the Snow Leopard in Uzbekistan for 2019–2029. Participation in the Global Snow Leopard & Ecosystem Protection Program (GSLEP).

The priority areas of species conservation work under the Central Asian Mammals Initiative (CAMI) Program in Uzbekistan are:

- Breeding in nurseries. Bukhara deer are bred in nurseries in two PNAs - in the Lower Amudarya Biosphere Reserve and Zarafshan National Natural Park. In the Bukhara specialized nursery "Dzheiran", work has also begun on breeding Bukhara deer;
- Strengthening the capacity of the PNA Inspection Service to effectively work to prevent cases of illegal hunting and trade (saiga, snow leopard and its food objects);

- Strengthening of interagency cooperation in data exchange and conservation of CAMI types;
- Optimization and expansion of the PNA network in the habitats of the snow leopard, Persian gazelle, onager;
- Involvement of local residents, customs and border guards in the protection of saiga, snow leopard, Bukhara deer, onager;
- Optimization of the system of monitoring the snow leopard and victim species, taking into account new methods and technologies; implementation of a united monitoring system for the country;
- Strengthening transboundary cooperation with neighboring countries on the protection of seasonal movements ways of saiga (Kazakhstan), snow leopard and mountain hoofed species (Kazakhstan, Kyrgyzstan and Tadzhikistan), Bukhara deer, onager (Turkmenistan), illegal trade and exchange of monitoring data.

4). In 1993, the World Association for Bird Protection BirdLife International established the International Autumn Bird Observation Days (EuroBirdwatch). More than 40 countries on the European-African flyway participate annually in this action. Over the 20 years of the Autumn Bird Observation Day, BirdLife has implemented a large number of projects along the European-African flyway to protect migratory birds. As part of the International Autumn Bird Observation Day, UzRSPB, as a BirdLife partner, has been participating in autumn observations since 2013, providing autumn observations to the EBW Coordination Center (Table 18).

Table 18: The results of autumn bird observations for 2015-2017 (<http://uzspb.uz/>)

Year	Results
2015	Tashkent, Namangan, Jizzakh, Samarkand, Bukhara, Kashkadarya provinces, Karakalpakstan; 13 recording points, 121 participants; 16035 birds, 72 species
2016	Tashkent, Syrdarya, Namangan, Samarkand, Bukhara provinces, Karakalpakstan; 13 recording points, 112 participants; 49357 birds, 93 species
2017	Tashkent, Namangan, Samarkand, Bukhara provinces, Karakalpakstan; 11 recording points, 77 participants; 50684 birds, 91 species

I. Monitoring data is used to implement international action plans for conservation of globally threatened species:

International Saker Falcon *Falco cherrug* Action Plan (SakerGAP); “Egyptian Vulture (*Neophron percnopterus*) Flyway Action Plan” (EVFAP). In 2016, within the framework of CMS Raptors MoU, the development of the “Multi-species Action Plan to Conserve African-Eurasian Vultures” (Vulture MsAP) has begun. Information on 5 species of vultures of Uzbekistan was presented for this meeting: bearded vulture *Gypaetus barbatus*, carrion vulture *Neophyon percnopterus*, Himalayan vulture *Gyps himalayensis*, black vulture *Aegypius monachus* and griffon vulture *Gyps fulvus*. The first version of the Action Plan was presented at the 12th meeting of the Conference of the CMS Parties in October 2017.

The connection between the UN Sustainable Development Goals and the NT 1

Monitoring is a part of the biodiversity control and management system, monitoring data will allow to assess the state and trends in biodiversity, identify threats, and determine priorities

in the field of biodiversity conservation and sustainable use. The ability to improve knowledge, scientific base and technologies associated with biodiversity, its values, functioning, status and trends, as well as consequences of its loss, plays an important role in achieving sustainable development of each country and the world as a whole. However, SDGs include no direct mentioning of biodiversity monitoring, exchange of information and use of this information in planning sustainable biodiversity management. At the same time, measures to develop and improve the monitoring system can assist in the implementation of the 5 sustainable development goals of the UN. The sustainable development goals most associated with achieving of the NT 1 are listed in Table 19.

Table 19: Sustainable development goals related to the implementation of the NT 1

UN Sustainable Development Goals (SDGs)	Sustainable Development Targets
UN SDG 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	8.4 During the whole period until the end of 2030, to increase gradually the global efficiency of resource use in consumption and production systems and strive to ensure that economic growth is not accompanied by environmental degradation, as foreseen in the Ten-Year Action Strategy for Transition to Using Rational Consumption and Production Patterns
UN SDG 11: Make cities inclusive, safe, resilient and sustainable	11.4 Strengthen efforts to protect and safeguard the world's cultural and natural heritage
UN SDG 12: Ensure sustainable consumption and production patterns	12.2 By 2030, achieve the sustainable management and efficient use of natural resources. 12.6 Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle 12.8 By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature
UN SDG 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	15.1-15.9 Progress in accomplishing all the targets of this goal is associated with information obtained from monitoring components of biodiversity.
UN SDG 17: Revitalize the global partnership for sustainable development	17.6 Enhance North-South, South-South and triangular regional and international cooperation on and access to science, technology and innovation and enhance knowledge sharing on mutually agreed terms, including through improved coordination among existing mechanisms, in particular at the United Nations level, and through a global technology facilitation mechanism

National Target 2: Expanding knowledge and awareness of the state administration and governance bodies and the whole society of the value of biodiversity and ecosystem services

Conenction between NT 2 and global Targets adopted in Aichi

All the activities for implementing the NT 2 listed in Sections I and II contribute to the achievement of the Aichi Target 1: **“By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.”**

Realizing itself as a part of important joint activities of the CBD Parties in this direction, Uzbekistan actively participates in international initiatives, programs and projects related to the protection of biodiversity and ecosystem conservation. Thus, the national contribution to the achievement of the Aichi Targets 1 and 19 is determined by the development of the process of international information exchange and participation of Uzbekistan in international projects of priority directions in the field of environmental protection and ensuring ecological safety.

Examples include active work in international projects, each of which performs a component on public awareness and dissemination of knowledge. International and regional conferences have been conducted. In their turn, specialists and the public of Uzbekistan participated in international seminars, symposia, trainings held in various countries of the world. Thus, the dissemination of information and best practices in the field of biodiversity and ecosystem protection was ensured.

Representatives of Uzbekistan took an active part in international programs, initiatives, competitions such as the Spring Alive Program, the Wetlands International program for the International Waterbird Census, the Central Asian Mammal Initiative (CAMI) Program, the Zoi Ecological Network Initiative (Switzerland), the Global Snow Leopard & Ecosystem Protection Program (GSLEP), Saiga Alliance, etc.

The connection between the UN Sustainable Development Goals and the NT 2

Activities to increase knowledge and awareness of biodiversity values are inextricably connected with implementation of the commitments of the Republic of Uzbekistan to achieve the Sustainable Development Goals (SDGs) 4, 12 and 17. (Table 20).

Table 20: Sustainable development goals related to the implementation of the NT 2

UN Sustainable Development Goals (SDGs)	Sustainable Development Targets
SDG 4: Providing comprehensive and equitable quality education and expanding lifelong learning opportunities for all	4.7. By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development
SDG 12: Ensure sustainable consumption and production patterns	12.8. By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature
UN SDG 17: Revitalize the global partnership for sustainable development	17.6 Enhance North-South, South-South and triangular regional and international cooperation on and access to science, technology and innovation and enhance knowledge sharing on mutually agreed terms, including through improved coordination among existing mechanisms, in particular at the United Nations level, and through a global technology facilitation mechanism

National Target (NT) 3: Development and integration of arrangements of economic valuation of biodiversity and ecosystem services into the planning processes.

Connection between NT 3 and Global Targets adopted in Aichi

The Republic of Uzbekistan has developed the **NT 3** for the development of economic assessment of biodiversity and ecosystem services, which is directly related to the **Aichi Target 2**: “By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems.” The Aichi Target 2 focuses on integrating BD, as an important aspect, into the decision-making process in the field of economic development and poverty reduction. Without actualization of this aspect, the best conservation measures may be ineffective, since developmental activities will pose a threat to habitats and increase other burdens on the BD.

In developing the National Targets and analyzing the reasons for the loss of BD in Uzbekistan, one of the main reasons was the **underestimation** of the economic value of biodiversity and ecosystem services. Most of the causes for habitat loss, species reduction and degradation of ecosystem services are the result of unsustainable use of natural resources. The main reason for this unsustainable use of resources is absence of economic assessment mechanisms for biodiversity and important ecosystem services. It was recognized that the use of methods to estimate the economic value of biodiversity and ecosystem services in industrial development and land use planning shall ultimately become a standard component of economic planning in Uzbekistan.

The national target for the development and implementation of the economic assessment mechanisms for BD and ES in the planning process is directly related to the Global Aichi Target 2 and, indirectly, to the Aichi Targets 1, 3, 4, 5, 7, 19 (Table 1). The indirect connection is determined by the relevance of work related to the economic assessment of biodiversity and the development of regulatory economic instruments for biodiversity conservation on its basis - incentives, sanctions, subsidies, etc., and the development of policies and strategies for its sustainable use.

The national contribution to the achievement of the Aichi Targets is determined by the development of a regulatory framework aimed at: improvement and introduction of economic mechanisms for environmental management, methods of the economic assessment of damage to wildlife, taking into account long-term consequences, planning and incorporating the valuation of BD and ES into strategic national documents.

The conclusions of the analysis of the planning processes performed in the country indicate the following results of the national contribution to the achievement of the above mentioned Aichi targets:

- National strategic policy documents reflect an integrated approach to creating the conditions for sustainable development. They declare the need to take broad political measures in the field of environmental protection, sustainable use of natural resources, and solving global and regional environmental problems, i.e. determine the main conceptual areas of activity that affect, inter alia, issues of BD conservation;
- In general, the environmental policy of Uzbekistan takes into account the need for economic interest of nature users in sustainable use of natural resources and protection of the environment. Existing economic instruments are based on the principles “the polluter pays”, “user of natural resources pays”. To achieve these goals, Uzbekistan has developed programs for the main directions of state policy in the field of the environment and nature management, a phased transition to paid nature management, improvement of the system of state support and subsidies for integrated nature management, widespread attraction of foreign investment;

- There is a gradual development of the system of payments for environmental pollution and for the unsustainable use of natural resources, as well as further improvement of the mechanism for collecting payments for special environmental management. The main purpose of the application of economic mechanisms and instruments is to gradually ensure an adequate valuation of environmental resources and promote their efficient and targeted use.

However, the issues of connection between BD, ES and human welfare, the economic value of the components of biodiversity are not yet fully reflected in the state environmental policy. There are no plans to integrate the economic value of the BD into the national development strategy, planning processes, the national accounting and reporting systems.

The connection between the UN Sustainable Development Goals and the NT 3

The importance of developing economic mechanisms for conservation of biodiversity is reflected, directly or indirectly, in almost all the Sustainable Development Goals. This interconnection is determined by the fact that the development and implementation of mechanisms for the economic valuation of biological diversity and ecosystem services in the process of state and sectoral planning is mandatory for sustainable development of every country. The sustainable development goals most associated with achieving of the NT 3 are listed in Table 21.

Table 21: Sustainable development goals related to the implementation of the NT 3

UN Sustainable Development Goals (SDGs)	Sustainable Development Targets
UN SDG 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	8.4 During the whole period until the end of 2030, to increase gradually the global efficiency of resource use in consumption and production systems and strive to ensure that economic growth is not accompanied by environmental degradation, as foreseen in the Ten-Year Action Strategy for Transition to Using Rational Consumption and Production Patterns 8.9 By 2030, devise and implement policies to promote sustainable tourism that creates jobs and promotes local culture and products
UN SDG 9: Build resilient infrastructure, promote sustainable industrialization and foster innovation	9.4 By 2030, upgrade infrastructure and re-equip industrial enterprises to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities.
UN SDG 11: Make cities inclusive, safe, resilient and sustainable	11.4 Strengthen efforts to protect and safeguard the world's cultural and natural heritage

UN SDG 12: Ensure sustainable consumption and production patterns	12.2 By 2030, achieve the sustainable management and efficient use of natural resources. 12.6 Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle 12.8 By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature
UN SDG 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	15.9 By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts 15.A Mobilize and significantly increase financial resources from all sources to conserve and sustainably use biodiversity and ecosystems
UN SDG 17: Revitalize the global partnership for sustainable development	17.14 Enhance policy coherence for sustainable development

National Target (NT) 4: *Development and integration into state Environmental Impact Assessment (EIA) procedure of arrangements to evaluate impact of economic and other activities on biodiversity.*

Connection between NT 4 and Global Targets adopted in Aichi

National Target 4 on development and integration into state Environmental Impact Assessment (EIA) procedure of mechanisms to evaluate impact of economic and other activities on biodiversity is not directly related to any of the global Aichi Targets; however, there is an indirect connection with almost every Target that relates to conservation and sustainable use of biodiversity.

National contribution to achievement of Aichi Targets (global Targets 3, 4, 5, 7 and 8) is driven by the relevance of developing mechanisms to evaluate impact of economic and other activities; implementation of procedures related to obligatory assessment of harmful impacts on biodiversity during economic development; elaboration and implementation of compensatory mechanisms as an instrument for conservation and sustainable use of biodiversity. Development and implementation of mechanisms to evaluate impact of economic and other activities on biodiversity allows to avoid, mitigate, restore and compensate harmful impact. This, in turn, will reduce pressure on biodiversity, will allow to develop and implement positive incentives for its conservation and sustainable use, as well as will slow down rates of loss of all-natural habitats.

Achievement of National Target 4 will promote conservation and sustainable use of biodiversity, including globally important biodiversity, because it provides for achievement of sustainable balance between country's economic development and sustaining key ecosystems and values of biodiversity through prevention of damage, mitigation of consequences, as well as compensation of losses. As a result of developing EIA procedure, decision-making process is also improved; principles of integrating environmental protection dimensions into decision-making process are promoted following participation of policy makers, environmental agencies and society in this process.

The connection between the UN Sustainable Development Goals and the NT 4

The importance of developing mechanisms for assessing the impact of economic and other activities on biological diversity and incorporating them into the procedure of state environmental impact assessment is reflected, directly or indirectly, in almost all the Sustainable Development Goals. Such a connection is determined by the fact that the integration of biodiversity in economic development is mandatory for the sustainable development of every country. The sustainable development goals most associated with achieving of the NT 4 are listed in Table 22.

Table 22: Sustainable development goals related to the implementation of the NT 4

UN Sustainable Development Goals (SDGs)	Sustainable Development Targets
UN SDG 6: Ensure access to water and sanitation for all	6.3 By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally
UN SDG 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	8.4 During the whole period until the end of 2030, to increase gradually the global efficiency of resource use in consumption and production systems and strive to ensure that economic growth is not accompanied by environmental degradation, as foreseen in the Ten-Year Action Strategy for Transition to Using Rational Consumption and Production Patterns
UN SDG 9: Build resilient infrastructure, promote sustainable industrialization and foster innovation	9.4 By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities.
UN SDG 12: Ensure sustainable consumption and production patterns	12.2 By 2030, achieve the sustainable management and efficient use of natural resources. 12.6 Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle 12.8 By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature
UN SDG 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	15.1 By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements

	15.5 Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species 15.9 By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts
UN SDG 17: Revitalize the global partnership for sustainable development	17.14 Enhance policy coherence for sustainable development

National Target 5: Development and commencement of implementation of the set of measures to reduce the rate of degradation and fragmentation of the most vulnerable natural ecosystems

National Target 5 on reduction of the speed of degradation and fragmentation of vulnerable natural ecosystems is connected with the Global Aichi Targets 5, 7 and 15. Understanding the importance of the global significance of combating land degradation, since its independence, Uzbekistan has been continuously making efforts to reform agriculture and land use sectors. In addition, the government of the country, with the support of donors, performed various pilot initiatives to test new approaches to land management. As a result, a certain institutional and legal framework has been created that defines activities to prevent habitat loss, including forests, to optimize forest management, as well as to create conditions for conservation and restoration of biodiversity, to increase contribution to carbon accumulating and climate change.

The economic costs of land degradation for a country are superimposed on all three levels:

- (i) at the local level, in terms of reduced productivity;
- (ii) at the national level, in terms of loss of productive capacity of agricultural land and reduction of the share of agriculture in GDP and export revenues;
- (iii) at the global level, in terms of negative impact on carbon sequestration and climate change, biodiversity reduction and pollution of transboundary water resources.

The active work of the Republic of Uzbekistan in performing the obligations of the Global Environmental Conventions is of great global importance: CBD, UNCCD and FCCC. For example, the activities performed at the national level in the framework of the implementation of the NT-5 make a significant contribution to the achievement of the strategic goal of the UNCCD: “To achieve global benefits through sustainable land management and combating desertification/land degradation that contribute to conservation and sustainable use of biodiversity and mitigate the effects of climate change.” A significant part of the work in this area is performed by international projects. About a dozen projects have been implemented during the reporting period, directly or indirectly related to solving problems of biodiversity conservation. Activities to combat land degradation are inextricably connected with the performance of Uzbekistan’s commitments to achieve SDG 15 (Table 23).

Table 23: Sustainable development goals related to the implementation of the NT 5

UN Sustainable Development Goals (SDGs)	Sustainable Development Targets
UN SDG 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	15.1 – 15.9 all the targets of this goal are associated with implementation of NT 5

National Target 6: Ensuring sustainable use of biodiversity in water bodies within improved legal and methodological frameworks

Connection between NT 6 and Global Targets adopted in Aichi

NT 6 is directly connected with Aichi target 6 “By 2020 all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits». All the measures for implementing the NT 6 listed in Section II make a certain contribution to the achievement of Aichi GAT 6, which promotes sustainable management of fish resources and control of fish production on a legal and methodical basis.

The country performs targeted activities to ensure sustainable use of fish resources, including improvement of the legal basis, scientific research on the assessment of food resources of water bodies to prevent over-exploitation of fishery water bodies, taking into account the ecosystem approach. The activities are fully consistent with the Global Target 6.

The connection between the UN Sustainable Development Goals and the NT 6

Implementation of NT 6 ensures sustainable use of water resources, which corresponds to SDG 6 (Table 24).

Table 24: Sustainable development goals related to the implementation of the NT 6

UN Sustainable Development Goals (SDGs)	Sustainable Development Targets
UN SDG 6: Ensure access to water and sanitation for all	6.5 By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate 6.6 By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes

National Target 7: Expansion of total area of protected natural areas in the country for creation of national environmental network (PNA of different categories), ensuring their efficient management

National contribution to the achievement of the Aichi Global Biodiversity Goals, which are directly related to the National Target 7.

Aichi Target 11: *By 2020, at least 17 percent of terrestrial and inland water, and 10 percent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes.*

The connection is determined by the fact that this Target provides for an increase in land areas that are effectively managed and interconnected. The NT also provides for the development of the PNAs system by increasing their area, creating a national ecological network and ensuring effective management.

Thus, the area of PNAs in the country belonging to the I-IV categories of IUCN and biosphere reserves, as of 2018, is about 5%. However, work in this direction continues in order to achieve the Aichi targets of 17% and 10% for terrestrial and maritime areas.

Aichi Target 12: *By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained*

The interconnection is determined by the fact that this Target presupposes conservation of rare and threatened species, which is generally possible due to the provision of their territorial form of protection, i.e. by organizing the PNAs, which the NT 7 provides for.

About 180 plant species included in the Red Book of the Republic of Uzbekistan grow at the PNAs of I-IV categories and biosphere reserves, which is about 54%.

The territorial form of protection is currently ensured for 72% of fish, 63% of reptiles, 90% of birds, 68% of mammals included in the Red Book (2009).

Existing PNAs cover only parts of their habitats and do not provide protection for certain species during their full life cycle.

Aichi Target 14: *By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable segments of the population.*

The interconnection is determined by the fact that this Target presupposes restoration and conservation of ecosystems that render essential services, which is possible thanks to, inter alia, provision of territorial form of protection for them, i.e. by organizing a PNAs in order to increase their area and create a network, which is provided by the NT 7.

The existing PNA system of Uzbekistan reflects the diversity of the natural landscape complexes of the country to a certain extent, but it does not provide full protection of the biological diversity of the country as a whole for a number of objective reasons. The PNAs of Uzbekistan provide a high level of protection for only certain types of natural ecosystems and habitats — mountain forests and high mountains (14% of the area of these ecosystems). For other ecosystems - desert (more than 3.5%), submontane ecosystems and floodplain forests (3%) - the area in PNAs is still insufficient to ensure the full protection of species, communities and ecosystems.

As a part of ecosystem services provided by PNAs, ecological tourism (both international and domestic) in the Republic of Uzbekistan can be mentioned as one of the main ones, with the exception of reserves, protected areas of natural parks and biosphere reserves.

National contribution to the achievement of the Aichi Global Biodiversity Goals, which are indirectly related to the National Target 7.

Aichi Target 5: *By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.* The relationship is determined by the fact that this target provides for decreasing the loss of natural habitats and reducing degradation. The indirect connection is explained by the fact that the loss of natural habitats and prevention of degradation is also possible through the establishment of PNAs.

Forest ecosystems of the country have a territorial form of protection in the PNAs of various categories, in particular, having appropriate management in state reserves, national natural parks, nurseries and forestry enterprises, and forest-hunting facilities, and biosphere reserves. The types of ecosystems protected in the existing PNA system are shown in table 25:

Table 25: Ecosystems Protected in PNAs of I-III Categories

PNA Name	Location	Main Protected Objects	Area (ha)
State Reserves;			
Chatkal	Western Tian-Shan, Chatkal Ridge	Mountain-forest and highland ecosystems, including juniperic forests	24706
Gissar	Pamir-Alay, Gissar Ridge	Mountain-forest and highland ecosystems, including juniperic forests	80986.1
Kyzylkum	Floodplain of Amurdarya	Tugay and desert ecosystems	10311
Zaamin	Pamir-Alay, Turkestan Ridge	Mountain-forest and highland ecosystems	26840
Nurata	Pamir-Alay, Nurata Ridge	Ecosystems of arid lowlands and middle mountains, nut-bearing forests;	17752
Kitab	Pamir-Alay, Zarafshan Ridge	Geological and paleontological monuments; low mountain and mountain-forest ecosystems, including juniperic forests	3938
Surkhan	Pamir-Alay, Kugitang Ridge	Low mountain, mountain-forest and highland ecosystems, including juniperic and nut-bearing forests	23802.3
Complex (landscape) wildlife sanctuaries			
Saygachiy	Ustyurt plateau	Desert ecosystems; threatened animal species, including houbara bustard, saiga	628.300
National Natural Parks			
Ugam-Chatkal	Western Tian-Shan Ridges	Mountain-forest and highland ecosystems, including juniperic and nut-bearing forests	531637
Zaamin	Pamir-Alay, Turkestan Ridge	Mountain-forest and highland ecosystems, including juniperic forests	24110
Zarafshan	Floodplain of Zarafshan	Tugay and wetland ecosystems	2426.4

The connection between the UN Sustainable Development Goals and the NT 7

There is a connection between the NT 7 and the four SDGs (Table 26), which is determined by the development of the PNA system, contributing to sustainable development.

Table 26: Sustainable development goals related to the implementation of the NT 7

UN Sustainable Development Goals (SDGs)	Sustainable Development Targets
Goal 6: Ensure access to water and sanitation for all	6.6 By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes
Goal 11: Make cities inclusive, safe, resilient and sustainable	11.4 Strengthen efforts to protect and safeguard the world's cultural and natural heritage

Goal 14: Conserve and sustainably use the oceans, seas and marine resources	14.5 By 2020, conserve at least 10 per cent of coastal and marine areas, consistent with national and international law and based on the best available scientific information
UN SDG 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	15.1 By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements 15.2 By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally 15.3 By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world 15.4 By 2030, ensure the conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for sustainable development 15.5 Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species

National Target 8: Development of state program on conservation and sustainable use of biological diversity components used for food production and farming

Connection between NT 8 and global Targets adopted in Aichi

In general, botanic diversity and, primarily, CWR is a strong potential resource for satisfying demands of economy, what will help to achieve sustainable development of the society in general, what stipulates connection of NT 8 with Aichi Global Goals and Targets (13, 18, Section I), as well as with Sustainable Development Goals (SDG 2, 15) (Table 27). The scope of humane impact on botanic diversity increases exponentially, particularly due to quick distribution of modern models of consumption, production, agricultural and industrial development, etc. Catastrophic drying of Aral Sea leads to change of biologic diversity not only in Uzbekistan, but in whole Central Asia, desertification process enlarges its scope, aridization of natural systems is substantial.

Table 27. Sustainable Development Goals Related to Implementation of NT 8

UN Sustainable Development Goals (SDG)	Sustainable Development Targets
UN SDG 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture	2.3 By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, cattle breeders and fishers, including through secure and equal access to land, other productive resources and agricultural inputs, knowledge, financial services, markets and

	opportunities for value addition and non-farm employment 2.4 By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality. 2.5 By 2020, maintain the genetic diversity of seeds, cultivated plants and farmed and domesticated animals and their related wild species, including through soundly managed and diversified seed and plant banks at the national, regional and international levels, and promote access to and fair and equitable sharing of benefits arising from the utilization of genetic resources and associated traditional knowledge, as internationally agreed.
UN SDG 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	15.4 By 2030, ensure the conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for sustainable development 15.5 Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species 15.6 Promote fair and equitable sharing of the benefits arising from the utilization of genetic resources and promote appropriate access to such resources, as internationally agreed

National Target 9: Inclusion of provisions of the National Biodiversity Strategy and Action Plan as integral parts of the plans for national, territorial and sectoral development

Planned and implemented activity, which was reflected in NBSAP project fully, complies with Aichi Target 17.

Concept of sustainable development appeared in the process of merge of three main points of view: economic, social and ecological. Implementation of measures directed at optimal use of limited resources and use of environmental, natural, energy and material-saving technologies, on maintenance of stability of social and cultural systems, on provisioning integrity of biological and physical natural systems is stipulated. In final SDG document, four goals are directly focused on provisioning sustainable development of environment and are directly or indirectly designed for further conservation of biological diversity (Table 28). All these positions are almost fully taken into account by provisions and measures contained in new draft NBSAP.

Table 28. Sustainable Development Goals Related to Implementation of NT 9

UN Sustainable Development Goals (SDG)	Sustainable Development Targets
UN SDG 6: Ensure availability and sustainable management of water and sanitation for all	6.4 By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water

	scarcity 6.5 By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate 6.6 By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes
UN SDG 12: Ensure sustainable consumption and production patterns;	12.1 Implement the 10-year framework of programmes on sustainable consumption and production, all countries taking action, with developed countries taking the lead, taking into account the development and capabilities of developing countries 12.2 By 2030, achieve the sustainable management and efficient use of natural resources 12.6 Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle
UN SDG 13: Take urgent action to combat climate change and its impacts;	13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries 13.2 Integrate climate change measures into national policies, strategies and planning 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
UN SDG 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	15.1 By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements 15.3 By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world 15.5 Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species

SECTION V. DESCRIPTION OF NATIONAL CONTRIBUTION TO THE IMPLEMENTATION OF TARGETS OF GLOBAL STRATEGY FOR PLANTS CONSERVATION

Interconnection between 16 targets of Global strategy for plants conservation, 20 targets adopted in Aichi and National targets in the field of biological diversity developed in the Republic of Uzbekistan is shown in the following table:

Table 29. Relationship between the tasks of the GSPC, Aichi and the NCP

Updated targets of Global strategy for plant conservation (GSPC) for 2011-2020	Global Aichi Targets on conservation and sustainable use of biodiversity	National targets on conservation and sustainable use of biodiversity
1: Creation of an online flora of all known plants 2: An assessment of the conservation status of all known plant species, as far as possibly, to guide conservation action 3: Receipt and maintenance of free access to information on methods and results of studies directed at implementation of the Strategy	19: By 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and development trends, and the consequences of its loss, are improved, widely shared and transferred, and applied	1: Improvement of the system of state monitoring of environment through embedding monitoring of biological diversity into it

4: At least 15 per cent of each ecological region or vegetation type secured through effective management and/or restoration	5: By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced 11: By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes 15: By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification	5: Development and start of implementation of a set of actions on decrease of degradation and fragmentation rates of the most vulnerable natural environmental systems 7: Increasing total area of country protected natural areas with the purpose to establish national environment network (PNA of different categories and types), ensuring efficient management of them
5: At least 75 per cent of the most important areas for plant diversity of each ecological region protected with effective management in place for conserving plants and their genetic diversity	11: By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes	7: Increasing total area of country protected natural areas with the purpose to establish national environment network (PNA of different categories and types), ensuring efficient management of them
6: At least 75 per cent of production lands in each sector managed sustainably, consistent with the conservation of plant diversity	7: By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity	5: Development and start of implementation of a set of actions on decrease of degradation and fragmentation rates of the most vulnerable natural environmental systems
7: At least 75 per cent of known threatened plant species conserved in situ	12: By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained	7: Increasing total area of country protected natural areas with the purpose to establish national environment network (PNA of different categories and types), ensuring efficient

		management of them
8: Conservation of at least 75 per cent of threatened plant species in ex situ collections, preferably in the country of origin, and at least 20 per cent available for recovery and restoration programmes	12: By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained	7: Increasing total area of country protected natural areas with the purpose to establish national environment network (PNA of different categories and types), ensuring efficient management of them
9: 70 per cent of the genetic diversity of crops including their wild relatives and other socio-economically valuable plant species conserved, while respecting, preserving and maintaining associated indigenous and local knowledge	13: By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity	8: Development of state program for conservation and sustainable use of components of biological diversity which are used for production of food and agriculture
10: Effective management plans in place to prevent new biological invasions and to manage important areas for plant diversity that are invaded	9: By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment	-
11: Elimination of threat from international trade by wild flora species	4: By 2020, at the latest, Governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits	-
12: All wild harvested plant-based products sourced sustainably	4: By 2020, at the latest, Governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits 6: By 2020 all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits	4: Development and integration into state Environmental Impact Assessment (EIA) procedure of mechanisms to evaluate impact of economic and other activities on biodiversity. 6: Ensuring sustainable use of biological resources of bodies of water on updated legal and methodological basis
13: Indigenous and local	18: By 2020, the traditional	8: Development of state

knowledge innovations and practices associated with plant resources maintained or increased, as appropriate, to support customary use, sustainable livelihoods, local food security and health care	knowledge, innovations and practices of indigenous and local communities relevant to the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels.	program for conservation and sustainable use of components of biological diversity which are used for production of food and agriculture
14: The importance of plant diversity and the need for its conservation incorporated into communication, education and public awareness programmes	1: By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably	2: Increase of knowledge and awareness of state authorities and management, overall society on the value of biological diversity and ecosystem services
15: The number of trained people working with appropriate facilities sufficient according to national needs, to achieve the targets of this Strategy	20: By 2020, at the latest, the mobilization of financial resources for effectively implementing the Strategic Plan for Biodiversity 2011-2020 from all sources, and in accordance with the consolidated and agreed process in the Strategy for Resource Mobilization should increase substantially from the current levels. This target will be subject to changes contingent to resource needs assessments to be developed and reported by Parties	-
16: Institutions, networks and partnerships for plant conservation established or strengthened at national, regional and international levels to achieve the targets of this Strategy	17: By 2015 each Party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan.	9: Inclusion of provisions of the National Strategy and Action plan on conservation of biological diversity as parts of plans for national, territorial and sectoral development

GSPC 1. Creation of an online flora of all known plants.

GSPC 2. An assessment of the conservation status of all known plant species, as far as possible, to guide conservation action

GSPC 3. Receipt and maintenance of free access to information on methods and results of studies directed at implementation of the Strategy

NT 1. Improvement of the system of state monitoring of environment including monitoring of biological diversity into it

After the Republic of Uzbekistan acquired its independence, a range of legislative acts which define legal bases for protection and sustainable use of plants was adopted and new floristic research became quite relevant. Data on distribution and condition of population of plant species (in particular rare and resource) became important. For decades past after publication of

“Flora of Uzbekistan” this data became much out-of-date, a lot of new floristic discoveries and findings were made. So, during the period of 2000 - 2017, on the territory of Uzbekistan 1 new for science monotypic genus and 38 species of 9 bloodlines were described. Including within the framework of implementation of first stage of project “Botanic and geographical zoning of Uzbekistan and establishment of unified base of data on plant diversity” (2012-2014) 12 new for science plant species were described and over 110 new additions for flora of Uzbekistan were identified.

At present one of the priorities and most popular direction of research is creation of national and regional floras including digital floras in on-line format.

Results of research which were performed during last five years in the Institute of botany of Academy of Science of the Republic of Uzbekistan had a key value for understanding of up-to-date condition of plant diversity and preparation of new edition of “Flora of Uzbekistan”. A new national summary of country flora was created in the form of a database which includes over 4364 wild species. A detailed scheme of botanic and geographical zoning of Uzbekistan was developed for the first time. It was created in GIS environment based on analysis of flora, originality of composition of geni and bloodlines, list of endemic and subendemic taxa and their geographical connections, specifics of landscapes and land cover. Within mountain part of Uzbekistan 8 regions and 23 districts are identified, and in plain part - 8 regions and 15 districts are identified. Lists of endemics for each district are prepared for the first time. A range of issues regarding criteria of zoning, boundaries of regions and districts, botanic and geographical position of some territories was settled.

Scheme of botanic and geographical zoning became the basis for preparation of a new edition of “Flora of Uzbekistan”, the first volume of which was published in 2017. Monographic processing of a range of large taxonomic groups of vascular plants was performed by present time: sections Equisetophyta, Filicoid, Gymnospermae, Monocotyledoneae class section Magnoliophyta, 10 bloodlines from Dycotyledoneae class. These revisions were performed at modern world-class level and have no analogues in the countries of Central Asia.

So, new “Flora of Uzbekistan” is a result of taxonomic revision, fundamental critical and monographic summary reflecting up-to-date composition of species and their classification. During the preparation and publication of the new “Flora of Uzbekistan” herbaria samples which are stored in Central herbarium of the Institute of Botany of the Academy of Science of the Republic of Uzbekistan in Tashkent (TASH), Herbarium of Botany institute named after L.V. Komarov of Russian Academy of Science in St. Petersburg (LE), Herbarium of Moscow State University named after M.V. Lomonosov in Moscow (MW), Herbarium of the Institute of Botany and Phyto Introduction of Ministry of Education and Science of the Republic of Kazakhstan in Almaty (AA) and Herbarium of Botany Institute of National Academy of Science of Tajikistan in Dushanbe (TAB), as well as newly gathered herbarium and alive plants from natural habitats are analyzed. At present systematic processing of flora taxa are based on combination of modern methods of molecular phylogeny with traditional morphologic and geographical and typification methods.

A structure of a new “Flora of Uzbekistan” and format of presentation of the material are similar to the format of printed and electronic national floras adopted in the World. Scope of bloodlines complied with modern phylogenic system of metasperms APO IV. Nomenclature part includes binary scientific name of species, synonymy, and sources of initial description. References to typical samples are specified if credible data on each species is available. For greater availability of information and coverage of the widest audience, new “Flora of Uzbekistan” will be published in two languages, Russian and English.

One of main advantages of a new edition of “Flora of Uzbekistan” is a detailed information on distribution of species by botanic and geographical regions and districts of the country including distribution dot maps for each species. This paper sufficiently contributed to the development of floristics, systematics, taxonomy and phylogeny of vascular plants in a world-wide range.

Cadaster of rare and extincting plant species in the context of administrative regions. Keeping state cadaster, assessment and monitoring the condition of population of rare and extincting species is a relevant task, what is reflected in the range of Laws and other legal acts of the Republic of Uzbekistan, as well as in international environmental Conventions, a participant to which our country is. In particular, according to Regulation on “Red Book” of the Republic of Uzbekistan, data on rare species of flora and fauna shall be updated regularly (every 5 years). Therefore, the State Committee of the Republic of Uzbekistan on ecology and protection of environment and other government institutions need up-to-date and reliable data on species composition and condition of populations of rare species for a country as a whole and in the context of regions.

At present, cadaster floristic research on rare and extincting species of vascular plants were performed in Jizzakh, Kashkadarya, Samarkand, Surkhandarya, Khorezm provinces and Karakalpakstan (within the framework of state grants implemented within the period of 2011-2017). As a result of these projects relevant data on distribution, number, condition of populations of rare and extincting species were received, and maps of their distribution on the territories of specified provinces were issued based on GIS. Moreover, a full cadaster list of flora was issued for Jizzakh, Kashkadarya and Samarkand provinces for the first time.

From 2018 in the Institute of botany of Academy of Science of the Republic of Uzbekistan a project “Cadaster of rare and extincting species of vascular plants of Navoiy and Bukhara provinces” started, which is a logical continuation of mentioned above cadaster floristic research. The most part of the territory is occupied by Kyzylkum desert, in south part of the region, Gizhduvansky, Bukharsy and Karakulsky oases are located in downstream of Zeravshan river, and south-east of the research region occupies a part of Nurata and Zirabulak-Ziadin mountains. As concerns botanic and geographical characteristics, the territory of the province relates to Nurata and Kukhistan regions of Mountain and Central Asian province and Kyzylkum and Bukhara regions of Turan province. Level of floristic exploration of this region is very uneven.

Conservation and rational use of plant resources of our planet is a global problem of intercountry level. On-going process of climate change threatens conservation of natural vegetation and human environment itself. Combination of global warming with other environmental stresses and activity of a human may lead to quick death of existing ecosystems particularly in arid regions which comprise the most part of territory of the Uzbekistan.

Therefore, in up-to-date conditions of taking inventory of natural plant resources on regional, as well as on national levels, in line with generalization and addition of new information on useful characteristics, is a foundation for development of scientific-based algorithm for conservation and rational use of plant wealth.

GSPC 4. At least 15 per cent of each ecological region or vegetation type secured through effective management and/or restoration.

GSPC 5. At least 75 per cent of the most important areas for plant diversity of each ecological region protected with effective management in place for conserving plants and their genetic diversity

GSPC 6. At least 75 per cent of production lands in each sector managed sustainably, consistent with the conservation of plant diversity

GSPC 7. At least 75 per cent of known threatened plant species conserved in situ

GSPC 8. At least 75 per cent of threatened plant species in ex situ collections, preferably in the country of origin, and at least 20 per cent available for recovery and restoration programmes

Information on implementation of these GSPC targets is given in corresponding sections of the report in description of NT 5: Development and commencement of implementation of the set of measures to reduce the rate of degradation and fragmentation of the most vulnerable natural ecosystems and NT 7: Increasing total area of country protected natural areas with the purpose to establish national environment network (PNA of different categories and types), ensuring efficient management of them (Sections I - IV).

GSPC 9. 70 per cent of the genetic diversity of crops including their wild relatives and other socio-economically valuable plant species conserved, while respecting, preserving and maintaining associated indigenous and local knowledge

Information on implementation of this GSPC target is given in corresponding sections of the report in description of NT 8: Development of state program on conservation and sustainable use of biological diversity components used for food production and farming (Sections I - IV).

GSPC 11. Elimination of threat from international trade by wild flora species

Resolution of the Cabinet of Ministers of the Republic of Uzbekistan dated 27.10.2014 No. 290 “On regulation of use of biological resources and performance of permitting procedures in the field of receipt of permit on use of animal and plant communities’ objects” is directed at improvement of the system of use of biological resources. Procedures of import and export of species of wild flora are also controlled by this Resolution. According to this Resolution of the Cabinet of Ministers the issues of import and export of products of plant raw materials are controlled by the State Committee of the Republic of Uzbekistan for Ecology and Environmental Protection with assistance of the State Customs Committee. Main objects of wild flora exported from the Republic of Uzbekistan are common licorice, caper, briar and ferule.

Resolutions of the President of the Republic of Uzbekistan No. PP-3617 dated 20.03.2018 “On measures for creation in the country of plantation of ferule, increase of the volume of processing its raw material and export” and of the Cabinet of Ministers of the Republic of Uzbekistan dated 27.01.2018 No. 63 “On measures for further development of production and industrial processing of licorice and other medicinal plants in the Republic of Uzbekistan” stipulate establishment of associations and imposing on them tasks on development of industrial and export capacity of the country. Moreover, according to Resolution of the Cabinet of Ministers dated 14.04.2017 No. 210 exporters of common licorice receive benefits in the field of exemption from payment of fees for export of raw materials outside the Republic of Uzbekistan. Approved Resolution creates additional conditions for development of private entrepreneurship, as well as improvement of control over rational use of raw materials and processed product and its export outside the Republic of Uzbekistan. Resolution exempts legal entities and individuals from payment of fees for export of common licorice in the form of raw material outside the country for the period till 31.12.2018.

GSPC 12. All wild harvested plant-based products sourced sustainably

In Uzbekistan there is a high demand on medicinal and food raw materials of wild harvested plants. At present slightly over 100 species of medicinal plants are used in medical practice what equals to around 2.5% of the total number of species of flora of Uzbekistan, although at least 1157 species of plants which are used in medical practice of peoples of Central Asia and neighboring countries are harvested on the territory of Uzbekistan. Collection of existing information on use of medicinal plants, its analysis and systematization, as well as identification of new sources of biologically active substances are important part of development and implementation of new efficient medicines.

Every year procuring organizations, pharmaceutical companies and other users of nature apply for quotas on around 121 species of wild harvested medicinal plants among which there are species included into the Red Book, as well as endemic species.

Collection of information on use of medicinal plants of Uzbekistan, its analysis and systematization, as well as identification of new sources of biologically active substances are important part of development and implementation of new efficient medicines. Therefore, taking inventory of medicinal plants which are widely distributed here, registration of their stocks, search of ways of rational use are quite a relevant problem. From the side of management of our country, steps on fundamental change towards high efficiency of existing before measures on protection of natural environment are being taken. For example, Law of the Republic of Uzbekistan dated 26.12.1997 No. 543-I “On protection and use of plant community” (new edition). Only for the last year a range of up-to-date and progressive resolutions were issued. So, the Resolution of the President of the Republic of Uzbekistan dated 26.12.2016 No. PP-2698 “On measures for on further implementation of perspective projects on localization of production of ready-made types of products, components and materials for 2017-2019”, the Program on localization of production of ready-made types of products, components and materials for 2017-2019 is approved and developed. Within the framework of this Program measures on widening production of galenicals, original substances from plant raw materials and the most demanded generics are stipulated. Resolution of the President of the Republic of Uzbekistan “On measures for increase of production and industrial processing of liquorice root (licorice) in the Republic of Uzbekistan” No. PP-2970 dated 16.05.2017 pays a specific attention to creation of natural areas of growing in 14 districts of Karakalpakstan for the period 2017-2021.

Decree of the President of the Republic of Uzbekistan “On creation of free economic zones “Nukus-Farm”, “Zaamin’Farm”, “Kasansai-Farm”, “Syrdarya-Farm”, “Baisun-Farm”, “Bustonlyk-Farm” and “Parkent-Farm” No. UP-5032 dated 03.05.2017 is approved for the purposes to form favourable conditions for active attraction of foreign and domestic investments for implementation of investment projects directed at development of pharmaceutical industry of the country, saturation of domestic market of medicines with high quality drugs of domestic production taking into account unique conditions of growing of medicinal plant raw materials, organization of its deep processing and manufacture of products with high added value, as well as complex and efficient use of production and resource capacity of the Republic of Karakalpakstan, Jizzakh, Namangan, Syrdarya, Surkhandarya and Tashkent provinces, creation of new jobs and increase of income of the country population based on that.

Resolution of the President of the Republic of Uzbekistan “On additional measures for facilitated development of pharmaceutical industry” dated 14.02.2018 No. PP-3532[13] highlights that the system of state management of pharmaceutical industry is revised in the country, Agency for development of pharmaceutical industry under the Ministry of Health of the Republic of Uzbekistan is established. Moreover, a Road map for ensuring favorable conditions for facilitated development of pharmaceutical industry is approved, which stipulates generation of available maps for areas with favorable conditions with the purpose to plant raw materials for medicines taking into account climatic conditions, specifics of land plots, etc. is approved, as well as a list of medicinal plants which are recommended for planting on the territory of the Republic of Uzbekistan in the context of provinces.

Despite many year history of collection of medicinal plants in Uzbekistan and existing literature, a lack of information on up-to-date condition of natural populations of the mostly demanded medicinal, food, technical and other plant raw materials of Uzbekistan is especially evident in this direction. Exclusions are only not more than five plant species which are produced within the framework of commercial contracts between business entities and related organizations (the State Committee of the Republic of Uzbekistan for Ecology and Environmental Protection, the State Committee on Forestry).

Analysis of available materials indicated the necessity to perform a wide program of research with the purpose to identify up-to-date condition of wild harvested plant resources,

study of rehabilitation (recovery ability) rates of their scrub after procurement. As for these directions there are no experimental data available, recommendations are given only similar to similar species.

Due to the above mentioned study of medicinal plants of local flora and their further implementation into medicine is the most relevant requirements at present.

Norms for procurement of wild harvested species of medicinal and food plants and vegetable technical raw materials are approved annually by the State Committee of the Republic of Uzbekistan for Ecology and Environmental Protection based on conclusions of the Academy of Science of the Republic of Uzbekistan.

GSPC 13. Indigenous and local knowledge innovations and practices associated with plant resources maintained or increased, as appropriate, to support customary use, sustainable livelihoods, local food security and health care

Unfortunately, valuable information on use of plants in folk medicine and other aspects of their use in everyday life is being lost because of aging of bearers and keepers of unique information.

Wild relatives in Uzbekistan are mainly distributed and shall be conserved on lands of state forestforest which are not transferred to private ownership. But use of non-wooden forest goods (collection of fruits, berries, medicinal herbs, if they grow not in state pay zones) is allowed for population free of charge within the framework of necessities of life in accordance with the law. Mowing, grazing and collection of firewood are allowed for moderate charge. That is why population of settlements adjacent to areas where CWR grow (mainly forests, scrub and scrublands) actively use such plants (walnut, apple tree, cherry plum tree, almond tree, pistachio tree, hawthorn and briar) for food, collection and sales of fruits, grazing, collection of firewoods for cooking and heating.

Use of CWR for these purposes was performed during the whole history of humanity. As time passes it only increases what is connected to increase of the number of population, construction of roads for shipment of goods, increase of quality of life and related to it demands of people. All listed reasons lead to the fact that areas occupied by wild relatives quickly decrease and a threat to reduce their valuable genetic fund, as well as loss of species themselves, especially endemic species, arises.

In Uzbekistan areas occupied by CWR are comparatively small, they do not exceed several thousands of hectares. Yields of fruits from them are also small within the scale of the country (wild apple - not more than 200 ton, nuts - 100 ton, cherry plum and apricot - 100-150 ton, etc) and income received from their collection is also comparatively small. For population living near CWR planting income from collected yield comprises the most part of income and influences the welfare of families. Local population shall be interested in conservation and improvement of CWR condition, as it influences family income. But accidental use of forests only for collection of non-wooden products (yield of fruits, mowing, grazing, etc.) leads to destruction of planting. Rent of CWR plantings on long-term basis with perspective of increasing yields under the condition of correct use is a way-out from existing situation and will enable increasing benefits from use of products, as well as conserving to maximum extent CWR genetic fund for the purpose of use in selection of new sorts.

GSPC 14. The importance of plant diversity and the need for its conservation incorporated into communication, education and public awareness programmes

A system of primary, secondary and advanced education in rural areas, as well as a system of higher education play an important role in formation of public conscience on necessity of conservation and safe use of CWR. Mass media also play an important role in this: TV, radio, issue of different newspapers, bulletins and brochures. These possibilities shall be efficiently used for increase of spiritual and cultural motivation of the distribution relations policy in the system of management of benefits of use of CWR objects.

GSPC 16. Institutions, networks and partnerships for plant conservation established or strengthened at national, regional and international levels to achieve the targets of this Strategy

The State Committee of the Republic of Uzbekistan for Ecology and Environmental Protection is a specially authorized coordinating agency which performs state control and cross-sectoral management in the field of protection and reproduction of natural resources. Inspection for the control over protection and use of biodiversity and protected natural areas (Bioinspection) operates under the State Committee of the Republic of Uzbekistan for Ecology and Environmental Protection. Scope of its powers includes:

- Performance of state control over performance by state authorities, other organizations, legal entities and individuals of regulations regulating relations in the field of protection, rational use and reproduction of biodiversity and protected natural areas;
- Creation of necessary conditions for performance, conservation of biodiversity of plant and animal communities, integrity of natural communities and habitats;
- Ensuring conservation of typical, unique, valuable natural facilities and complexes, genetic fund of plants and animals, prevention of negative influence of human activities, monitoring natural environment in the field of plant and animal communities;
- Keeping state cadaster of plants and animals, protected natural areas, as well as nursery for breeding and keeping wild animals, wild plants, zoological and botanic collections.

Resolution of the President of the Republic of Uzbekistan No. PP-3956 «On additional measures for improvement of state management system in the sphere of ecology and environmental protection» was approved on October 3, 2018. According to Resolution the Inspection for the control over protection and use of biodiversity and protected natural areas was eliminated and included into the State Committee of the Republic of Uzbekistan for Ecology and Environmental Protection as a Department on the issues of biodiversity and protected natural areas.

Resolution of the President No. PP-3256 dated September 4, 2017 specifies the following tasks as main tasks and direction of operation of the Institute of botany of the Academy of Science of the Republic of Uzbekistan: complex study of flora of the country, identification and rational use of plant resources, identification of key botanic areas, development of scientific basics of conservation of rare and endemic species of plant community; development and keeping state information and analytical database on flora of the country, keeping state cadaster of rare and threatened to extinction species of wild plants, Red Book of the Republic of Uzbekistan and monitoring of plant community; development of theoretical basics of introduction and acclimatization of promising, economically valuable plant species, creation of genbank of rare plants; study of climatogenic dynamics and evolution of land cover and development of practical recommendations due to desertification.

Clauses 5 and 6 of the Resolution of the President of the Republic of Uzbekistan No. PP-3861 dated 17.07.2018 “On measures for further improvement of activity of the Institute of botany of Academy of Science of the Republic of Uzbekistan” stipulates measures on creation in the structure of the Institute of the following:

- Laboratory “Cadaster and monitoring rare plant species” imposing on it tasks on performance of targeted scientific research of rare and endemic plant species and preparation of editions of Red Book of the Republic of Uzbekistan in accordance with international standards;
- Laboratory “Flora of Uzbekistan” with imposing on it tasks on performance of systematic research and taking inventory of taxonomic diversity of natural flora of Uzbekistan, identification of composition and geographical distribution of invasive species of plants, identification of key botanic areas and preparation of new edition of “Flora of Uzbekistan” in accordance with up-to-date nomenclature and phylogenetic system of plant community.

- Botanic museum with the purpose of popularization of achievements of R&D and educational and practical activity of the Institute, as well as acknowledgment of public with unique plant diversity of Uzbekistan.

SECTION VI. ADDITIONAL INFORMATION ON THE CONTRIBUTION OF INDIGENOUS PEOPLES AND LOCAL COMMUNITIES TOWARDS ACHIEVING NATIONAL TARGETS ON CONSERVATION AND SUSTAINABLE USE ADOPTED IN AICHI. GENDER: THE CONTRIBUTION OF LOCAL COMMUNITIES, INCLUDING WOMEN IN THE CONSERVATION OF BIODIVERSITY

From the first days of its independence, the Republic of Uzbekistan has shown the world its commitment to democratic principles, having joined almost 70 main international documents in the field of ensuring human rights. These are the Universal Declaration of Human Rights, the UN Convention on the Elimination of All Forms of Discrimination against Women, the Millennium Development Goals and others.

The Republic, based on its own model of social and economic transformation of society, assigns a key role to solving national development issues on the basis of equality of women and men and the empowerment of women in society and the state, the development of civil society institutions and the private sector as important partners capable of taking the initiative on development and implementation of economic and legal mechanisms.

The equality of the rights of women and men is enshrined in the Main Law of the country - the Constitution of the Republic of Uzbekistan, Article 18 of which reads: "All citizens of the Republic of Uzbekistan have the same rights and freedoms and are equal before the law without distinction of gender, race, nationality, language, religion, social origin, beliefs, personal and social status".

The Constitution of the Republic of Uzbekistan secures for every person the whole range of personal, social, political, cultural and economic rights contained in the International Bill of Human Rights. The basic law secures for every person the right to life, liberty, and personal inviolability that is not alienable to anyone.

During the years of independence, the Republic of Uzbekistan also adopted more than a hundred legislative acts in the field of the rights and freedoms of citizens. These are laws: "On elections to the Oliy Majlis of the Republic of Uzbekistan", "On appealing to court actions and decisions violating the rights of citizens", "On social protection of disabled people", "On property", "On education", "On guarantees of electoral rights of citizens ", " On appeals of citizens ", " On freedom of access to information ", " On public associations ", " On employment of the population "and many others.

Ensuring the full participation of women in the electoral process and equality of election standards for women and men of the country are enshrined in the laws of the Republic of Uzbekistan: "On elections to the Oliy Majlis of the Republic of Uzbekistan", "On elections to regional, district and city councils of people's deputies", " On guarantees of the electoral rights of citizens ", " On the nationwide discussion of draft laws ", " On the referendum of the Republic of Uzbekistan ", " On the election of the President of the Republic of Uzbekistan ". Article 5 of the Law "On guarantees of the electoral rights of citizens" stipulates that "direct or indirect restriction of the electoral rights of citizens is not allowed except for the requirements established by legislative acts on elections".

The Law "On Elections to the Oliy Majlis of the Republic of Uzbekistan" from August 29, 2003 (Article 22) stipulates that the number of women must be at least 30% of the total number of candidates for deputies nominated by a political party. Judicial protection of the electoral rights of citizens, regardless of their gender, is guaranteed by the Law on Guarantees of Electoral Rights of Citizens (Article 20).

The Family Code of the Republic of Uzbekistan (1998) enshrines the equality of personal and property rights of women and men in marriage relations (Article 2) and the obligations of both spouses in raising and caring for children, as well as in all other family matters (Article 21).

The right to education for all citizens regardless of their gender is guaranteed by the Constitution of Uzbekistan (article 41), thus considering the access of women and girls to education, vocational training and development of their abilities as a decisive factor in empowering and improving their well-being. Equal rights of women and men to receive education are also established by the Law of the Republic of Uzbekistan “On Education”, and for physical development and sports by the Law “On Physical Culture and Sport” (Article 2).

To ensure a stronger presence of women at the decision-making level, the President of the Republic of Uzbekistan adopted Decrees “On enhancing the role of women in state and public construction of the Republic of Uzbekistan”, from March 2, 1995, “On additional measures to support the activities of the Women's Committee of Uzbekistan” from May 24, 2004, in addition to several Resolutions of the Cabinet of Ministers regarding this topic.

The Labor Code of the Republic of Uzbekistan (1995) uses a protectionist approach with respect to the right of women to employment. The employer does not have the right to refuse a woman to be employed on the basis of her pregnancy or having many children, the articles of the Code include some provisions that protect women from work under harmful or difficult conditions, as well as other benefits during pregnancy. At the same time, their remuneration remains at the same level as at their previous workplace.

The legislation of the Republic of Uzbekistan provides for a set of measures aimed at preventing violence against women. The Criminal Code of the Republic of Uzbekistan establishes various types of punishment for violent acts committed against women (articles 103,115,117,121,136).

All legal acts of the Republic of Uzbekistan are aligned with the articles of the Constitution and do not contain any provisions that are discriminatory against women. Direct or indirect violation or restriction of equality of citizens is prosecuted under the Criminal Code of the Republic of Uzbekistan (article 141).

A fundamentally new institutional environment has been created in the republic for the implementation of the constitutional principle of equality of women and men in public life: the Women's Committee of Uzbekistan (1991), the Institute of Parliamentary Ombudsman on human rights, the Commission on the observance of constitutional rights and freedoms of citizens under the Oliy Majlis Commissioner on Human Rights (1995). In order to coordinate the activities of all governmental and non-governmental organizations related to the protection of human rights, the National Center for Human Rights of the Republic of Uzbekistan was established (1996). The Institute for Monitoring the Current Legislation under the President of the Republic of Uzbekistan was established, in order to study the current legislation, its compliance with international norms and standards in the field of human rights and the development of proposals for the implementation of international legal norms in the field of human rights in the current legislation of the republic, conducting a scientific examination of draft laws, developing proposals for plans and programs lawmaking work,

Thus, over the years of independence, a progressive and reliable basis for implementing state policy towards women and men, aimed at ensuring the constitutional principle of equality of women and men in the legal, organizational, financial, economic, social and other fields, was created at the legislative and executive levels in the republic.

The organization of targeted activities of all segments of society requires the creation of the necessary gender-disaggregated information base, conducting gender analysis and monitoring the gender situation at the level of all regions.

The relevance of the creation and availability of such information in each country was emphasized by the IV World Conference on Women (Beijing, September 1995). In accordance with Article 206a of the Beijing Platform for Action, national statistical services should collect, process, analyze, and present statistics relating to people, disaggregated by gender and age, so that they reflect problems and issues related to the status of women and men in society.

In order to ensure that all strata of the population have wide access to information on gender development in the republic and pursuant to the recommendations of the IV World

Conference on Women (Beijing, September 1995), state statistical bodies in close cooperation with government and public organizations developed statistical compilations containing data describing the position of women and men in Uzbekistan in the field of education, health, employment and the labor market, social protection, government management, etc.

The State Statistics Committee provides open information on gender-disaggregated data, based on the Minimum Gender Indicators as recommended by the UN Statistical Commission, namely: Economic structures, participation in productive activities and access to resources; Education; Health and related services; Social life and participation in decision making; Human rights of women and girls (<https://gender.stat.uz/ru/>). For example, in the section on “Economic Structures, Participation in Productive Activities and Access to Resources” the following information is available: “Share of employed as managers, by gender; Percentage distribution of employment by sector, separately for each gender; The percentage of the difference between the average monthly wages of men and women to the average monthly wages of men; Coverage of children aged 3-6 years with preschool institutions; The proportion of persons 10 years and older using the Internet by gender in 2017; The share of people 10 years and older using mobile / cell phones by gender in 2017; Provision of households with durable goods, by gender of the head of household in the Republic of Uzbekistan”. The section “Public life and participation in decision-making” provided data on the proportion of women in management personnel (in 2017, -1.7%).

According to the State Statistics Committee (<https://gender.stat.uz>) for 2017, the republic’s population is: women - 15999.5 thousand; men - 16121.0 thousand; urban population - 50.6%; rural - 49.4%.

The number of economically active population of the Republic of Uzbekistan in 2016 amounted to 14.0 million people, of which the share of men was 54.4% (7.6 million people); the share of women was 45.6% (6.4 million people).

In 2016 in the republic, the number of unemployed amounted to 724.0 thousand people, of which women made up 317.5 thousand people (43.9% of the total number of unemployed), men – 406.5 thousand people (56.1% of the total number of unemployed).

The number of unemployed women increased compared to 2015 by 2.0%, as compared to 2012 - 15.3%.

The number of unemployed men increased compared with 2015 by 2.1%, as compared to 2012 - 15.8% (Figure 3).

Unemployment rate in 2016 amounted to 5.2%, of which among women - 5.0%, and among men - 5.3%.

The State Statistics Committee (<https://gender.stat.uz>) informs that in 2016 in the republic, the number of employed people in the economy amounted to 13.3 million people, which is 1.8% higher than in 2015. Of these, the number of women was 6.0 million, or 45.7 percent of the total employed population, which is an increase compared to 2015 by 1.8%, and the number of men employed in the economy — 7.2 million people or 54.3% of the total employed population, an increase compared with 2015 that accounted for 1.8%.

In terms of types of economic activity, a significant gender gap in the number of employees is observed in such types of activity as construction (5.8% of women and 94.2% of men), transportation and storage (7.2% of women and 92.8% of men), education (75.6% of women and 24.4% of men), health care and the provision of social services (76.5% of women and 23.5% of men).

The largest share of women employed in the economy is observed in such economic activities as agriculture, forestry and fisheries (26.3%), education (13.8%), industry (12.7%) and trade (12.3%). The largest share of men employed in the economy accounts for agriculture, forestry and fisheries (28.4%), construction (16.5%), industry (14.3%), trade (9.7%), transportation and storage (8.2%).

The national goals and objectives in the field of sustainable development for the period until 2030 were adopted by the government of Uzbekistan on October 20, 2018. In particular, National Goal 5 that aims to ensure gender equality and the empowerment of all women and girls. The number of national tasks is 9. Ministries, state committees and departments are responsible for the implementation of Task 5.1. “Eliminate all forms of discrimination against all women and girls everywhere, including incorporating into the law and effectively introducing principles of eliminating indirect discrimination into law enforcement practice.”

The criterion of women's participation in public administration is one of the key markers for assessing the country's commitment to gender equality. The legislation provides for a 30% quota for women in parliament. According to the World Bank, the proportion of women in the country's parliament was 16% in 2017.

According to the results of the 2014 elections, there are 24 women in the Legislative Chamber of Parliament out of 150 deputies. There are 17 women senators in Uzbekistan, which is 17% of the total number of senators. In the top executive positions of the executive branch, the share of women is just over 14%. The proportion of women in government bodies in the local, elective and appointed positions is 17.1%. In local Kengashes of people's deputies, these figures are higher. At the same time, there is not a single female hokim (mayor), although there is a woman in each hokimiyat (mayor's office) - the deputy hokim, which is also the chairperson of the respective Women's Committee.

In 2014, the state portal of gender statistics (<http://gender.stat.uz>) was created by joint efforts of government agencies, the donor community and non-governmental organizations.

Opportunities are being created for the development of female entrepreneurship. The Decree of the President of the Republic of Uzbekistan “On additional measures to support the activities of the Women's Committee of Uzbekistan” (2018) provided the legislative basis for the development of women's entrepreneurship, the wide use of banking services, and the receipt of microcredit for those who want to start a business.

According to the current estimates of the Chamber of Commerce and Industry of Uzbekistan, the total number of women entrepreneurs in the country is about 10% of all business entities.

According to the Ministry of Justice of the Republic of Uzbekistan, as of January 1, 2017, there are 9205 non-governmental non-profit organizations (NGOs) in the country. It should be noted that the total number of NGOs includes all divisions of political parties, movements, trade unions and regional branches of republican NGOs. The so-called self-organized NGOs are lesser in amount, no more than 3000, according to information posted on the website of the Independent Institute for Monitoring the Formation of Civil Society (<http://nimfogo.uz/ru/publications/reports/>).

NGOs operate mainly in the areas of entrepreneurship and farming (21.2%), development of sports (13.7%), strengthening democratic institutions (9%). The share of public organizations, the scope of which includes increasing the activity of women, is 3% (314), and environmental NGOs amount to about 1% of the total number of registered NGO's.

More than 65% of women's NGOs work on educational programs that cover the following areas: women's rights, reproductive health, gender education, professional training and retraining of women, issues of running small businesses and private entrepreneurship, environmental protection, etc.

A total of 314 organizations are engaged in increasing social, economic and political activity of women, while 103 organizations are focused on ecology and environmental protection. According to the State Committee on Statistics, at the end of 2016, the number of employees in the NGO sector without external part-time workers was 30,968, of whom 11285 were women, which amounts to 36%.

The country's commitment to achieving gender equality can be assessed by the IUCN Environmental Gender Index (EGI) in Category 3: “Gender Rights and Participation”, noting that:

- Equal legal rights are reserved for women at all legislative levels;
- The CEDAW Convention, which is regularly reported on, was ratified in 1995;
- Women are represented in the delegations of the Conference of the Parties in various international programs;
- A 30 percent quota for elections of political parties and movements has been introduced, as a temporary measure to increase the proportion of women at decision-making levels,
- At all levels of the local government, the position of deputy hokim for women, the chairperson of the subdivision of the Women's Committee of Uzbekistan is institutionalized;
- Similar quotas are currently being implemented in such sectors as energy, road construction, water management, this especially applies to training and capacity development

Moreover, on the IUCN Environmental Gender Index (EGI) in “Category 5: Gender Education and Assets / Access”, which focuses on women's equal access to basic education and resources, the following should be noted

- At the level of primary, general education and specialized secondary education, parity is almost reached. Thus, 49% of students in general education institutions are women, 51% are men, 47.3% of pre-school students are girls, 52.8% are boys;
- At the higher education level, the picture changes and the proportion of women decreases to 38.2%;
- At the level of the number of research specialists - in the natural sciences: there are 2856 women and 5535 men; in agricultural sciences: 520 specialists are women and 1717 men. Among the doctors of science in these industries, the share of women is 10 and 18%, respectively.

In Category 5 of the IUCN Gender Education and Assets / Access Environmental (EGI), it should be noted that at the level of government policy and decision making there are no restrictions on the basis of gender, and the necessary measures have been taken to prevent gender disparity in access to agricultural land and property, loans and other financial resources. At the same time, traditionally, on the basis of the established foundations, property objects, loans are issued to a man as the head of the family. Responsible decisions regarding property and financial resources are usually also made by men at the family and community levels.

Women often have to combine duties at work and at home, which leads to gender occupational segregation and, as a result, women are concentrated in less-paid jobs and in less prestigious areas of activity.

It should be noted that rural women are more burdened with domestic work, since living conditions in rural areas are much worse than in urban areas. Rural women also work on family farms and take care of livestock. At the same time, access to the social infrastructure in the form of preschool institutions in the village is either limited or not available. Rural areas are also associated with more conservative values and gender norms of behavior that persist due to lack of awareness, education, and vocational training, which limits gender-fair behaviors.

Based on the objectives of the CBD and the Gender Equality Action Plan, it is necessary to highlight the growing awareness that gender equality and the empowerment of women is the most important prerequisite for environmental conservation and sustainable development. The persistence of attitudes toward women in society, as a “homemaker,” also affects the participation of women in environmental protection activities, including biodiversity conservation.

The gender aspects of the participation of the active population, including women, in the implementation of the Convention on the Conservation of Biodiversity can be traced from gender-disaggregated data of relevant agencies and organizations as of November 2018. The share of women in the total number of employees of ministries / departments, including their

units at all levels, is 14.8%. Including, the 7.3% of the management apparatus of these organizations consist of women. It should be noted that about 50% of the staff of the Institute of Zoology and the Institute of Botany of the Academy of Sciences of the Republic of Uzbekistan are women, and the Center of Hydrometeorological Service women make up to 83.6% of the overall staff.

According to the State Statistics Committee, the share of women in the number of people employed in agriculture, forestry and fisheries on average in 2016 was 45.7%. However, in the Ministry of Agriculture and its units, 813 out of 3,140 employees are women, which is 25%. The proportion of women in the central office of the Ministry is 0.5%. In the State Forestry Committee, the share of women is 16%, in the management apparatus of 110 employees only 1 is a woman. In the State Committee on Ecology and Environmental Protection, the share of women is 18.4%, in the management team - 26.6%.

There are no women among PNA inspectors. There are examples of women's participation in the use of biodiversity resources. For example, among the members of Uzbekohotrybolovsport Association, there are 130 women. One woman works as a public hunter.

One example of the contribution of women to the implementation of the Aichi 13 target and National Target 8 is the activity of the department head of the Ministry of Agriculture of the Republic of Uzbekistan, which organized a mini-collection of unique grape varieties for further use.

It can be said that almost all women - scientific employees and laboratory assistants of the Institute of Botany of the Academy of Sciences of Uzbekistan contribute to the conservation of biodiversity, being the performers of the scientific grants of the institute. Of the 36 employees employed in seven biodiversity projects of the Institute of Zoology of the Academy of Sciences of Uzbekistan, 17 are women.

The director of the Dekhkanabad state forestry in the Kashkadarya region in 2017 was awarded the "Dustlik" Order for achievements in environmental activities. Under her leadership, in the period 2015-2018, plantations on an area of 600 hectares were created, about 600 thousand saplings of ornamental and fruit trees were produced, more than 500 hectares of plantations of medicinal plants are created annually.

In the Environmental Monitoring Service of Uzhydromet, which is a specialized unit with the functions of monitoring the environmental parameters of environmental objects, including monitoring the biodiversity of aquatic ecosystems at a departmental stationary and expedition network of stations, 84% of employees are women. The head of the hydrobiological laboratory, which consists entirely of women, received training in environmental protection and monitoring in Japan. Under her leadership, the laboratory workers organized and conducted a practical training seminar on methods for monitoring the biodiversity of aquatic ecosystems for specialists of the National Hydrometeorological Services of Central Asia. Over the years, laboratory workers participated in more than 20 expeditionary studies of aquatic ecosystems as part of background environmental monitoring activity in the areas of the Chatkal biosphere reserve, the Nurata mountain-forest reserve, and the Ugam-Chatkal national park.

Since 2007, the non-governmental non-profit organization, the Uzbekistan Society for the Protection of Birds (UzSPB) has been operating in the republic, in which women, who constitute 44% of society's members, and the management of the organization consists of 40% women. International events for observing the EuroBirdwatch bird migration have become regular, where half of the participants are girls and women, including the leaders of student clubs and groups.

In 2018, according to the results of environmental activities of members of UzSPB, the senior teacher of the Department of Ecology, Ph.D. in Biology, the head of the Flamingo student club of Samarkand University was ranked among the 100 most influential women in the world according to the BBC company (<https://kun.uz/> <http://www.uzspb.uz>).

According to the BBC, a staff member of the Research Institute for Ecology and Environmental Protection took part in the republican contest “100 Best Innovative Projects of Women of Uzbekistan” in the category for environmental protection.

The State Prize was awarded to the deputy head of the Bukhara specialized nursery "Jeyran".

Based on the objectives of the CBD Action Plan on Gender Equality for 2015-2020, for example, it should be noted that from eight experts, which worked on the preparation of the Sixth National Report, four were women. This was given special attention by the national responsible agency.

To further advance gender equality and the creation of equal rights and opportunities for the participation of men and women the following actions must be completed:

- Take into account the recommendation of the International Union for Conservation of Nature (IUCN) on the use of the Environmental Gender Index (EGI) to monitor progress towards achieving gender equality;
- Initiate research at the national level to analyze possible differences in biodiversity use by women and men;
- To continue the study of various practices of attracting / empowering women in consulting and expert groups, projects, monitoring groups in Uzbekistan. And to analyze the participation of women in the development, planning and implementation of environmental policy (departmental information on personnel, women leaders and participants as experts / consultants of environmental projects).
- To collect and disseminate the results of case studies based on women's experience and knowledge on biodiversity conservation, the use of environmental services, etc;
- Conduct comprehensive trainings for biodiversity conservation professionals on gender equality issues in order to achieve a more complete understanding of the importance of incorporating gender-sensitive indicators in environmental issues.

SECTION VII. UPDATED INFORMATION ON COUNTRY BIODIVERSITY

UPDATED INFORMATION ON CONDITION AND TRENDS IN THE FIELD OF FLORISTIC DIVERSITY

According to up-to-date estimate, flora of Uzbekistan equals to over 4300 species of vascular plants, including a large number of endemics, threatened and globally important species. Desert, mountain and near-water ecosystems of Uzbekistan are included into the list of key environmental regions of our planet (WWF Global, 2005) No. 111 - Mountain steppes and forest areas of the Central Asia: Forest areas and light forests of Gissar-Alai; Tian-Shan coniferous forests; Alai - Western Tian-Shan mountain steppes; Tian-Shan submontane and low-mountain arid heaths (semisavannas); No. 134 - Deserts of the Central Asia: South deserts of Central Asia; Riparian lands (alluvial terraces above flood-plain, deltas) and oases. Mountains of Uzbekistan (and whole Central Asia) are included into the World list of “Earth's Biologically Richest and Most Endangered Terrestrial Ecoregions” Unique natural centers of origin and diversity of species, including ancestors of many valuable cultivated plants are identified in the territory of the country. Mountain ecosystems of Uzbekistan are the part of Central Asian center of origin of wild relatives of cultivated plants. Zeravshan range and basin of the river Zeravshan are included by IUCN and WWF into World list of centers of plant diversity.

Around 20% of the area of Uzbekistan is landscapes transformed by a human. As a result of agricultural development natural ecosystems has been almost fully replaced by anthropogenic landscapes in such regions as Fergana valley, valleys of Zeravshan, Kashkadarya, Surkhandarya, Khorezm and Tashkent oasis, Golodnaya (Foodless) heath. Flora and land cover in many regions have degraded a lot. Natural habitat and number of many species of plants significantly decreased, many species are at the edge of extinction. Analysis of up-to-date condition of ecosystems and biological diversity of Uzbekistan and existing trends shows that the process of decreasing of floristic diversity is on-going in the country mainly in the result of degradation and elimination of habitats and excessive use of bioresources. A characteristic of ecosystems of Uzbekistan is their high fragility - western part of the country is situated in the area of Aral environmental crisis.

Threatened species and communities include those species and communities which are strictly connected with specified narrow localized habitats (for example, with outcrop of variegated stones). Anthropogenic transformation of such habitats is the main factor of the risk of extinction for such species and communities.

Floristic diversity of Uzbekistan

First floristic research on the territory of the country were started over 150 years ago and by present time a lot of scientific papers were published based on results of study of plant diversity of Uzbekistan. The most important result of a classic stage of research is a 6 volume edition of “Flora of Uzbekistan” (1941-1962) which contains detailed information on 4148 species of plants which were registered at that moment on the territory of the country (3663 among them are native, 485 are imported and introduced). For decades past after publication of “Flora of Uzbekistan” this data became much out-of-date, a lot of new floristic discoveries and findings were made. So, during the period of 2000 - 2017, on the territory of Uzbekistan 1 new for science monotypic genus and 38 species and 9 bloodlines were described. Within the framework of implementation of applied project of the Academy of Science of the Republic of Uzbekistan “Botanic and geographical zoning of Uzbekistan and establishment of unified base of data on plant diversity” (2012-2014) 12 new for science plant species were described and over 110 new additions for flora of Uzbekistan were identified. These examples directly show that to

the present moment there is a strong necessity to issue up-to-date national list of flora in the country.

The relevance of preparation of new “Flora of Uzbekistan” is also explained by the fact that since the end of XX century, systematics of vascular plants has significantly changed, many taxa changed nomenclature. The results of research which were performed during 2014-2018 in the Institute of botany of the Academy of Science of the Republic of Uzbekistan had a key value for understanding of up-to-date condition of plant diversity and preparation of a new edition of “Flora of Uzbekistan”. A new national summary of country flora was created in the format of database which includes at least 4364 wild harvested species. A detailed scheme of botanic and geographical zoning of Uzbekistan (Figure 1) was developed for the first time. It was created in GIS environment based on analysis of flora, originality of composition of geni and bloodlines, list of endemic and subendemic taxa and their geographical connections, specifics of landscapes and land cover. Within mountain part of Uzbekistan 8 regions and 23 districts are identified, and in plain part - 8 regions and 15 districts are identified. Lists of endemics for each district are prepared for the first time. A range of issues regarding criteria of zoning, boundaries of regions and districts, botanic and geographical position of some territories was settled.

Scheme of botanic and geographical zoning became the basis for preparation of a new edition of “Flora of Uzbekistan”, the first book of which was published in 2017. Monographic processing of a range of large taxonomic groups of vascular plants was performed by present time: sections Equisetophyta, Filicoid, Gymnospermae, Monocotyledoneae class section Magnoliophyta, 10 bloodlines from Dycotyledoneae class. These revisions were performed at modern world-class level and have no analogues in the countries of Central Asia.

Among representatives of Monocotyledoneae class the largest number of new amendments were identified at revision of geni Onion (*Allium*), Gagea (*Gagea*), Tulip (*Tulipa*) and Iris (*Iris*). 1st volume of “Flora of Uzbekistan” which was published in 1942 contained information on 68 species of genus *Allium*, and up-to-date research identified 13 species, among which 42 were described for latest 50 years including 14 species which were described after 2000. 1st volume of “Flora of Uzbekistan” contained 26 species of genus *Gagea*, and after processing data for past decades, summary of this genus in flora of the country increased to 50 species. Two new for science species of this genus were described after 2000, as a result of field research of recent year 6 new species of *Gagea* were found. 1st volume of “Flora of Uzbekistan” contained 21 species of genus *Tulipa*.

Starting from 2009, three new for science species of tulips were found, some new findings for flora of Uzbekistan were identified on the territory of Uzbekistan, and as a result of critical processing the number of species of genus *Tulipa* in national list increased to 34. 1st volume of “Flora of Uzbekistan” contained 8 wild harvested species of genus *Iris*, 15 species of genus Juno (*Juno*) and 2 species of genus Xiphium (*Xiphium*), totally 25 species. As a result of molecular - phylogenic research these geni were combined in one genus *Iris*, which according to up-to-date data is presented in Uzbekistan by 43 species. Among them 7 species of irises were described after 2000.

Botanic and geographical zoning of Uzbekistan

A new scheme of botanic and geographical zoning of Uzbekistan (figure 1) is based on analysis of floristic research for the period 1941-2011.

In general, by the level of floristic exploration it is possible to specify satisfactory, meduim and weakly studied regions on the territory of Uzbekistan (figure 2).

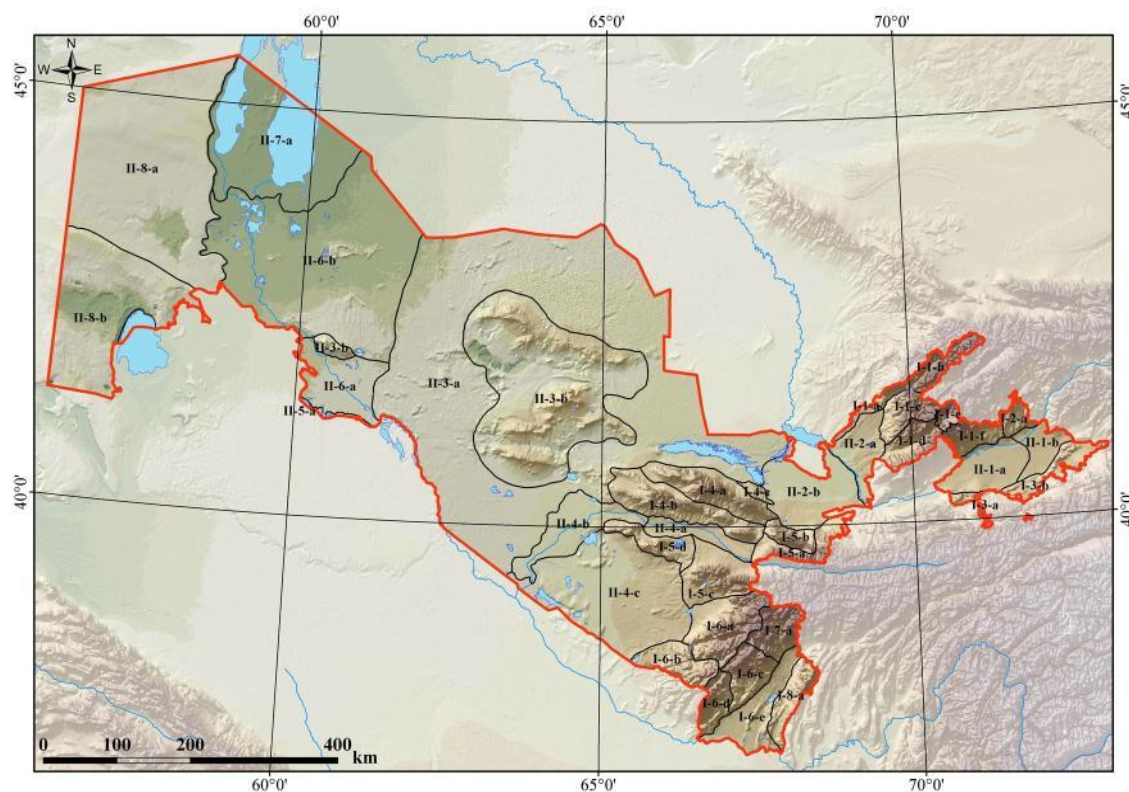


Figure 1. Scheme of botanic and geographical zoning of Uzbekistan according to Tozhibayev K.Sh., Beshko N.Yu., Popov V.A.

I. Mountain Central Asian province, its regions:

I-1 West Tian-Shan (districts: I-1-a Tashkent, I-1-b Ugam-Pskem, I-1-c West Chatkal (Chimgan), I-1-d Kuramino (Akhangaran), I-1-e Arashan, I-1-f Chorkesar);

I-2 Fergana (I-2-a South Chatkal (Alabuga) district);

I-1 Fergana - Alai (districts: I-3-a West Alai; I-3-b East Alai);

I-4 Nurata (districts: I-4-a Nurata, I-4-b Aktau, I-4-c Nurata isolated mountain);

I-5 Kukhistan (districts: I-5-a North Turkestan, I-5-b Malguzar, I-5-c Urgut, I-5-d Zirabulak-Ziadin);

I-6 West Gissar (districts: I-6-a Kashkadarya, I-6-b Tarkapchigai, I-6-c Baisun, I-6-d Kugitang, I-6-e Surkhan-Sherabad);

I-7 Gissar-Darvaz (I-7-a Sangardak-Tupalang district);

I-8 Pyanj (I-8-a Babatag district);

II. Turan province, its districts:

II-1 Central Fergana (districts: II-1-a Kairakkum-Yazyavan, II-1-b West Fergana);

II-2 Middle Syrdarya (districts: II-2-a Chinaz, II-2-b Mirzachul');)

II-3 Kyzylkum (districts: II-3-a Kyzylkum, II-3 Kyzylkum isolated mountains);

II-4 Bukhara (districts: II-4-a Middle Zeravshan, II-4-b Lower Zeravshan, II-4-c Qarshi-Karnabchul');)

II-5 Karakum (II-5-a North-East Karakum district);

II-6 South Aral Sea (districts: II-6-a Khorezm, II-6-b Amudarya delta)

II-7 Aral (II-7 Aral district);

II-8 Usturt (districts: II-8-a North Usturt, II-8-b South Usturt).

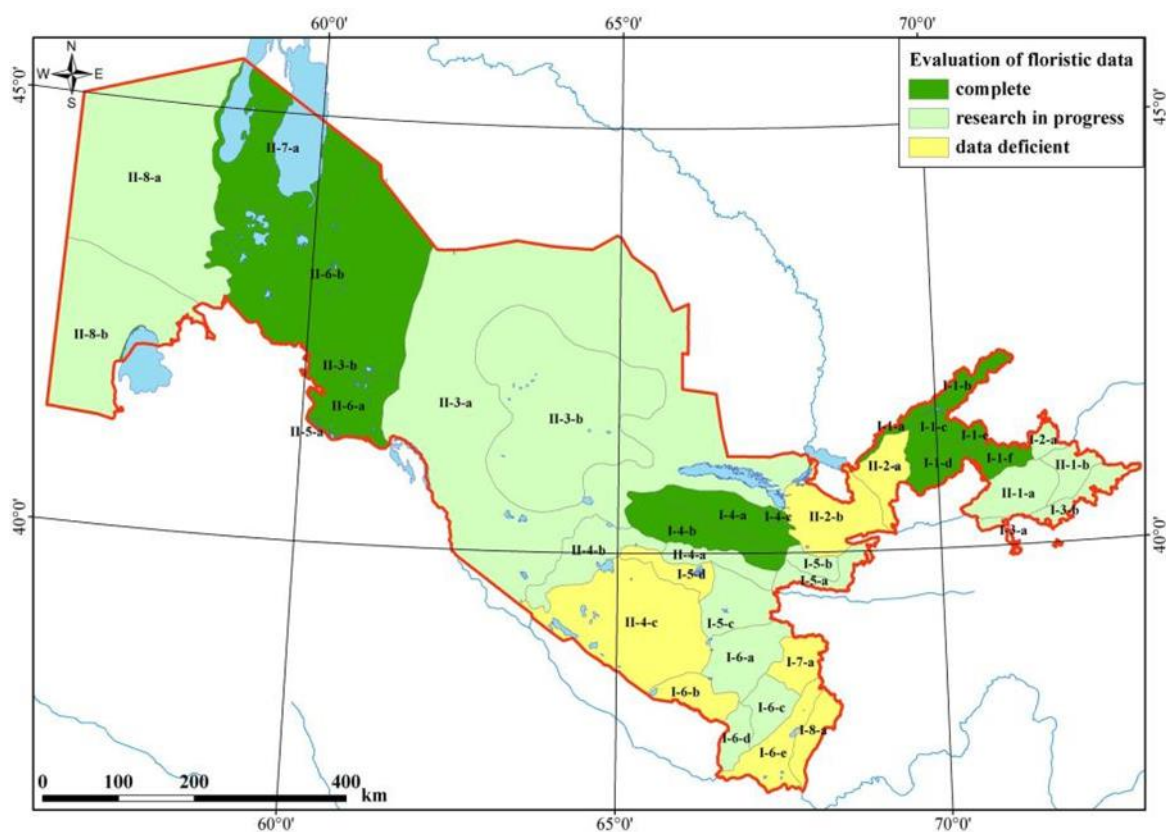


Figure 2. Level of floristic exploration of the regions of Uzbekistan according to Tozhibayev K.Sh. and Beshko N.Yu. (Botanical and geographical districts are designated by numbers similar to Figure 1)

The mostly studied parts of Uzbekistan are West Tian-Shan (Tashkent province and a part of Namangan province) and Nurata mountains (part of Jizzakh, Samarkand and Navoiy provinces) which totally account for around 8% of country area. There is a lot of information on Aral Sea area, which is a focus of many domestic and foreign experts from 80-s of last century due to environmental crisis.

A large part of the country is not sufficiently studied in floristic context. Existing sources consist of different papers with various level of details and credibility, incomplete or old lists of flora. At present research are performed in Kyzylkum, Fergana valley, Baisyn mountains, on Usturt. Up-to-date data on flora of basins of Sangardak and Tupalang rivers on Gissar mountain range, Babatag, Zirabulak - Ziadin mountains, Karshin steppe, middle stream of Syrdarya and some other districts is almost unavailable.

Suggested scheme of zoning of Uzbekistan is complex (floristic, botanic and geographical, and landscape) in its content. It is based on analysis of flora, originality of composition of geni and bloodlines, list of endemic and subendemic taxa and their geographical connections, geological history, specifics of landscapes and land cover. At identification of principle of naturality of borders natural borders were taken into account such as water-divisions of river basins, watercourse of large rivers, large benches (cliffs), etc.

1986 species of vascular plants from 115 bloodlines and 645 geni were established for flora of Jizzakh province. According to up-to-date scheme of botanic and geographical zoning of Uzbekistan, 1195 species were identified for Jizzakh part of Nurata botanic and geographical district, 652 species for Nurata district, 1170 species for Malguzar district, 1476 species for North Turkestan district, 453 plant species for Kyzylkum plain district, 552 species for flora of Mirzachul' district. 12 new species were identified for flora of Nurata reserve, among them 5 new species for Nuratau mountain range and 12 new species for flora of Zaamin reserve, among them 1 new specie for flora of Uzbekistan. 53 species which grow in Jizzakh province were

included into the Red Book of the Republic of Uzbekistan 46 among 53 species included into the Red Book are protected in Nurata and Zaamin reserves and Zaamin national part and only 7 are not provided with territorial protection. Moreover, 2 species of plants which are included into International Red Book are met in Jizzakh province, among them only 1 is included into the Red Book of the Republic of Uzbekistan - *Lonicera paradoxa* (*Lonicera paradoxa*).

It was established that wild harvested flora of Samarkand province consists of 1715 species of vascular plants from 598 geni and 103 bloodlines. 1043 species were identified on the territory of Samarkand part of Nurata botanic and geographical region (part of Nurata and Aktau districts), 1174 species for Samarkand part of Urgut district of Kukhistan region, 384 species for Zirabulak-Ziadin district, and 774 species for Middle Zeravshan district of Bukhara region among others.

During field research in central part of Nuratau a new for science endemic specie was found and described - *Acantholimon zakirovii* (*Acantholimon zakirovii*), during analysis of herbaria materials of TASH a new for flora of Uzbekistan specie - *Taraxacum tadshikorum* (*Taraxacum tadshikorum*) was identified. Moreover, at administrative border of Samarkand and Kashkadarya provinces in water-dividing part of Zeravshan mountain range a specie included into the Red Book which was assumed as extinct *Oenanthe heterococca* (*Oenanthe heterococca*) was found. The list of rare species of Samarkand province which are included into the Red Book of the Republic of Uzbekistan includes 54 species. 5 plant species are included into International Red Book. Detailed cadaster information with data on distribution, number, condition of a population is prepared for 46 species.

Within the framework of government innovation project which is devoted to cadaster of rare and extincting species of flora and fauna of Kashkadarya province as a result of expedition research, studies of literature sources and herbaria materials of TASH, a cadaster list (resume) of flora of Kashkadarya province which includes 2023 species of plants from 617 geni and 103 bloodlines was issued for the first time. 1550 species of vascular plants were identified for Kashkadarya botanic and geographical region, 1214 species - for Urgut district, 942 species - for Tarkapchigai district, 709 species -for Karshin - Karnabchul' district. 12 species which are new for flora of Uzbekistan were identified. The list of rare and extincting plants of the province which are included into national Red Book equals to 88 species.

From 2018 in the Institute of botany of the Academy of Science of the Republic of Uzbekistan an implementation of an applied project "Cadaster of rare and extincting species of vascular plants of Navoiy and Bukhara provinces" started. This project is a logical continuation of above mentioned cadaster floristic research. As concerns botanic and geographical point of view, territory of the province relates to Nurata and Kukhistan regions of Mountain and Central Asian province and Kyzylkum and Bukhara regions of Turan province. Level of floristic exploration of this region is very uneven.

Despite arid conditions and mainly plain relief this wide and comparatively low populated area has a significant landscape and biological diversity.

A unique national region is isolated low mountains of Kyzylkum desert which flora differs by a large number of rare, extincting, endemic and relict species and by the diversity of composition of species significantly exceeds the flora of surrounding desert plain.

Ecosystems of the region experience critical anthropogenic stress which significantly increased during last decades due to intensive exploration and exploitation of deposits of different natural resources. Moreover, a threat of extinction of endemic and rare species of plants of low mountains of Kyzylkum desert increases due to climate change and desertification processes. Despite periodic environment audit of mining industry facilities and availability of other various data which are sufficient for cadaster keeping, full information on condition of populations of endemic and rare plant species is non-available. That is why issue of cadaster of particularly vulnerable objects of plant community of this huge territory is quite relevant.

At the first stage of this project a preliminary list of rare and extincting species of flora of Navoiy province which are included into a new, 5th edition of the Red Book of Uzbekistan was

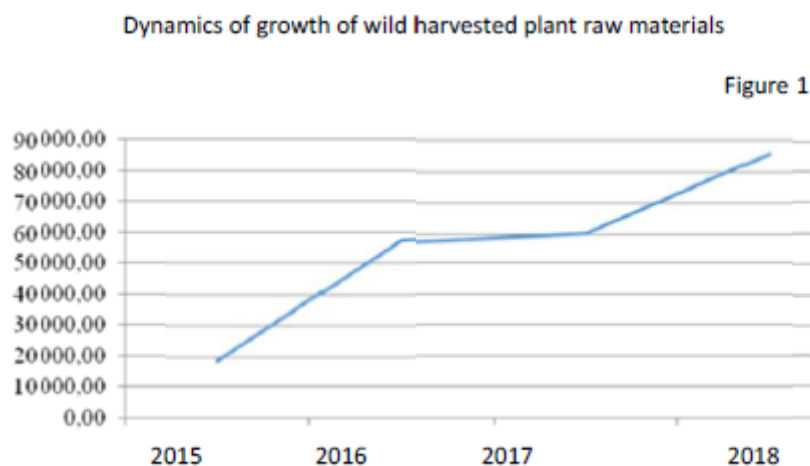
issued. It includes 54 species, i.e. twice as much as it was specified in 2006 based on results of research on issue of primary cadaster of rare species of the province.

Up-to-date condition of plant resources of Uzbekistan, trends and problems

Every year procuring organizations, pharmaceutical companies and other users of nature apply for quotas on around 121 species of wild harvested medicinal plants among which there are species included into the Red Book, as well as endemic species.

An analysis of quantitative procurement of wild harvested plant raw materials were performed in the context of species which are the most vulnerable at present: cane (*Phragmites* sp.) (industrial plant), common licorice (*Glycyrrhiza glabra*), *Ferula tadshikorum* (*Ferula tadshikorum*) and *Cistanche salsa* (*Cistanche salsa*) (medicinal raw material). Analysis indicated that dynamics of consumption of these plants is constantly increasing. For the period 2015-2018 the increase of procurement of wild harvested plant raw materials increased more than by 4 times. Such intensive procurement may cause irreparable damage to populations of these plants.

For example, rush banks are a biological oasis, a habitat of wild animals. Business activity and intervention to this bioenvironment may lead to irreparable loss of plants and animals, as well as to decrease their role in protection of water and shores.



From medicinal plants the strongest pressing is over wild harvested bushings of *Glycyrrhiza glabra* and *Ferula tadshikorum*, stocks of which were significantly decreased due to intensive procurement during last 20 years.

The latest data on condition of plant species from the Red Book and perspectives of its new editions

The first edition of the Red Book of the Republic of Uzbekistan (Plants) (1984) included 163 plant species; the second edition (1998) - 301 species; the third edition (2006) - 302 species of plants and 3 species of mushrooms,

The latest 4th edition of the Red Book of Uzbekistan (2009) includes 321 species of vascular plants and 3 species of mushrooms. Compared to first three editions, the Red Book of 2009 included some changes. For example, due to increase of the number of peculiarities of *Crocus korolkowii*, *Euonymus koopmannii*, *Allium suworowii*, *Allium stipitatum* and widening their habitats these species were excluded from the Red Book. Totally 23 species are excluded. On the other hand, 11 new species of higher plants which were considered as rare are included, 7

species are transferred from status 2 to status 3 due to widening their population in nature. It is necessary to highlight the availability in actual edition of 18 species with status 0. This is a documented evidence of strong anthropogenic pressing on our flora.

5th edition, prepared for publishing, includes 313 species of animals and 3 species of mushrooms. A new edition excludes from the list of rare and threatened yellow marsh saxifrage (*Saxifraga hirculus*), Alp lily (*Lloydia serotina*), saw grass (*Cladium martii*), Altai globe-flower (*Trollius altaicus*), found-leaf foxbane (*Aconitum rotundifolium*) *Allochrysa takhtajanii* (*Allochrysa tadshikistanica*). These species are rarely met in Uzbekistan as their habitats are mainly located in other countries (Russia, Kazakhstan, Kyrgyzstan, Tajikistan, etc.). The following species were excluded from the Red Book: Ulugbek's scabious (*Scabiosa ulugbekii*), Plocama trichophylla (*Neogaillonia trichophylla*), Sorbaria olgae (*Sorbaria olgae*) and Nataliella Alai (*Nathaliella alaiica*), as according to up-to-date data habitat of these species does not cover the territory of Uzbekistan. Moreover, research of latest years indicated that such species as Cousinia chaetocephala Kult (*Cousinia sogdiana*), liquorice milk-vetch (*Astragalus kelleri*), *Crócus alatávicus* (*Crocus alatavicus*), Pseudoclausia olgae (*Parrya olgae*), Mogoltavia sewertzowii (*Mogoltavia sewerzovii*), Lipskya insignis (*Lipskya insignis*) are quite largely distributed and are not threatened. Based on that these plants were excluded from the Red Book.

The number of species which are deemed as extinct with status 0 decreased from 19 to 10. Other 15 rare and endemic species (*Allium philistaeum* (*Allium eremoprasum*), parrya saxifragous (*Perrya saxifraga*), etc.) were included into the Red Book. They include several new for science species which were discovered for last several years *Juno rodionenkoi* (*Juno rodionenkoi*), *Tulipa intermedia* (*Tulipa intermedia*) etc.

Compared to the previous edition 157 species changed their status. Scientific names of many taxa (species, geni, bloodlines) which were used in specialized literature for a long time were changes due to large number of nomenclature changes which occurred from the moment of publishing of the previous edition and related to a wide use of DNA analysis methods.

Four categories of species are specified in the Red Book of the Republic of Uzbekistan: 0 (probably extinct) corresponds to categories - EX and EW, 1 (threatened) - corresponds to categories CR and EN, 2 (rare species) - category VU and 3 (reducing) - corresponds to category NT. But only 166 from over 4300 species of flora of Uzbekistan are assessed in accordance with categories and criteria of IUCN and only 17 were included into IUNC list as globally threatened (categories CR, EN, VU), only 5 of them were included into the national Red Book of the Republic of Uzbekistan. As an example, it is possible to note the following species: chapparal currant (*Ribesma lvifolium*) is an endemic of Gissar mountain range. Category of a specie in IUCN - SR matches with the assessment of a status in the Red Book of the Republic of Uzbekistan - category 1. *Malus sieversii* (*Malus sieversii*) is an endemic of Central Asia, in IUCN this specie is of category VU, and in Uzbekistan it is not a rare one. In line with it, Uzbekistan has a first experience in assessment of some endemic and rare species of plants under international criteria of IUCN.

So, a regular monitoring of plants which are included into the Red Book of the Republic of Uzbekistan, identification of threatened species are performed, reasons of decrease of number and extinction of plant species are identified, preparation and issue of papers for next editions of the Red Book are performed. Works are performed on monitoring quote resource (medicinal, food) plant species with a high demand on domestic, as well as on foreign market.

For recent years 1 new monotypic species and 38 species from 9 bloodlines were described. A new national summary of country flora was created in the format of database which includes 4364 wild harvested plant species. In the nearest future it is planned to continue taking inventory of flora in the context of administrative provinces.

UPDATED INFORMATION ON CONDITION AND TRENDS IN THE FIELD OF FAUNAL DIVERSITY

Animal world of Uzbekistan differs by abundance and diversity of species. Abundance of species of fauna of invertebrate animals of Uzbekistan is evaluated in around 15 000 species, but faunal works in this field are almost not performed. With regard to species diversity in fauna of vertebrate animals some changes related to new findings on the territory of the country, re-description of species, identification of new species from subspecies rating happened for several recent years. For recent years, opinions of experts-zoologists on systematic belonging of separate taxa changed somehow. Based on that, at present according to data of the Academy of Science fauna of vertebrate animals of Uzbekistan, which includes species which are registered on the territory of the country for the whole period of zoological research, is presented by 5 classes and includes 715 species: 77 species of fishes, 3 species of amphibia, 61 species of reptiles, 467 species of birds and 107 species of mammals.

The territory of Uzbekistan is a specific region of combination of endemic species and subspecies of animals of Central Asian origin. Some species of fauna initially originated between the rivers Amudarya and Syrdarya and later distributed into other regions of the Central Asia. The level of endemism among fishes reaches 50%. Endemics account for near 9.5% of the total number of species of terrestrial vertebrate species of the country. The highest level of endemism is specific for fauna of reptiles - near 60% of species are endemics of Uzbekistan and Central Asia. The level of endemism in the class of mammals is 15% - 16 representatives of theriofauna (species, subspecies) are narrow or regional endemics. A small number of endemics (species, subspecies) is among the class of birds - 1.7%.

A separate part of fauna of Uzbekistan are alien species which were directly introduced by a human or occasionally imported into the country from other regions. Many of these species of animals and plants successfully naturalized in wild nature of Uzbekistan, i.e. created stable and independently long-existing populations. Among terrestrial vertebrate species alien species account for: 2 species of birds (1.1% of ornithofauna) and 5 (4.7% theriofauna) species of mammals. Most of introduced species in fauna of vertebrate species of Uzbekistan are fishes - up to 50% of ichthyofauna.

As a result of intensive business activity, substantial changes occur in natural conditions, particularly in plain and submontane landscapes of the country. Development of agriculture, animal breeding, primary sector and communications to a certain extent is reflected on the condition of the total biodiversity. But degradation of habitats and direct elimination mainly refer to the fauna components. Due to its biological specifics, the mostly threatened are rare, as well as endemic and locally prevalent species which live on territories with intensive business development.

Analytical material for assessment of up-to-date condition and trends in the field of faunal diversity was: agency materials of related agencies and organizations, results of performance within the framework of international Conventions, Treaties and Memorandums, materials and results of completed and on-going national and international projects in the field of biodiversity, corresponding scientific publications, results of activity of environmental NGO, issue-related expert materials.

Updated information on rare and globally threatened species of faunal diversity of Uzbekistan (up-to-date condition, changes in status and trends)

General degradation and fragmentation of natural ecosystems which are strengthened because of anthropogenic influence lead to decrease of habitats and number of rare as well as resource (hunting) species. Such species have a higher risk of extinction in wild nature and are recommended to be included into national Red Book.

The legal basis of the Red Book of the Republic of Uzbekistan is duly approved lists of objects of animal and plant communities included into Red Book. The Red Book of the Republic

of Uzbekistan itself is a regularly updated edition which contains a list of information on such objects and measures on their conservation. Up-to-date condition and trends in the field of faunal diversity are reflected by dynamics of introduction of new species into the list of the Red Book, as well as revision and amendment of national threat statuses for species.

Over 20 years passed from the time of second edition of the Red Book of the Republic of Uzbekistan (2003). Next editions of 2006 and 2009 included only small changes on a limited number of species. The latest edition of the Red Book of the Republic of Uzbekistan (2009) includes 184 rare and threatened species of animals. Performance of scientific research by experts - zoologists of the Academy of Science, Higher Educational Institutions, PNA, public institutions, as well as performance of a range of targeted projects on study and conservation of biodiversity enabled receipt of new data on up-to-date condition and trends in the field of faunal diversity, what enables revising and amending lists of rare and threatened species of animals. .

In 2016-17 experts - zoologists gave scientific justification and prepared an updated list of species of animals for inclusion into national Red Book, which updated and amended edition is being planned for publishing.

Substantial changes were introduced into planned regular edition of the Red Book. As for 2018, taking into account new species, which are recommended for inclusion into Red Book of the Republic of Uzbekistan, 239 species of faunal diversity of Uzbekistan are included into different categories of rare and threatened species. It is recommended to include 206 species of animals, from which 22 are new, to updated list of Red Book of the Republic of Uzbekistan. In total 30 species of mammals (with subspecies - 32). 52 species of birds, 21 species of reptiles, 17 species of fishes (with subspecies - 18), 3 species of Annelida, 14 species of mollusca, 66 species of arthropods. Moreover, 91 species of animals of the Republic of Uzbekistan which destiny causes concerns on global level, are included into Red List of IUCN. Appendices of Convention on International Trade in Endangered Species (CITES) includes 92 species (subspecies) of animals (Table 29). Moreover, 176 species of birds and 10 species of mammals are included into appendices of Convention on migrating species (CMS).

Table 30. Number of rare and globally threatened species of animals of Uzbekistan compared to their abundance in the country

Classes	Total number of species in the class	Amount/ Share in general number of species in the class, %		
		Species included and recommended into UzRDB	IUCN species (2017)	CITES
Invertebrata	15000	83/0.6	5/0.03	1/0.007
Fishes	77	18/23.4	11/14.3	4/5.2
Amphibia	3	-	-	-
Reptiles	61	21/34.4	8/13.1	5/8.2
Birds	467	52/11.1	47/10.1	62/13.3
Mammals	107	32/29.9	20/18.7	20/18.7
Total	15715	206/1.3	91/0.6	92/0.6

Note: UzRDB – Red Book of the Republic of Uzbekistan; IUCN - International Union for Conservation of Nature; CITES – species included into Appendices of CITES Convention

It is recommended to include additionally 22 species of animals totally - 6 species of invertebrate animals, 5 species of reptiles, 4 species of birds and 7 species of mammals into the lists of rare and threatened species of national Red Book. 30). Moreover, 12 species of fishes (fish - 1, reptiles - 1, birds - 8, mammals - 2 species) changed their status of threat at national level in accordance with data on condition of species received for several last years.

2 species - Turkestani orfe *Leuciscus idus oxianus* and Molchanov toad agama *Phrynocephalus moltschanowi* changed their national status from 4(DD) (indefinite status and/or not studied) to 3 (NT) (near to threatened) what is connected with receipt of new data on up-to-date condition of species.

Table 31. Change of condition and statuses of vertebrate species of Uzbekistan

N o.	Specie/ subspecie	Status on 2009 (UzRB)	Condition and status on 2018 (expert estimates)	IUCN (2017)
Fishes <i>Piscis</i>				
1	Turkestani orfe <i>Leuciscus idus oxianus</i>	4 (DD)	3 (NT) reduction in number due to change of water regime of reservoirs, their pollution and salinization, influence of fishes - invaders	
Reptiles <i>Reptilia</i>				
2	Central Asian tortoise <i>Agryonemys horsfieldii</i>	Object of procurement	2 (VU) reduction in number due to unsustainable use, reduction of area of habitats, poaching	VU
3	Phrynocephalus moltschanowi <i>Phrynocephalus moltschanowi</i>	4 (DD)	3 (NT) Locally prevalent, naturally small endemic of Aral Sea region. Reduction in number due to degradation of habitats because of grazing	-
4	Trans - Caspian road agama of Bettger <i>Phrynocephalus raddei boettgeri</i>	-	2 (VU:D) Endemic subspecie. Reduction in number due to degradation of habitats because of grazing	-
5	Alsophylax szczerbaki <i>Alsophylax szczerbaki</i>	-	1(EN) Mosaic distributed, relict endemic specie Reduction in number due to degradation of habitats	VU
6	Sand boa <i>Eryx miliaris</i>	-	3 (NT) Mosaic distributed; reduction in number due to unsustainable use, poaching	-
7	Tatary sand boa <i>Eryx tataricus</i>	-	3 (NT) Mosaic distributed; reduction in number due to unsustainable use, reduction of area of habitats, poaching	-
Birds <i>Aves</i>				
8	Dalmatian pelican <i>Pelecanus crispus</i>	2 (VU)	1(EN) Reduction of area of habitats and number due to change of water regime in the basin of Aral Sea, poaching. For recent 50 years the number in Uzbekistan reduced by at least 50%	NT
9	Pond heron <i>Ardeola ralloides</i>	2(VU:D)	2(VU:R) Rare specie. Reduction in number due to elimination of habitats caused by change of water regime in the basin of river Amudarya	
10	Flamingo <i>Phoenicopterus roseus</i>	2(VU:R)	2(VU:D) On-going reduction in number as a result of loss of habitats due to unstable hydrological regime	
11	Red-breasted goose <i>Rufibrenta ruficollis</i>	1 (EN)	2(VU:R) Rare specie on the country territory. Data on reduction in number of species up to 50% are not available.	VU
12	White-eyed pochard <i>Aythya nyroca</i>	3 (NT)	2(VU:D) On-going reduction in number on country territory as a result of loss of habitats	NT
13	Neophron <i>Neophron percnopterus</i>	-	2(VU:D) reduction in number on country territory as a result of lack of food resources, possibly because of poisoning by veterinary preparations. World population of the specie reduces	EN
14	Griffon vulture <i>Gyps fulvus</i>	3 (NT)	2(VU:D) During last decades reduction in number due to reduction in number of wild hoofed, poaching. Condition of the population of a species is characterized as unstable	

15	Steppe eagle <i>Aquila rapax nipalensis</i>	3 (NT)	2(VU:D) During last years number of birds migrating and wintering in Uzbekistan reduced due to their mass death on power transmission lines. World population of the specie quickly reduces	EN
16	Saker falcon <i>Falco cherrug</i>	3 (NT)	1(EN) Reduction in number of the species in Uzbekistan for recent 50 years by more than 50%. Main reason is destruction of nests and catching of adult birds.	EN
17	Black-tailed godwit <i>Limoza limoza</i>	-	2(VU:D) Reduction in number and areas of habitats due to unstable hydrological regime	
18	Eurasian curlew <i>Numenius arquata</i>	-	2(VU:D) Long-time reduction in number and areas of habitats due to unstable hydrological regime	NT
19	Turtle dove <i>Streptopelia turtur</i>	Hunting specie	2(VU:D) Reduction in number due to loss of nesting areas and food, intensive hunting on pass ways	VU
Mammals <i>Mammalia</i>				
20	Lesser fat-tailed jerboa <i>Allactaga vinogradovi</i>	-	2(VU:R) Naturally rare, narrow areal, endemic specie. Area of habitat in Uzbekistan equals to 1/5 of world total habitat. Reduction of areas of habitats due to business development of territories	NT
21	Vulpes corsac <i>Vulpes corsac</i>	Hunting specie	2(VU:D) Reduction in number, loss and fragmentation of habitats due to business development of territories	-
22	Turkestan polecat <i>Mustela eversmanni</i>	Hunting specie	2(VU:D) Reduction in number, loss and fragmentation of habitats due to business development of territories	-
23	Marbled polecats <i>Vormela peregusna</i>	-	2(VU:D) Reduction in number, fragmentation of habitats due to business development of territories	VU
24	Dune cat <i>Felis margarita</i>	-	3 (NT) Reduction in number due to use of desert area, driving by human	
25	Pallas' cat <i>Felis margarita</i>	-	4(DD) Extremely rare, low studied specie. From the middle of XX century not more than 10 thousand meetings are known Is subjected to a threat of direct elimination due to extremely beautiful fur.	NT
26	Tian-Shan big horn <i>Ovis ammon karelini</i>	-	4(DD) Extremely rare, low studied subspecie	NT
27	Saiga antelope <i>Saiga tatarica</i>	3 (VU)	1(CR) Change of status due to extreme reduction in number - reduction by 99.5% starting from 1990	CR
28	Turkmen wild ass <i>Equus hemionus kulan</i>	0 (EW) as extinct specie in country wild nature	(CR) Change of status due to identification of near 50-100 wild specimen in 2012 which were the part of transborder population with Turkmenistan	NT

National status was revised and increased for 5 species of birds (Dalmatian pelican *Pelecanus crispus*, White-eyed pochard *Aythya nyroca*, Griffon vulture *Gyps fulvus*, Steppe eagle *Aquila rapax nipalensis*, Saker falcon *Falco cherrug*). In this case change of status was caused by significant reduction in number of species caused by loss of habitats, death during migrations, reduction of food base and poaching.

2 species of birds (Pond heron *Ardeola ralloides* and Flamingo *Phoenicopterus roseus*) changed their status of threat because of adjustment of the reason of their vulnerability ("reducing" or "naturally rare"). Status of threat of red-breasted goose *Rufibrenta ruficollis* is decreased from 1(EN) («extincting») to 2(VU:R) («naturally rare»), as no data confirming reduction in number of species to 50% on country territory is available.

It was recommended to include the following 5 new species (subspecies) into the list of rare and threatened species of reptiles of national Red Book:

Globally threatened specie - Central Asian tortoise *Agrionemys horsfieldii*, which for long period of time is the object of intensive procurement on the territory of Uzbekistan. The species is recommended for inclusion into the list of national Red Book due to reduction in number in the result of unsustainable use, business development of natural habitats, illegal procurement.

Trans - Caspian road agama of Bettger *Phrynocephalus raddei boettgeri* is an endemic subspecies which significant reduction in number is caused by degradation of habitats in the result of grazing.

Alsophylax szczerbaki *Alsophylax szczerbaki* is a globally threatened relict endemic specie, mosaic distributed only in anthropogenic landscapes. It is under threat of extinction due to loss of habitats related to reconstruction of old clay settlements and irrigation networks.

Sand boa *Eryx miliaris* and Tatory sand boa *Eryx tataricus* are near to vulnerable, mosaic distributed species, reduction in number of which is caused by a complex of reasons: primarily this is unsustainable use, reduction of area of habitats due to business development of lands, poaching.

4 new species were included into the list of rare and threatened species of birds of national Red Book. A globally threatened specie- Neophron *Neophron percnopterus* - was recommended to be included into national Red Book as a vulnerable, mosaic distributed species, which number reduced on the country territory due to reduction of food resources and, possible, because of poisoning by veterinary preparations. In 1990-2000 the number of the species in Uzbekistan accounted for 200 pairs. At present - 135 - 140 pairs. According to expert estimate, in 2000-2010 in south regions of the country the number of neophron reduced approximately by 26%. Global population, according to approximate estimate, which accounted for 20-61 thousand specimen is also reducing.

Black-tailed godwit *Limoza limoza* is a globally threatened specie which is met in Uzbekistan on plain reservoirs during pass. It is included into the list of the Red Book due to reduction in number in the result of transformation of habitats in nesting area, on migration ways and wintering area. Although world population of the species is wide and numerous, local reductions by 14-33% are highlighted for last 15 years.

Eurasian curlew *Numenius arquata* is a globally threatened specie which is included into the list of Red Book due to long-period of reduction in number and area of habitats due to unstable hydrological regime of the region. The specie was always small, but in the past it was met on the pass in small groups of 3-15 specimen. At present single meetings are noted. It is supposed, that the number of world population reduced by 29-30% for last 15 years.

Globally threatened specie - Turtle dove *Streptopelia turtur*- is included into the list of threatened species due to reduction in number as a result of loss of places of nesting and food, intensive hunting on pass ways. Earlier the specie was included into the list of hunting species, but for last 30 years its number significantly reduced. During registrations in Kashkadarya, Samarkand, Jizzakh, Syrdarya, Navoiy and Bukhara provinces in spring and summer of 2015 no bird was met. Only one pair was found in Tashkent in 2015.

The following changes occurred in national statuses of species among mammals. Status of threat of Saiga antelope *Saiga tatarica* was changed from 3(VU) («vulnerable, reducing») to 1(CR) («being at the edge of full extinction»). Change of status is caused by significant reduction in number - starting from 1990 the number of saiga antelopes on country territory reduced by 99.5%. Turkmen wild ass *Equus hemionus kulan* is a subspecies which till now was considered as extinct in country wild nature. In 2012 in Karakalpakstan part of Usturt and Sarykamysh bowl experts-zoologists founded around 50-100 specimen which were a part of transborder population with Turkmenistan due to what status of threat was changed from 0 (EW) to 1 (CR).

7 new species were included into the list of rare and threatened species of mammals of national Red Book. Suppositions and grounds for inclusion of these animals into the list of rare and threatened species are the following:

a) 3 species - Marbled polecats *Vormela peregusna*, Pallas' cat *Felis manul* and Tian-Shan muflon *Ovis ammon karelini* were earlier included into the Red Book (1983) as rare and threatened species, but were excluded from further editions (2003, 2006, 2009) without any grounds and scientific bases.

b) other 4 species - Lesser fat-tailed jerboa *Allactaga vinogradovi*, Vulpes corsac *Vulpes corsac turkmenicus*, Turkestan polecat *Mustela eversmanni talassica* and Dune cat *Felis margarita* were recommended to be included into a new edition of the Red Book of the Republic of Uzbekistan for the first time. Turkestan polecat and Vulpes corsac are inhabitants of piedmont and desert landscapes which previously were the objects of fur-trade. At present due to intensive business development of these territories they are conserved only on separate isolated areas and are at the edge of extinction. Vulpes corsac fully disappeared from the part of its habitat in Uzbekistan (foothill plains and adyrs of Tashkent province). Lesser fat-tailed jerboa is an endemic narrow habitat specie, world habitat of which consists only of two isolated areas, one of area of habitat is located on the territory of Uzbekistan. Dune cat is a naturally small stenecious specie which areal is strongly fragmented due to specifics of habitats.

Five species which were included into the list of rare and threatened species of national Red Book are representatives of class *Carnivora*, for which the list of anthropogenic threats is significantly larger than for other species. This in its turn determines a large complexity and necessity of comprehensive approach to their conservation. For each of 22 species of animals which are recommended to be included unto the list of national Red Book there are specific threats of anthropogenic, as well as natural character.

Among the species recommended for inclusion in the national Red Book are such globally threatened IUCN Red List species as the Central Asian tortoise (VU), Scherbak's shell gecko (VU), Buzzard (EN), large spindle (NT), Great Curlew (NT), Common Turtle Dove (VU), manul (NT), Tianshan argali (NT) and the Vinogradov jerboa (NT). Giving the listed species a national protectiotal status will provide them with additional protection on the legislative level.

Condition and perspectives in the field of conservation of faunal diversity

Protected national areas (PNA) are the basic of concentration and conservation of biodiversity in the country. System of PNA plays a specified role in conservation of biodiversity, its separate components, ecosystems and habitats. Protected natural areas have special value for conservation of rare and threatened species of animals and their habitats. In some cases, only due to creation of special protected natural areas it was possible to prevent extinction of some rare species, such as sheep of Severtsov *Ovis ammon severtzovi*, markhoor *Capra falconeri*, Bokharan deer *Cervus elaphus bactrianus*, snow leopard *Pantera uncia*.

Analysis of modern condition, distribution over country territory and level of protection of animals taking into account changes that occurred in the system of PNA shows that in quantitative and qualitative scope of components of faunal biodiversity changes mainly occurred due to revision and amendment of the list of rare and threatened species. Around 77% of specie diversity of vertebrate species which are included into the list of rare and threatened species are formally provided with territorial form of protection. But a significant part of rare and threatened vertebrate species (in particular reptiles and birds) is noted only on the territory of natural sanctuaries and natural monuments. Moreover, many protected species have habitats exceeding area of PNA and/or use huge territories outside PNA for breeding, taking food and during seasonal migrations. In such cases only small part of their habitats is protected.

72.2 species of fishes, 71.4% of reptiles, around 88% of birds (around 50% of which are protected in plain sanctuaries) 75% of mammals which are included into the list of rare and

threatened species are noted in protected natural areas (of I-IV categories and within the scope of biosphere reserves).

Table 32. Distribution of rare and threatened species of vertebrate species of Uzbekistan in existing system of PNA

Class/ Number of species included and recommended into UzRDB	Amount/ % in general number of species included and recommended into UzRDB					
	Reserves (Ia IUCN)	Landscape sanctuary (Ib IUCN)	National natural parks (II IUCN)	Natural monuments (III IUCN)	Sanctuaries, natural nursery "Jeyran" (IV IUCN)	Biosphere reserves
Fishes/ 18	12/66.7	-	5/27.8	-	2/11.1	7/38.9
Reptiles/ 21	7/33.3	3/14.3	4/19.0	7/33.3	3/14.3	3/14.3
Birds/ 52	20/38.5	5/9.6	17/32.7	-	37/71.2	19/36.5
Mammals/ 32	18/56.3	7/22.0	11/34.4	-	7/22.0	8/25.0
Total/ 123	52/43.0	13/10.6	37/30.1	7/33.3	49/39.8	37/30.1

Reserves provide conservation of around 50% of total specie diversity of vertebrate species of Uzbekistan and on average 43% of specie diversity of vertebrate species which are included unto the list of rare and threatened species (Table 31). System of country reserves provide protection for over 56% of rare and threatened species of mammals, 38.5% of species of birds included into the Red Book, many of which spend a significant part of their life cycle outside protected natural areas.

13 rare species of vertebrate species live on the territory of complex landscape sanctuary "Saigachii", what equals to 10.6% from the number of species of this category. Over 30% of species of vertebrate species of the category under the question are protected in natural parks - Ugam-Chatkal, Zaamin and Zarafshan parks.

Sanctuaries have a great value for protection of separate species such as water and moor birds and fishes. This is related to the fact that PNA of this category were created for recovery of hunting fauna. Total amount of rare and threatened vertebrate species which are protected in sanctuaries equals to around 40% from total number of species of this category (these are mainly water and moor birds or near water birds). Plain sanctuaries which are located in pass ways and in the places of wintering of water and moor birds cover with protection around 50% of specie diversity of birds and save passing-by and wintering groupings.

From protection objects reptiles dominate on the territory of natural monuments, they inhabit in sand massifs of Fergana valley where 24% of their species are noted and included into the list of rare and threatened species. Biosphere reserves (Ugam-Chatkal and Lower Amudarya) maintain conservation of around 30% of rare and threatened species (Appendix 1, table 9).

Territories with international importance for conservation of faunal diversity

Natural ecosystems of Uzbekistan **have** a high international importance for conservation and maintenance of 91 species of globally threatened animals, therefore some territories of the country have international importance for conservation of globally threatened biodiversity. Such territories include Aydar-Arsanay system of lakes (area of 527 100 hectare) and Dengizkul lake (area of 31 300 hectare) - territories which are included into the List of wetlands of Ramsar. Works on inclusion into international List of wetlands of new territories - Tudakul and Kuyumazar reservoirs which are important for wintering and nesting of swimming birds, including globally threatened - are in progress.

52 IBA - Important Bird Areas, which have international value for conservation of species of birds which are under threat of global extinction and total biodiversity - are identified

and described in the Republic of Uzbekistan. These territories are confirmed by the Secretary of BirdLife International and included into international network of IBA (http://www.uzspb.uz/iba_map.html). Total area of IBA of Uzbekistan is 2 230 186 hectare (4.98% of the country territory). A part of IBA (17 areas) partially or fully match with existing PNA, i.e. they have official environment protection status in the country. Moreover, 26 reservoirs of international importance for conservation of birds and biodiversity (IBA) are divided from these areas, where 24 globally threatened species of IUCN (75%) and 20 species from the Red Book of Uzbekistan (41.6%) are noted. At least 18 reservoirs of Uzbekistan have important value for wintering of 58 species of birds (12% of total ornithofauna).

IBA network covers all main landscapes of the country. 9 IBA (1 133 365 hectare) are presented by deserts, 3 (19 002 hectare) - by desert low mountains, 9 (371 631 hectare) - by desert and lake complexes, 4 (16 452 hectare) - by tugay forests, 15 (373 910 hectare) - by wetlands, 12 (315 826 hectare) - by mountain territories.

“Termez” area is an Important Bird Area of international importance which is included into the Network of areas for white crane and other semiaquatic birds of West and Central Asia.

It is necessary to mention that some areas which have international value do not have environment protection status, i.e. they may include areas for business use, as well as PNA of various categories. Only 17 (32.7%) out of 52 IBA are fully or partially under state protection (are placed on the territories of existing PNA), and the rest 35 areas (67.3%) are not protected at present. Efficient protection and control over this network which comprises a quite small share of country area is a realistic target achievement of which will contribute a lot into conservation of many species of birds and other components of biodiversity in Uzbekistan.

Key biodiversity areas (KBA) as a basis for conservation of biodiversity in Uzbekistan

In 2016 according to the initiative of the Critical Ecosystem Partnership Fund (CEPF) and its partner - Environmental network “Zoi” identification and description of key biodiversity areas (KBA) of mountain territories of Central Asia which are important for conservation of components of biodiversity was started. This work is performed within the framework of “world consultation process on approval of methodology with enables countries identification of key biodiversity areas” according to initiative of the IUCN Species Survival Commission (SSC) and IUCN World Commission on Protected Areas (WCPA)(www.keybiodiversityareas.org). Main purpose of work is identification of key areas which are important for conservation of globally threatened components of biodiversity of various taxonomic groups. Due to strict and standardized approach to identification of key areas in accordance with Global standard (IUCN, 2016, Version 1.0) which are mandatory for performance in all areas, KBA may be compared with each other at national, regional and global levels. 36 Key biodiversity areas were identified during work on the territory of Uzbekistan, 12 areas among them are fully or partially overlapped by existing PNA

National experts of UzSPB and Institute of zoology of the Academy of science identified 13 KBA which are important for conservation of faunal biodiversity, 5 among them were defined by CEPF as priority for initial scientific research (<https://www.cepf.net/sites/default/files/mountains-central-asia-ecosystem-profile-rus.pdf>).

Key biodiversity areas «UZB04 Akbulak River Basin» and «UZB05 Bashkizylsay River Basin» have key value for conservation of globally threatened species - Menzbier's marmot *Marmota menzbieri* and Snow Leopard *Panthera uncia*. Over 90% of world population of sheep of Severtsov *Ovis ammon severtzovi* live on KBA «UZB24 Nuratau Ridge». Transborder Uzbek - Turkmen KBA «UZB30 Talimarjan Reservoir» is a unique place where over 30% of total world population of sociable lapwings *Vanellus gregarius* gather during autumn pass (over 8000 specimen).

During the reform of the Academy of Science of the Republic of Uzbekistan in 2017 one of main directions of activities of the Institute of zoology was identifies as “ identification of key

zoological areas”. Correspondingly, environmental protection investment program which is suggested by CEPF may strengthen the efforts of the government on conservation of biodiversity.

Data received at identification and description of KBA may be used for different purposes. Identification of key areas may serve as scientific basis for planning and development of the system of protected areas at national level, because these areas are characterized by the most concentration of biodiversity with high level of naturalism, rareness and endemism. When such areas receive environment protection status at national level, they will play an important role for conservation of rare, globally threatened and endemic species. Received data will enable development of complex measures for maintenance of species of mammals and their habitats. Identification of key biodiversity areas is necessary for development of environment protection policy, implementation of targets in the field of biodiversity adopted in Aichi by KBA Parties, identification and description of areas which are protected in accordance with international conventions and treaties (wetlands, Important bird areas, facilities of world environmental heritage, etc).

Inclusion of Uzbekistan into World network of KBA will enable increasing environment protection states of existing PNA, as well as not protected areas which are important for conservation of biodiversity, receiving additional capabilities for development and widening regional environment network.

Species of fauna with high priority for conservation

Species with high priority for conservation are:

- 1) Species under threat of global extinction (globally threatened species), including migrating lower species;
- 2) Rare and threatened species which are included into national Red Book;
- 3) Species for which the territory of Uzbekistan maintains a significant part of world population;
- 4) Species which number and habitats are significantly reduced on the territory of the country under influence of anthropogenic and climate factors.

In some cases, only special measures such as keeping state cadaster of rare species, performance of monitoring research, development and implementation of national and international Action plans on conservation and recovery of species and their habitats, Action plans and actions on conservation of biodiversity in sectors of economy helped to reduce the risk of extinction of some species. Examples of such special measures are provided below.

Threatened migrating animals - snow leopard *Pantera uncia*, sheep of Severtsov *Ovis ammon severtzovi*, Turkmen wild ass *Equus hemionus kulan*, Bokharan deer *Cervus elaphus bactrianus*, Persian gazelle *Gazella subgutturosa*, Saiga antelope *Saiga tatarica*. Measures on conservation of these species which were taken by our country are implemented from 2014 within the framework of the Central Asian Mammals Initiative (CAMI) and includes provision of territorial form of protection of globally threatened migrating animals, as well as participation in international environment protection initiatives and development of Action plans on their conservation.

Objects for targeted study were two globally threatened species of birds - saker falcon *Falco cherrug* (UzRDB, RL) and neophron *Neophron percnopterus* (UzRDB, RL). The basis for this was reduction of their number over the total habitat by 90%. At the moment when studies started total number of saker falcon on the territory of the country accounted for approximately 120-150 specimen, but this data had no up-to-date confirmation. Number of neophron in Uzbekistan were not sufficiently studied and despite the fact that the specie had the states of globally threatened, it was not included into National Red Book. In 2010 based on all available sources a database on these two species for latest 100 years was created, field research were performed and “Action plans on conservation of globally threatened species of bird in

Uzbekistan” (2011) were prepared (<http://uzspb.uz/>). This development received further development within the framework of “Memorandum of Understanding on the Conservation of Migratory Birds of Prey in Africa and Eurasia” of Convention on the conservation of migrating species of wild animals (Raptors MoU):

In 2016 within the framework of CMS Raptors MoU a development of “Action plan on conservation of different species of African and Eurasian vultures” (Vulture MsAP) was started. Available information on 5 species from vulture family of Uzbekistan was presented for this meeting – lammergeier *Gypaetus barbatus*, neophron *Neophron percnopterus*, Himalayan griffon *Gyps himalayensis*, black vulture *Aegypius monachus* and griffon vulture *Gyps fulvus*. The first version of Action plan was presented at 12th meeting of Conference of CMS parties in October 2017.

Agricultural development of territories in 2nd half of XX century led to sharp reduction of nesting habitat of black-sided lapwing *Chettusia gregaria* (UZRDB, RL). According to IUCN criteria the specie was assessed as “critical” (CR). Only single passing specimen were known for Uzbekistan from 1980 to 2010. A program “Observations over pass of black-sided lapwing in Uzbekistan” was developed based on analysis of many year data in 2012. Observations over spring pass of black-sided lapwing at 3 potential sections - Talimarjan reservoirs, Tudakul reservoir and at Aydar-Arnasay system of lakes are performed annually.

In 2015 studies of black-sided lapwing significantly widened and became international. At the end of 2016 the territory of Talimarjan was included into the international list of Key Biodiversity Areas (KBA) as a priority one within the framework of activity of the Critical Ecosystem Partnership Fund (CEPF) (<https://www.cepf.net/sites/default/files/mountains-central-asia-ecosystem-profile-rus.pdf>).

Turkestan white stork *Ciconia ciconia asiatica* was earlier a common specie for the most part of Uzbekistan, but by the beginning of 1980-s this specie almost disappeared from central and south-east parts of the country due to negative consequences of intensive agricultural development. The specie is included into national Red Book as a close of vulnerable subspecie of migrant specie (NT).

For recent 30-35 years, distribution and number of specie in Uzbekistan constantly changed. In April 2014 Nature and Biodiversity Conservation Union of Germany, NABU, addressed to the Society of protection of birds of Uzbekistan with a suggestion to take part in regular 7th international registration of white stark which is held each 10 years from 1934.

Field research were performed during two spring and summer seasons - 2014 and 2015. Registration works covered all known, as well as potential nesting places of white stork in 8 provinces - Fergana, Namangan, Andijan, Tashkent, Syrdarya, Jizzakh, Samarkand and Kashkadarya. Total length of registration routes accounted for 3227 km. Total number of population of Turkestan white stork in Uzbekistan was assessed to be 2500-2700 specimen (<http://uzspb.uz/>).

Stiff-tail *Oxyura leucocephala* is a globally threatened specie which is included into national Red Book. Within the period of 1999 - 2006 clusters up to 5000 specimen were noted at different reservoirs, i.e. More than a half of biogeographical population of this specie. Stiff-tail was also noted at nesting and wintering at 14 reservoirs. Clusters of up to 25% of biogeographical population of this specie were registered at such reservoirs as Sudochoye, Karakyr and Dengizkul. This defined a necessity to develop Action plan on conservation of a specie. For this purpose, a program “Development of national Action plan on conservation of stiff-tail in Uzbekistan” was prepared at the end of 2014. By middle of 2016 a database on meetings of stiff-tail for over than half a century period was collected and the most valuable districts for collection of up-to-date data were specified. In October 2016 a cluster of stiff-tails of more than 9000 specimen was founded on the lake Dengizkul (<http://uzspb.uz/>). Till present maps of up-to-date distribution of the species in different seasons of a year were issued, the most valuable reservoirs for maintenance of a specie are defined, and preparation of Action plan on conservation of stiff-tail in Uzbekistan is being completed.

Plans of actions and activities on conservation of biodiversity are an important nature protection tool, and their development and implementation is an integral task of nature users. Within the framework of activity on conservation of biodiversity on contract areas of “Lukoil Uzbekiston Operating Company” LLC “Action plan on conservation of biological diversity of an area Khauzak-Shady (lake Dengizkul)” and “Action plan on conservation of biological diversity of important bird area Khoja-Davlet” were developed and implemented. Within the framework of implementation of Action plans a document of the State Committee of Nature Protection and LUKOIL on agreement of level of water at the lake Dengizkul was signed which is directed at prevention of serious threat to reproduction of species of water and moor birds and degradation of wet habitats. Analysis of impacts of project activity on water and moor lands and their inhabitants was performed. System of monitoring of biodiversity and in particular birds is based on up-to-date international approaches, is performed at 40 stationary observation posts, an in time aspect covers 6 most important phenological periods.

MAIN THREATS LEADING TO THE REDUCTION OF BIODIVERSITY OF UZBEKISTAN

Based on available actual material taking into account national specifics, as well as existing international classification of threats, a scheme of main types of threats which have negative influence on biodiversity in the condition of natural ecosystems of Uzbekistan is developed (figure 3).

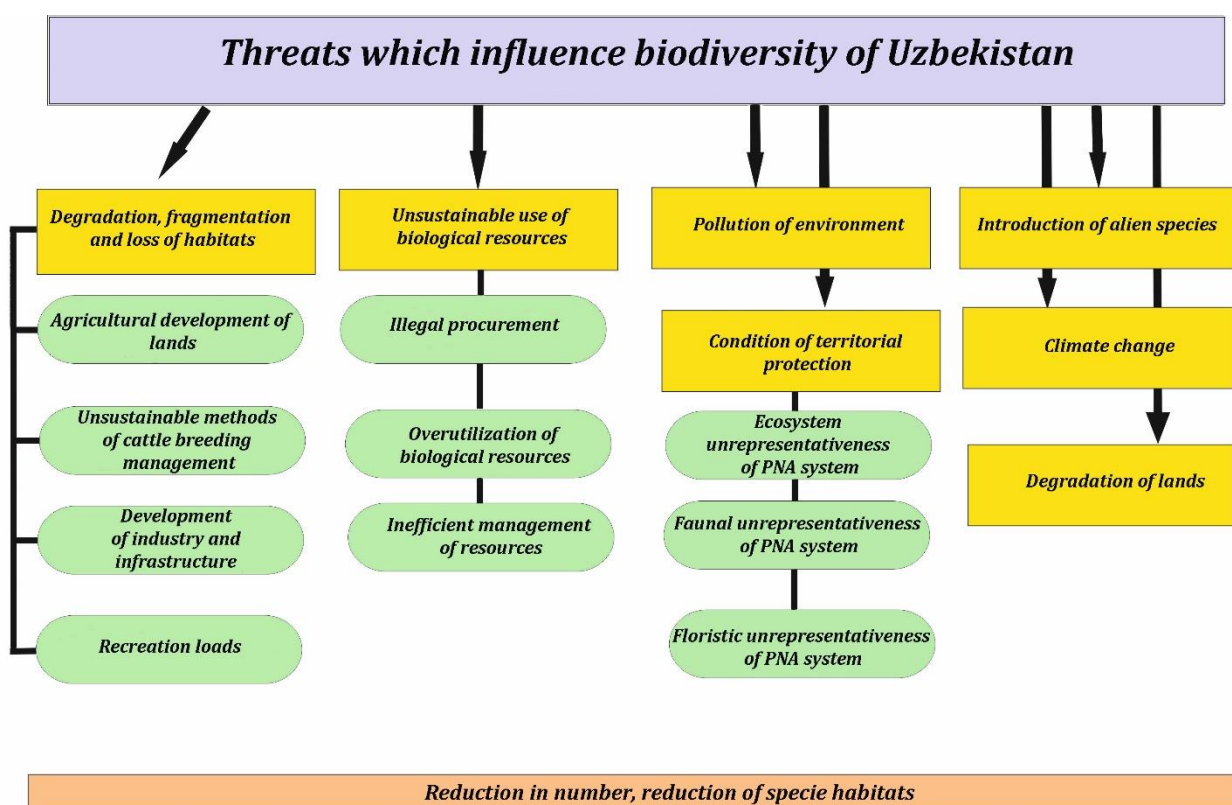


Figure 3. Main threats leading to loss of biodiversity (main threats to biodiversity are shown in yellow, reasons of threats are shown in green)

Analysis of actual situation in the sphere of biodiversity indicated that the list of main threats which influence condition of biodiversity and lead to reduction in number and/ or reduction of habitats of species which is published in 5th National report on conservation of biodiversity (2015) is still relevant at present, and all main loads on biodiversity strengthen. The

following threats (in yellow at figure 3) and their reasons (in green) are identified as main threats which cause loss of biodiversity:

1. Degradation, fragmentation and loss of habitats which are caused by unsustainable methods of agriculture, unsustainable system of management of cattle-breeding, etc.
2. Unsustainable use of biological resources (excessive use of natural populations of animals and plants, inefficient management of hunting, illegal hunting and procurement);
3. Condition of protection of biodiversity, which drawbacks are ecosystem, floristic and faunal unrepresentativeness of the system of PNA;
4. Pollution of habitat (especially with toxic chemicals and particularly with pesticides);
5. Unsustainable development of recreation areas;
6. Introduction of alien species, their influence on native flora and fauna;
7. Climate change.

Almost in all cases the listed threats are of anthropogenic nature. Influence of the most of them on significant part of ecosystems and, correspondingly, species stays stable and increases at this stage, what is related to intensive development of economic activity in the country. Moreover, from the moment of adoption of measures on conservation of biodiversity (adoption of legal measures, establishment of PNA, implementation of Action plans on conservation and recovery of species and ecosystems, etc.) and elimination of reasons which caused its loss and till occurrence of these actions at the level of ecosystems a significant period of time shall pass.

Agricultural sector has the strongest influence on condition of habitats and, correspondingly, on species by unsustainable methods of crop farming and livestock breeding. The fullest list of threats including those which are related to anthropogenic activity is for low mountain, submontane, plain part, water and near water ecosystems, particularly in downstream of main rivers including Aral Sea district and Aral Sea. Consequences of anthropogenic influences on species are totally specified in reduction of area of habitats (particularly of stenecious species) and in reduction of their number.

Main results of influence of anthropogenic factors on biological characteristics of species are

- direct reduction in number;
- disturbance of reproduction;
- disturbance of life cycles, including migration cycles;
- disturbance of gender and age structure of population;
- disturbance of genetic structure of populations, loss of genetic diversity;
- disturbance of population structure of a specie.

These consequences may be different depending on complex of influencing factors and specific environmental conditions. But at the end all they lead to reduction in number and extinction of some populations and a species in general.

Existing system of management of territories in general does not comply with targets of conservation and sustainable use of biodiversity and is to a large extent governed by receipt of economic benefits by various business entities. Imperfection of management of territories especially in productive landscapes lead to increase of the number of species, which number and habitats decrease.

1. Main threat for biological diversity of Uzbekistan is presented by the following: degradation, fragmentation and loss of habitats of species. The main factors of disturbance of natural ecosystems are agriculture, stock-breeding, development of power sector and mining industry.

a) Degradation and loss of natural habitats under influence of agricultural development of territories is still one of main factors which influence on condition of components of fauna and

their habitats. Despite the fact that during 1991-2017 the share of agriculture in GDP of Uzbekistan decreased from 37% to 17%, it is still a key economic sector in the country. In 2018 the share of rural population of the country accounted for 49.4% or around 16 million people (<https://stat.uz/uploads/docs/demog-yan-mart-ru.pdf>). Over one third of employed population in the country work in this industry. Area of agricultural lands of Uzbekistan is a sum of areas which are occupied by crop lands and permanent crops and permanent pastures and accounts 26770 km² or 62.9% of land fund of Uzbekistan. This ratio is almost stable for last 15 years (<http://nd.uznature.uz/page/ispolzovanie-zemelnogo-fonda>).

Degradation of lands is mainly caused by use of unsustainable methods of irrigation what causes salinization, bogging, wind and water erosion, tightening of soil covering, in desertification processes which in their turn facilitate degradation processes. Rates and scale of desertification may be reduced through decrease of anthropogenic loads on arid ecosystems. So, the efforts directed at combating desertification and elimination of climatic risks complement measures on conservation of biological diversity of the country.

Plain, bottomland, submontane and low mountain habitats are significantly changed as a result of agricultural activity which is followed by re-distribution of water resources. Agricultural development of lands in the country was performed mainly based on these territories. As a result, wide areas were so changed that their biodiversity is significantly eliminated, separate species extinct at all or are at the edge of extinction. We may just note that among 22 species of animals which are recommended to be included into a next edition of the Red Book of the Republic of Uzbekistan, a main limiting factor for 12 species is reduction and/or degradation of habitats resulted from influence of business activity. Habitat of 4 out of 6 species of reptiles reduces due to their degradation as a result of influence of agricultural development of lands. Area of habitat of 3 out of 4 species of birds reduces due to change of water regime or other business activity. Area of habitat of 5 out of 7 new species of mammals reduces due to degradation and fragmentation as a result of influence of agricultural development of lands.

Moreover, general decrease of diversity of wild animals and birds and increase of diversity and number of sinanthropic and adventive species occur at agricultural development of natural areas. A part of natural habitats is turned to farming ecosystem, another which before took a large area, is fragmented by roads, utility lines and other facilities.

b) Degradation of ecosystems under influence of cattle-breeding. Cattle breeding has a strong influence on natural ecosystems and plays an important role in economics of the Republic of Uzbekistan still accounting for over 40% of gross production of agricultural products in the country. Since 1992 the number of cattle in the country increased almost by 2.5 times what lead to increase of the part of cattle breeding in gross product of agriculture of Uzbekistan from 30-35% in 1980-s to 46% in 2016. From 19 million hectare of pastures, desert pastures take over 80% of the country territory (as a rule, they are designed only for sheep), the rest of pastures (designed for cattle and small cattle) are divided between semi desert (12%, mountain steppes (5%) and high mountain pastures (2%). A large part of pastures is concentrated in the Republic of Karakalpakstan (4780.7 thousand hectare), Navoiy (8759.9 thousand hectare), Bukhara (2576.2 thousand hectare) and Kashkadarya (1455.6 hectare) provinces.

Grazing industry takes first place among anthropogenic factors by intensity of influence on biodiversity in many regions of the country, particularly mountain. One of main environmental indicators is the condition of pastures. According to expert estimate, approximately 16.4 mln hectare (78%) of pastures in Uzbekistan are subjected to various level of degradation (National program of actions on combating desertification and drought, 2015). For recent decade productivity of pastures decreased by more than 23%. The reasons of degradation of pastures are various factors: overgrazing (44%), elimination of vegetation for fuel (25%), reduction of water sources (15%), advance of blown sands (10%), plowing lands for crops (5%), disturbance of vegetation cover at construction of roads, lines of energy and industrial complex; mines and open casts (1.0%) (<http://nd.uznature.uz/page/ispolzovanie-zemelnogo-fonda>).

Table 33. Distribution of livestock number in main productive landscapes of Uzbekistan
(Source: SSC of the Republic of Uzbekistan for 2017)

Livestock	Livestock number by ecosystems which are used as pastures				
	Desert	Submontane	High mountains	Total in the country	% from total livestock number
Cattle	5 437 056	3 786 089	1,184,968	10,408,113	35.4%
Sheep	6 651 692	6 729 399	1 896 043	15 277 134	51.9%
Goats	1 569 236	1 210 554	956 487	3 736 277	12.7%
Total	13 657 984	11 726 042	4 037 498	29 421 524	

Such rare and globally threatened species of animals as Menzbier's marmot *Marmota menzbieri*, snow leopard *Pantera uncia*, markhoor *Capra falconeri*, Bokharan big horn *Ovis vignei boharensis*, sheep of Severtsov *Ovis ammon severtzovi*, Persian gazelle *Gazella subgutturosa* etc. directly or indirectly suffer from degradation of ecosystems under influence of cattle breeding (Table 5). Significant amount of rare and endemic species of plants is pastures, and it is replaced by so-called “weedy plants” and start to dominate. Saturation of pastures with cattle lead to competition with wild hoofed, infection them with ecto- and endoparasites.

Pressure on mountain pastures additionally strengthens with rejection from traditional practice of movement of cattle between summer and winter pastures, as it is convenient for population to graze cattle near settlements during whole year. In districts which are situated near settlements all vegetation including valuable medicinal plants is used as a rule as a food for cattle.

Cattle grazing in mountain forests strongly interfered natural rehabilitation, as well as negatively influences availability of food for wild hoofed animals. This leads to reduction of area of forest ecosystems (mountain forests, bottomland forests). Grazing on flood plain, watersides of river bottomlands and wetlands lead to pasturing and poaching of waterside vegetation, disturbance of habitats, destruction of nesting and spawning places. In some districts severe damage, particularly to fauna of mammals is caused by sheepdogs following grazed herds. Such rare, vulnerable and endemic species as Menzbier's marmot, Kashmir marmot *Marmota caudata*, Tian-Shan souslik *Spermophilus relictus* suffer mainly from their hunting.

c) Reduction of area of forests which leads to loss of habitats. Land of forestforest in Uzbekistan are deemed lands which are covered with forest, as well as which are not covered with forest but granted for needs of forestry (<http://www.lex.uz/acts/86109>). Total area of lands of National forestforest in Uzbekistan as for 01.012018 accounted for 11.2 mln hectare, what equals to 25.2% from total land fund of Uzbekistan, among them around 3.26 mln hectare are covered with forests (forest cover is 7.2%). The largest areas of land of forests are located in the Republic of Karakalpakstan, Bukhara and Navoiy provinces, the smallest areas are kept in Samarkand, Syrdarya provinces and Fergana valley. These lands are situated mainly in sand deserts - 9.53 mln hectare, on mountain areas - 1.58 mln hectare, in bottomlands of rivers - 0.11 mln hectare, as well as in plain areas - 0.26 mln hectare.

The most part of tugay forests degraded as a result of change of hydro regime of rivers and continues to subject to the threat of elimination in the result of agricultural development of lands. Main reasons of reduction of area of forest habitats are: 1) development of areas for agricultural needs; 2) use of wood by local population for construction or as firewood; 3) fires; 4) change of hydro regime of rivers.

Analysis of the level of coverage of main natural ecosystems and habitats by the system of protected natural areas indicated that reserves and national parks cover around 3% of

bottomland forests of the country. Tugay habitats are out of protected areas with fauna complexes at bottoms of rivers of Chirchik, Chatkal, Akhangaran which are typical of them. Bottomland forests are protected on the territory of Kyzylkum reserve, in Zarafshan national natural park, and in Lower-Amudarya biosphere reserve also.

c) *disturbance of habitats due to engineering and technical and industrial activity* is caused by construction of industrial facilities and corresponding infrastructure, development and mining of mineral resources, hydro construction works. Lands which are occupied by settlements, hydro technical and industrial facilities, transport account for around 2% of total country area.

Irrational methods of irrigation lead to salinization, flooding, erosion of lands and adjustment of level of water sources. Adjustment of river flows, construction of water reservoirs and irrigation systems was the reason of reduction in number and habitats of animals and plants.

For recent decades oil and gas mining sector substantially developed. Some types of activities which relate to main infrastructural facilities (for example, pipelines, roads, power lines) to the maximum extent negatively influence on biodiversity causing degradation and fragmentation of habitats. Influence of line infrastructures (roads, power lines) is not studied thoroughly for species, but cases of death of birds- scavengers on roads, large birds on power lines are known. In such cases it is necessary to install threatening signs and protection facilities on power lines.

d) *Degradation of habitats under influence of recreation loads.* Use of recreation areas particularly in submontane and mountain areas near cities and other settlements has significantly increased for last 20 years. In some cases despite the fact that habitat was not directly destroyed or fragmented, communities which inhabit it may be deeply influenced by the activity of a human. Strong recreation loads in the places of traditional mass recreation of population influence significantly the structure of natural communities of plants and animals. Natural flora in the places of intensive rest is often suppressed or transformed into new anthropomorphic complexes. Level of its anthropogenic displacement may reach 90-100% near settlements and almost nowhere is lower than 20%. Recreation areas become centers of distribution of trivial sinantropic species of animals which push out typical species.

Recreation areas of Chatkal and Nurata mountain ranges are characterized by increase of touristic load which is not regulated. It is known, that anxiety on nesting places of neophron at Chatkal mountain range led to decrease of its number on nesting. For regulation of touristic flows in places of population mass recreation it is necessary to develop strategy of management and development of environmental tourism in different regions of the country.

2. Unsustainable use of biological resources

Conservation and sustainable use of biological resources shall be a priority of government policy. Taking inventory of resource species of fauna within the context of administrative regions, as well as all over the country is a basis for their sustainable use, justification and performance of scientific research, performance of long-term monitoring, taking prompt decisions with the purpose of conservation and sustainable use of components of animal community.

a) *Illegal procurement (poaching)* and trade by rare and threatened species is a direct threat to their existence. At up-to-date stage at some reduction of pastoral loads one of the most serious threats to the condition of populations of wild animals is illegal procurement which is on-going despite official prohibition. A threat for flora is accidental procurement of fruits, collection of medicinal plants, as well as flowers, seeds, bulbs for sale.

A reduction in number of some hunting species of animals is noted that primarily relates to actual up-to-date social and economic situation and increased illegal procurement. A list of illegally procured animals include rare and globally threatened species of animals (turtle, hoofed, marmots, bear). Traditional illegal catching of birds of prey and singing birds in mountain regions of Uzbekistan takes place. It is next to impossible to specify actual scope of illegal hunting.

Hunting on swimming birds including illegal hunting is a character for almost all reservoirs. During formation of wintering clusters active late autumn and winter hunting leads to anxiety at place of clusters, feed, rest and sleep. Under influence of anxiety factor clusters move and, as a result, dissolve.

Poaching is one of the reasons of reduction in number for 56% rare species and threatened mammals. Poaching is a significant factor which limits the number for 69% species among hunting and commercial fauna of mammals.

b) *Overutilization of biological resources and inefficient hunting management.* At present commercial hunting is not performed in the country due to significant reduction in number of main commercial species. At second half of last century outside PNA procurement of hunting and commercial species often exceeded admissible norms and did not always comply with seasonal restrictions what caused significant worsening of condition of populations of species. Some factors together with these events worsen condition of hunting and commercial species. For hoofed this is competition with live-stock, for all species - general degradation of natural ecosystems due to development of territories, reduction and fragmentation of habitats. As a result of these trends reduction in number of some species of hunting animals takes place.

One of the reasons leading to reduction of fish reserves in natural reservoirs of the country and reduction of catching of valuable species of fish is performance of fishing at quotaless basis and without scientific justification what in most cases causes overutilization of fish resources.

c) *Inefficient resource management* has negative influence on condition of biodiversity. Sustainable use of biological resources is one of main ways for maintenance of biological usefulness, high productivity and resilience of population of species.

State regulation of use of biodiversity facilities is performed through establishment of annual quotas on procurement of wild animals. Quotas are approved by the State Committee of the Republic of Uzbekistan for Ecology and Environmental Protection with agreement of the Academy of Science by decision of Interagency commission for identification of annual quotas on use of objects of biological resources. Establishment of quotas is performed based on requests which are received from nature users taking into account results of regularly performed registration of number and registration of procured/ collected animals and plants. But a lack of information on up-to-date condition of natural populations of the mostly demanded medicinal, food, technical and other plant raw materials of Uzbekistan, as well as hunting species of animals is especially evident in this direction. Exclusions are some species of plants and animals information on which condition is received within the framework of business contracts which are concluded with business entities and related companies.

Analysis of available materials indicated the necessity to perform a program of research with the purpose to identify up-to-date condition of resource species of plants and animals.

According to data of registrations which are conducted on annual basis by nature users on lands of state forest and related hunting farms, condition of main biological resources in Uzbekistan is almost stable (Table 33).

Establishment of quotas on procurement of wild species of animals is the most efficient arrangement which directly influences the level of poaching. But use of separate species of hunting resources is performed unevenly. Not all hunting species are used equally, but annual underutilization of quotas is registered for almost all species. So, established quotas in 2013-2017 for some species were utilized on average by 28-40%, for others - by 70-85% (Table 34).

Table 34. Use of main hunting species of animals at lands of forest and hunting farms (number/quota/used)

Hunting resources	Year	
	2016	2017
Boar	5210 / 180 / 59	5917/180/ 125
Badger	5067/450/ 134	8639/400/ 213
Hare	158803/12000/ 6588	186066/15000/ 12784
Partridge	226468/51000/ 11980	251509/51000/ 26879
Pheasant	196664/6000/ 3297	171725/9770/ 7462

Table 35. Use of quotas on procurement of main hunting species of animals on lands of forests and hunting farms (quota/used)

Year	boar	badger	hare	pheasant	partridge
2013	180/97	450/101	10000/8240	6000/2116	50000/21567
2015	180/54	450/27	10000/4846	6000/1680	51000/9500
2016	180/59	450/134	12000/6588	6000/3297	51000/11980
2017	180/125	400/213	15000/12784	9770/7462	51000/26879

3. Condition of territorial protection has a significant value on conservation and recovery of components of biodiversity. System of PNA of Uzbekistan has restrictions from the point of view of total size, representations, funding. At widening system of PNA in general, areas of natural habitats for recent 20 years reduced as a result of business activity. Major deficiencies of the system are:

a) System unrepresentativeness. System of PNA provides with high level of protection only separate types of natural habitats - mountain forests and high mountains (14% of area of these ecosystems in the country). For other - desert (3.5%) and submontane habitats, bottomland forest (3%) - areas which are present in NPA are insufficient for normal maintenance of reproduction of species and communities of animals which inhabit them.

b) Faunal and floristic unrepresentativeness. Complex protection of biodiversity is performed mainly on the territories of reserves. Reserves provide conservation of only 50% of specie diversity of vertebrate species and around 43% of specie diversity of vertebrate species which are included into the list of rare and threatened species. 72.2 species of fishes, 71.4% of reptiles, around 88% of birds (around 50% of which are protected in plain sanctuaries) 75% of mammals which are included into the list of rare and threatened species live in PNA (of I-IV categories and within the scope of biosphere reserves).

Fragmentation and insufficient area of PNA - areas of most reserves and other PNA are too small for reproduction of resilient population of many species of animals what does not enable providing full protection of species and ecosystems. Moreover, almost all the reserves are situated in border area what influences their operation. Country borders which pass along water divisions fragment single populations of animals what makes protection of these species very difficult. Unavailability of environmental corridors and, as a consequence, fragmentation of habitats of many large species of animals prevents conservation and reproduction of many species.

4. Pollution of natural habitat is defined by income of polluting substances from anthropogenic sources, as well as by physical and geographical conditions of the area. Visually these types of pollution are often not observed but concealed types of pollution are the most dangerous mainly because their influence appears not immediately. Main sources of pollution of habitats are oil and gas industry, chemical and mining industries, agriculture, generation of power and household waste. During recent years with development of private commercial cattle breeding

facts of use of diclofenac (Diclofenac) are noted. Poisoned baiting are also used against fissipedes. The question of influence of these medicines on large birds of prey in Uzbekistan is understudied, but world experience indicates that their use negatively influences on vulture family, including neophron and black vulture. It is necessary to study influence of medicines which are used in veterinary on death rate of scavengers in Uzbekistan.

Cheap nylon nets are often used in fishing which wear very fast and when they are in water they pollute waterside sections of reservoir. This leads not only to death of diving, as well as semiaquatic birds.

5. Influence of invasive alien species. Most of introduced species in fauna of vertebrate species of Uzbekistan are fishes - up to 50% of ichthyofauna. Among terrestrial vertebrate species a share of alien species equals to 1.1-2% - 2 species of birds (0.4% of ornitofauna) and 5 (4.7% theriofauna) species of mammals. Their influence on species of native fauna is small. Among birds alien species include myna *Acridotheres tristis* and collared turtledove *Streptopelia decaocto*, which are synanthropic species which expand its habitat naturally.

Alien species of mammals are: American mink *Mustela vison*, red squirrel *Sciurus vulgaris*, beaver-rat *Ondatra zibethicus*, nutria *Myocastor coypus*, sewer rat *Rattus norvegicus*. American mink occupies a free environmental niche and does not significantly negatively influence on other species. Red squirrel was imported into Tashkent with the purpose of acclimatization in 70-s of last century, but till present is still conserved in small number in some districts of the city. Beaver-rat and nutria are hunting and commercial valuable species which are the result of direct introduction. Distribution and number of nutria are limited by severe winter conditions, and of beaver rat - by procurement. Sewer rat is a synanthropic specie, for recent decades due to anthropogenic transformation of environment - intensive construction of settlements, development of railway, cattle breeding and melioration - increased its habitat significantly. Many-year observations indicate that main facility of passive expansion of sewer rat is various types of transport mainly water and railway. Active expansion in warm season is performed in river valleys, along roads and railways, and in urban conditions - in utility and other underground constructions. As a specie has an epidemiological value, it is necessary to strictly control its number and dynamics of habitat expansion,

6. Climate change is mainly expressed in increase of air temperature and aridization what is particularly indicated in arid areas to which Uzbekistan belongs. Degradation of lands and desertification significantly worsen productive capacity of soil, disturbances integrity and resilience of natural ecosystems what is a serious threat for humanity and total biodiversity. Climate change intensifies processes of degradation of lands and desertification and therefore influences condition of ecosystems and habitats. These processes are especially intensively going on in the Aral Sea Area and submontane regions of the country. Increase of frequency of droughts creates a danger of degradation of water and water-related waterside ecosystems, loss of their biodiversity and productivity. It is obvious, that in the conditions of warming and further aridization of climate these processes will have a more expressed nature.

Beside the above-mentioned direct threats, indirect reasons of loss of biodiversity are the following:

- Lack of awareness of the society and decision-making persons on importance of biodiversity which is a reason for insufficient prioritization of the issues of its conservation and sustainable use at government level;
- Lack of up-to-date scientific information on condition and relevance of biodiversity which is necessary for formation of policy and decision making.
- As a consequence of above-mentioned reasons, insufficient integration of issues of conservation and sustainable use of biodiversity into national policy, strategies, development programs, into plans and programs for development of economy sectors.

PROFILE OF BIODIVERSITY OF WATER ECOSYSTEMS OF UZBEKISTAN

The section is a summary of results of hydrobiological monitoring of priority indicator biohydrocoenoses (BHC) which are used for assessment of water quality and environmental condition of water facilities on observation network of Uzhydromet. For overview of biodiversity of water ecosystems the results of multi-year agency hydrobiological monitoring of river ecosystems which were performed by hydrobiological laboratory of Uzhydromet at the network of observation posts of background and impact levels related correspondingly to run-off formation areas (RFA) and zones of intensive consumption of surface run-off (RICA) are used. The section also contains results of expedition hydrobiological research of transformed water ecosystems of collector and drain network - collectors and Irrigation-waste water lakes which were performed within the framework of environmental grant projects which were funded by international structures: GEF, WB, UNESCO, etc. (www.hydrobiologymonitoring.com).

Concept, methodology, arrangements for performance of national hydrobiological monitoring and awareness raising

Concepts. Hydrobiological monitoring of biodiversity is based on performance of taxonomic analysis of indicator BHC, which specie composition and structure is fully determined by climatic and landscape conditions which developed in drain basins, directly in river corridors or waterside areas of lakes, their hydrobiological and hydromechanical properties. In water courses of the region with mountain type of feeding and increased speed of flow, main BHC are *periphyton* (*overgrowings*) and *zoobenthos*, which abundantly and diversly are presented in littoral of lakes and therefore in state system of hydrobiological monitoring which is performed by Uzhydromet these BHC are defined as priority bioindicators of environmental condition of water facilities of the region.

Methodology. Within the region for a specific BHC it is necessary to divide *total* (total species richness – TSR), *local* (local species richness – LSR) and *observed* community richness (observed community richness – OSR), under which corresponding levels of biodiversity are meant (box 1).

Box 1

Regional (total) species richness is defined by borders of distribution of water BHC of a specific type in the region, and *local species richness* - by borders of landscape facilities which include these BHC (for example water course or water course basin). The list and number of their populations which characterize local and, therefore, regional species richness are as a rule assessed based on the results of system monitoring in the format of long-term consequence of repeated observations. *Observed community richness* is information on biodiversity of indicator BHC at standard monitoring posts in a specific time period of performance of regular monitoring research what enables assessing the availability or unavailability of environmentally valuable time trends at performance of comparative analysis with preceding monitoring information.

Two main methodological approaches are used in the practice of systematic hydrobiological monitoring of Uzhydromet: approach I - calculation of formalized saprobiotic indices and approach II - analysis of availability of indicator species/ taxa which correspond to “high”, “basic” or “poor” environmental quality including invertebrates (insects, worms, crustaceans, mollusk, leeches, ticks, etc) which inhabit *zoobenthos*, as well as bacteria, mushrooms, protozoan, alga, which inhabit *periphyton*.

Both approaches together enable assessing for transit ecosystem of river type a biological class of water quality, invariant environmental condition of indicator BHC which depending on intensity of influence of anthropogenic factors may be in the condition of “environmental progress” or “environmental regress”. They also enable approximate assessing possibility to use water ecosystem for various types of water use and provide other possible ecosystem services (ES). The ration of results of taxonomic analysis of BHC of *periphyton* and *zoobenthos* in the form of formal saprobiotic indices, invariant conditions, biological classes of water quality and

possibility to provide ES for transit ecosystems is reflected in a summary matrix (Table 1) which is used in the system of hydrobiological monitoring of Uzhydromet at stationary and expeditionary network of observation posts. Such analysis enables approaching comprehensive assessment of social and environmental status of a water facility as a possible stage at transition to charged water use. Seven types of condition of water courses which are given in the table present a specific environmental row which reflects different level of environmental well-being and environmental degradation of water courses and, correspondingly, conservation or loss of their environmental and socially useful functions depending on their invariant condition. Totally 5 main invariant conditions of BHC are defined - AB (B), AB, AB-Ab, Ab, ab which based on taxonomic analysis of their biodiversity reflect various level of well-being or ill-being of ecosystems of river type.

Arrangements for performance of monitoring of biodiversity and awareness raising

Multi-year monitoring of quality and environmental condition of river and partially drain waters is performed by Uzhydromet on the network of stationary observation posts in accordance with agency annual program which is a part of SMNE. Transformed water ecosystems are examined mainly within the framework of international grant projects. This is collecting and drain network including collectors themselves and wetlands which are fed by them - irrigation-waste water lakes (IWWL): on the right side of Amydarya - Interriver system of reservoirs including Shegekul, Muinak gulf, Rybachii gulf and some collectors, in Karshi province - lakes Atchinskoye, Sichankul, Dengizkul; in Bukhara province - collectors West Ramitan, Parsankul, lake Solenoye; in Khorezm province - river Amydarya, collector Beruni, lakes Akchakul, Ayazkala, Akchadarya lake-wetland; in Takhtakypyr district of Karakalpakia - lake East Karateren, on the left side of Amydarya - complex of lakes of wetland Sudochoye including lakes Big Sudochoye, Begdulla Oidin, Tyily, Akushpa and feeding them collectors, on the left side of Syrdarya - Aydar-Arnasay system of lakes, etc.

Analysis of *observed* community richness of priority indicator BHC which are controlled at the network of observance posts of Uzhydromet is contained in primary agency materials (protocols of analyses) under result of summary of which formal reflected saprobiotic indices and invariant conditions are calculated. Based on these service materials reductions in number information on the level of pollution and environmental condition of water courses in monitoring posts is issued for interested agencies in the form of environmental bulletins, quarter and annual reference notes. Moreover, in accordance with the Resolution of the Cabinet of Ministers No. 273 dated 23.08.2016 quarter and annual statistic reporting shall be submitted to the State Committee of the Republic of Uzbekistan for Ecology and Environmental Protection based on results of performance of SMNE clauses for 2016-2020 which were assigned to Uzhydromet. Results of taxonomic analysis of BHC are generalized also in different thematic overviews/reports and publications. Results of taxonomic studies of BHC of collectors and IWWL which are reflected in various national and international publications, as well as in service hydrobiological Annual reports enable assessing *observed* community richness of priority indicator BHC, as well as assessing with a specific level of satisfaction environmental condition (well-being) of these types of ecosystems and spacial and time trends (successions) occurring in them in the context of condition of changing geophysical environment.

Facts on biodiversity of priority indicator BHC of water ecosystems: characteristics of condition, trends, factors of change of biodiversity (direct and indirect)

Biodiversity of BHC of water ecosystems of RFA

In mountain water courses related to upstream sections of water collecting basins a notable anthropogenic influence is present and change of their hydrological and hydrobiological characteristics have a natural character which depends mainly on dynamic of climatic factors. This enables considering them as a background in relation to BHC which are situated downstream in submontane and plain belts relating to RICA. Background water courses in simplest terms are conditionally divided into two contrast groups in relation to temperature mode.

The first group includes cold water oligotrophic rivers and springs/ sais of alpine and subalpine belts with various capacity which are characterized with low day water temperature in summer period (10.1-16°C) and comparatively low range of its annual and daily fluctuations. These are rivers and springs of Ugam-Chatkal national park (UChNP) - Chatkal, Pskem, Akbulak, Koksu, Nauvalisai, Mazarsai, Gulkamsai, upstream of rivers Aktashsai, Karakiyasai, Kyzylsu, Sukoksai; cold water rivers and springs of Maidantal section of Chatkal reserve - Tashkesken, Terakli, Zimnansai and Gissar reserve - East and West Aksu, spring Mukhbel; upstream and upstream creeks of river Bashkyzylsai at former section of Chatkal reserve; upstream of river of mountain border of Fergana valley - Chadaksai, Sumsar, Kasansai, Koksy; upstream of rivers of Kashkadarya and Surkhandarya oasis - Aksu, Tankhizidarua, Kyzylsu, Tupalang. Water biota develops weakly or moderately, without sharp seasonal fluctuations of quantitative and qualitative indicators. Therefore, BHC is characterized by relatively simple time structure, i.e. “smoothed” seasonal successions. Values of formal indices change within the following range: BPI and MBI - 9-10 points, IWW - 0.74-1.2 what corresponds to the level of o-saprobity and I class of water quality and environmental condition is also assessed as AB (B).

The second group combines all sections of rivers and springs which are located in *mountain forest belt* with snow and rain type of feeding, which in most cases (except for some permanently cold water rivers and sais) are continuation of considered above water courses in their middle stream, for example : in Ugam-Chatkal biosphere reserve - river Bashkyzylsai and its creeks in middle stream,; in UChNP - middle and downstream of rivers Aktashsai, Karakiyasai, Kyzylsu, Sukoksai, Chimgansai, in the basin of river Akhangaran - middle and downstream of river Dukantsai and mountain - submontane section of river Akhangaran, etc. They are characterized by a higher range of annual and daily fluctuations of water temperature in summer period when daily heating of water mass may reach 18,5-24,7°C. For this group of BHC values of formal indices change within a year within the following range: BPI and MBI - 7-9 points, IWW - 1.02 - 1.59, what corresponds to o- and o-b-mesosaprobic level and mainly to II class of water quality (pure waters). Environmental condition is also assessed as AB (B) but with more comprehensive structure of BC which in this group of BHC are more vulnerable to dynamic of change of climatic factors.

Table 36.

Consolidated rating matrix of biological class of water quality and ecological condition and ecosystem services of water courses under results of taxonomic analysis of priority indicator BHC (periphyton, zoobenthos) in the system of hydrobiological monitoring of Uzhydromet

Formal saprobiotic indices and environmental characteristics							
Values of BPI and MBI	IWW value	Biological class of water quality	Environmental quality	Invariant environmental condition		Structure of BHC	
				Name	Code		
10-9	0.5-1.5	I - Very pure waters	High	Background (reference)	AB (F)	Natural genofond which characterizes natural regional level of condition	
8-7	1.5-1.7	II- Pure waters	High	Background (good)	AB (F)		
6-5	1.7-2.3	III - Moderately polluted waters	Basic	Satisfactory	AB	Change of genofond within the limits of 30-50% compared to regional level	
4.5	1.9-2.4	III-IV - Moderately polluted - polluted waters	Transitional	Transitional (condition of stress)	AB-Ab	Change of genofond within the limits of 50-60% compared to regional level - disturbance of environmental balance	
4	2.0-2.5	IV - Polluted waters	Bad	Unsatisfactory	Ab	Change of genofond within the limits of 60-70% compared to regional level - degradation of environmental structure	
3-2	2.6-3.9	V - Dirty waters	Bad	Bad	Ab	Change of genofond within the limits of 70-80 % compared to regional level - degradation of environmental structure	
1-0	> 4.0	VI - Very dirty waters	Inadmissible	Inadmissible	Ab, ab	Change of genofond within the limits of 80-100 % compared to regional level -deep environmental regress	
Possibility of performance of ecosystem services							
Type of environmental condition	Possible types of water usage					Concentration of biodiversity	Provision of different types of works
	Household	Recreation	Fishery	Industry	Agriculture - irrigation		
Background (reference)	Suitable	Suitable	Suitable	Suitable	Suitable	Yes	Yes
Background (good)	Suitable	Suitable	Suitable	Suitable	Suitable	Yes	Yes
Satisfactory	Suitable with standard purification	Suitable	Suitable	Suitable with standard purification	Suitable	Yes	Yes
Transitional (condition of stress)	Suitable with additional purification	Use is under question	Use is under question	Suitable with additional purification	Suitable	Yes	Yes
Unsatisfactory	Not suitable	Not suitable	Not suitable	Use is under question	Suitable with restrictions	Yes	Use is under question
Bad, inadmissible	Not suitable	Not suitable	Not suitable	Not suitable	Not suitable	No	No

Results of complex analysis of biodiversity of these water courses may be presented in the form of the following summary which reflects their most typical (framework) regional characteristics (box 2).

Box 2

Framework regional characteristics of indicator BHC of water courses in RFA

From 1 (cold water) to 2 (heated) group of water objects a natural gradient of environmental conditions is created in them with decrease of absolute height: summer heating of water mass increases (from 6-16 to 19-26°C) and mineralization of water increases (from 97 to 330 mg/dm³), average concentrations of biogenic elements increase - ammonia, nitrite nitrogen and mineral phosphorus (from 0.001 to 0.009 mg/dm³), dissolved organic matters which are identified by COD (from 4.08 to 7.18 mg/dm³). This logically stimulates natural increase of trophicity level with decrease of absolute height and more abundant and diversified development of periphyton. A quite stable complex of stenecious North Alpine and criophilic species of alga from geni Meridion, *Tetracyclus*, *Ceratoneis*, *Diatoma*, *Cymbella*, *Eucoconeis*, *Didymosphenia*, *Achnanthes* (diatoms), *Prasiola* (green algae), *Hydrurus* (yellow-green algae) usually develop within a year in periphyton of water objects of 1st group.

Stone flies of geni *Capnia*, *Xantoperla*, *Mesonemoura*, larvae of dayflies *Iron montanus*, *Cinygmula joosti*, *Rhitrogena tianschanica*, two-winged from geni *Deuterophlebia*, *Blepharocera*, *Tianschanella*, as well as *Dicranota bimaculata*, caddis flies from geni *Agapetus*, *Mystrophora*, *Dinarthrum*, turbellarians *Polyclis asiatica*, ticks of genus *Protzia* from x-, x-o, o- saprobic organisms are present in the composition of zoobenthos.

In low water mountain springs and rivers of forest area where allochthonic organics come with falling of leaves from waterside tree and bushing vegetation, filamentous red and green algae from geni *Chantransia*, *Haetophora*, *Zygnema*, *Spirogyra*, diatoms from genus *Rhopalodia*, *Epithemia*, *Amphiptera*, *Fragilaria*, *Synedra*, *Cymbella*, develop notably which relate to biospecies with clusters of vegetative detritus.

In these "heated" water courses with change of temperature conditions from spring to summer - autumn a change of composition and structure of zoobenthos happen due to occurrence of eutibiotic species: larvae of dayflies of geni *Baetis*, *Caenis*, caddis flie of genus *Hydropsyche*, bugs of geni *Helmis*, *Stenelmis*, dragon flies, crustaceans, oligochaetes from bloodline *Naididae* etc. Trophic (environmental) structure is as a rule comprehensive, trophic chain are long, branched. Trophic dominants include detritophags - breakers, collectors, filterphags, zoo and phytophags, euryphags. In winter these differences become not so strong to a certain extent due to evening of temperature along the flow what enables to boreal-alpine species colonizing middle and even down stream what is not observed during hydrobiological summer.

Change of environmental conditions from 1st to 2nd group of water facilities is well reflected in change of saprobity level: xeno-oligosaprobic conditions are changed by oligo - and oligo-beta mesosaprobic conditions, and water quality class transits from I (very pure waters) to II class (pure waters). Environmental condition of this gradient is assessed as background - AB (G). Environmental structure of periphyton is 1st group of water facilities is very stable and these water facilities may be taken as global or biospheric background - Bb. Water facilities of 2nd group with a wider variation of environmental structure of periphyton may be taken as regional background - Br.

Such schematic description gives an idea on the most typical (framework) characteristics of indicator BHC within the range of heights from alpine to predimont belts, i.e. is a convenient matrix for monitoring biodiversity and registration of possible trends without appealing to many-specie lists which include several dozens and even hundreds of taxa with ranking lower than genus. *Regional biodiversity* of BHC for water ecosystems of West Tian-Shan looks like the following: *in periphyton* 569 taxa with ranking lower than genus (species, subspecies, forms) relating to 7 species, 97 geni are registered; *in zoobenthos* 478 taxa with ranking lower than genus relating to 204 geni are registered. *Local biodiversity* for water courses of Chatkal reserve includes in total: for *periphyton* 300 taxa with ranking lower than genus relating to 5 species, 71 geni, for *zoobenthos* 176 taxa with ranking lower than genus relating to 124 geni. At some sections of rivers in alpine and forest areas of Maidantal area of the reserve *in periphyton* 37 and 82 taxa and *in zoobenthos* – 34 and 38 taxa are registered correspondingly. At former Bashkizylsai areas of the reserve in upstream and middle stream of the river Bashkizylsai, 59 and 160 taxa with ranking lower than genus in periphyton and 66 and 142 taxa with ranking lower than genus in zoobenthos are registered correspondingly. In upstream and downstream creeks of the river Bashkizylsai, 73 and 183 taxa are registered *in periphyton* and 75 and 118 taxa are registered in *zoobenthos* correspondingly. Observed diversity of taxa with ranking lower

than genus in separate single probes of *periphyton* looks like the following: in alpine and forest areas of Maidantal area of the reserve - 8-40, in upstream and middle stream of river Bashkizylsai - 18-53, in upstream and downstream creeks of the river Bashkizylsai 0 0-83.

At separate background monitoring posts which cover in RFA upstream parts of rivers Ugam Chirchiq, Akhangaran, Akbulak the following is registered: in *periphyton* – from 67 to 183, and in *zoobenthos* – from 41 to 64 taxa with ranking lower than genus. Observed species diversity for these areas in different years equals to *periphyton* - in separate single probes – 32-141 taxa with ranking lower than genus, for *zoobenthos* - in separate single probes - 7-19 taxa with ranking lower than genus.

A special group of BHC is a character of low water sais/ springs which drain slopes of Nurata range in Nurata state reserve (Alychak, Khayatsai, Tykchasai, Ukhumsai, Shokhchinonsai, Fargunsai, Majerumsai, etc. (which may serve as analogues to other low water courses of RFA in the region. Low water content and prevalence of ground feed type of these water courses define their increased vulnerability to change of climatic factors and close dependence of BHC from the condition of adjacent landscapes and anthropogenic factors. Water content of springs significantly changes by seasons and years what causes different modulations of environmental structure of BHC similar to processes which are highlighted above for middle stream of reserve river Bashkizylsai.

Local species diversity of *periphyton* for hydrographic network of the reserve is characterized by the following indicators: 220 taxa with the ranking lower than genus are registered in total, among which diatoms prevail (*Bacillariophyta*) – 168 taxa. Blue and green algae (*Cyanophyta*) account for 32 taxa. Overall species diversity of algae in separate points which are covered with three-year observation changes within the range of 59 - 92, and observed species diversity in separate single probes - within the range of 13 - 63 taxa. In BHC of *zoobenthos* 118 taxa with ranking lower than genus are identified for the period of study, from which 49.2% of taxa are larvae of two-winged order. Chironomids prevail from two-winged - 33% from total number of taxa, 11% of taxa are presented by caddis flies. Dayflies, bugs and aquatic mites account for by 8.5% of total taxonomic diversity. Other species (stone flies, freshwater shrimp, turbellaria, dragon flies, mollusk, bedbugs, oligochaetes, ascorids) account totally for 16% of taxonomic diversity of *zoobenthos*. Overall taxonomic diversity in separate sections for the period of three-year studies changes within the limits of 13-41 taxa.

Most water courses of middle part of the reserve are in the condition of unstable environmental balance what is reflected in the structure of BHC. Biological arrangement operated with “overload” and is directed at processing and mineralization of allochthonic organic material, which incoming volume is comparable with the capacity of water courses themselves. A leading role in maintaining environmental balance and formation of water quality on water courses of Nurata reserve belongs to *zoobenthos* as a main destructor of allochthonic organics which comes from waterside phytocenoses and illegal posts of live-stock, as well as at mass death at the end of vegetation of filamentous and colonial algae of *periphyton*. In such situation it is important from one hand not to admit further increase of organic load on BHC of the reserve, and from the other - to conserve natural grass cover of mountain sledges which regulate intensiveness and evenness of underground spring feed of water courses. Similar situation occurs already in downstream of some mountain rivers of anthropogenic and recreation areas in UChNP, mouths of which are subjected to “hydrological eutrophication” due to excessive outtake of water.

Pilot research relate to the category of background monitoring. Their regular performance is extremely important from the point of view of study of biospheric processes, taking inventory and evaluation of condition of genofond of large landscape complexes and whole regions, study of dynamics of natural processes and their reaction in the form of biological trends which are related to global and local changes of geophysical environment under influence of anthropogenic or natural factors including global climate change.

Analysis of taxonomic summer and autumn phalanges (interyear time structures of BHC) identified an outlined in background water courses dangerous trend of transition of biological class of water quality from II class to transitional II-III class in small rivers of mountain and piedmont areas where boundary of RICA and gradually widening urbanized areas moves to RFA.

In the conditions of conservation of reserve mode, the list of dominant and subdominant species in long-term aspect will be mainly conserved unchanged with some fluctuations which are related to dynamics of climatic factors which for example may influence on water content of rivers and springs and correspondingly on their temperature and hydrobiological regimes.

Biodiversity of BHC in river ecosystems of RICA

In *moderately polluted* water courses of RICA compared to their background areas, linear increase of mineralization of water mass continues downstream (to 368-374 mg/dm³), average concentration of ammonia nitrogen (to 0.021-0.240 mg/dm³), nitrite nitrogen (to 0.006-0.039 mg/dm³), mineral phosphorus (to 0.009-0.020 mg/dm³), average values of COD (to 14.8-16.1 mgO₂/dm³). Water courses of plain belt are characterized by huge range of annual and daily fluctuations of water temperature and increase of its heating in summer - to 21-27°C. Moderate pollution of dissolved organic and mineral biogenic substances performs original “fertilizing” influence which together with heating of water mass facilitates further increase of trophicity level and, at favorable hydrological conditions, to diversified and intensive development of BHC of periphyton and zoobenthos which environmental structure logically changes. Reflection of this process is logical replacement of oligo - and oligo - beta - mesosaprobic taxa by beta-mesosaprobic what complies with transition of water quality to III class (moderately polluted waters). Compared to Br in this group of water facilities average values of BOD₅ is by 2.5 times higher, COD - by 2.1 times, mineralization - by 1.5 times, mineral phosphorus and ammonia nitrogen - by 7.0 times, nitrite and nitrate nitrogen - by 2.0 - 2.7 times. Transformation of taxonomic structure of BHC is more evident in mouth reaches of plain rivers due to increase of mineralization of water mass under influence of collector and draining flows from agricultural irrigated lands. Brackish-water complex of aquatic organisms often develops notably on such plots together with euribiontic species. Water quality (particularly in summer and autumn period of interseasonal hydrological phase) transits from III class of moderately polluted waters to transitional III-IV class, as well as into transitional invariant environmental condition AB-Ab because change of genofond exceeds 50% compared to background.

In background water facilities of 1st and 2nd group change of BHC of periphyton is directed at their natural evolution similar to natural autotrophic succession with output to mature climax condition which takes place in 3rd group of water facilities of plain part of RICA. This state is peculiar to the majority of water facilities of plain belt in RICA and can be taken as the regional background within an anthropogenic zone – Baz. Along rivers from *upstream* to *middle* and then to *downstream (mouth reaches)* a gradient of environmental conditions, i.e. hydrobiological inhomogeneity which correspond to gradually changing abiotic conditions, occurs. Framework regional characteristics of biodiversity of BHC of of periphyton and zoobenthos for moderately polluted water courses taking into account changed conditions along rivers in their plain part are reflected in box 3.

According to results of taxonomic analyses moderately polluted water courses include the following rivers and their sections with good or abundant development of BHC: river Akhangaran (transitional section downstream of Angren city; section from Tuyabuguz reservoir till settlement Soldatskoye, mouth reach); river Chirchiq (section from Chirchiq city to Novomikhailovka village, mouth reach); river Zarafshan (up- and downstream of Samarkand city till division of the river into two creeks - Akdarya and Karadarya); river Aksu (Miraki, tail bay of Khisarak reservoir); river Kashkadarya (tail bay of Chimkurgan reservoir); river Sherabad (Derbent); river Surkhandarya (tail bay of South Surkhan reservoir); river Amudarya (tail bay of

Tuyamuyun reservoir), river Syrdarya (within the limits of Tashkent oasis), channels Salar and Karasu (on sections higher than Tashkent city).

Moderately polluted water courses with weak development of water biota due to increased natural turbidity of their water and unstable loose clayed sand grounds include: river Karadarya (within the limits of Fergana valley); Syrdarya river (within the limits of Fergana valley). Weak development of water biota is also a characteristic of river Surkhandarya (at section Denau city - Shurchi), Kashkadarya river (from Chirakchi till Chimbukurgan reservoir), river Zarafshan (middle and downstream of Navoiy city) where the amount of water according to results of taxonomic analysis of BHC decreases to transitional III-IV class, and environmental invariant condition is qualified as AB-Ab.

Box 3

Framework regional characteristics of indicator BHC of moderately polluted water courses

In upstream section of water courses, directed to submountane part of river basins, *periphyton* is characterized with active metabolism and complex environmental structure what can be seen as satisfactory environmental condition - AB. Overgrowings are as a rule developed abundantly or moderately except for the cases of unfavorable hydrological conditions (increased natural turbidity of water and unstable loose clayed sand bed deposits) which suppress development of BHC. In *periphyton* and zoobenthos of upstream sections several elements of flora and fauna which characteristics of RFA are met. Widely spread o-, o-b-, b- and b-a-mesosaprobic species abundantly and diversely develop mainly in *periphyton*. Among diatoms the species of geni *Achnanthes*, *Cymbella*, *Diatoma*, *Gomphonema*, *Surirella*, *Melosira*, *Synedra*, *Cocconeis*, *Navicula*, *Nitzschia*, *Fragilaria*, *Amphora*, *Caloneis*, *Gyrosigma*, *Rhoicosphenia*, *Frustulia*, *Cymatopleura*, *Epithemia*, develop, some species of which comprise dominant complex. Filamentous green algae from geni *Cladophora*, *Ulothrix*, *Stigeoclonium*, *Spirogyra*, *Rhizoclonium*, *Oedogonium*, *Vaucheria*, *Stigeoclonium* develop abundantly. Protococcus and desmids from geni *Scenedesmus*, *Cosmarium*, as well as blue-green alga from bllodlines *Oscillatoriceae* – species of geni *Oscillatoria*, *Lyngbya*, *Phormidium*, *Spirulina* and plankton forms from oerder *Chroococcales* –species of geni *Dactylococcopsis*, *Microcystis*, *Merismopedia*, *Gloeocapsa*, *Gomphosphaeria*, *Anabaena* develop notably. Organisms from consumer group - amoebas, tardigrades, rotifers, some species of infusoria, flagellates, ascorids, olygocheates, from decomposer group - some species of filamentous and rod-like bacterias are present permanently but with low abundance. .

In zoobenthos together with mountain o-saprobic species of dayflies (*Caenis hissari*, *Baetiss tipposus*), caddis flies (*Dinarthrum reductum*, *Cheumatopsyche lepida*), two-winged from genus *Dicranomyia*, bugs from geni *Helmis*, *Esolus*, chironomids from geni *Orthocladus*, *Cricotopus*, o-c-, c-mesosaprobic eurybiontic species of dayflies from genus *Baetis* (*B. transiliensis*, *B. gracilis*), caddis flies from genus *Hydropsyche* (*H. ornatula*, *H. gracilis*), chironomids from geni *Orthocladus*, *Eukiefferiella*, oligochaetes from bloodline *Naididaedevelop*. Well developed mollusk, freshwater shrimps, larvae of dragon-flies, bedbugs, ticks, leeches, bugs, shrimps appear here.

Nearer to mouth reaches of rivers and with increase of trophicity level North Alpine and mountain x-o-saprobic species of alga almost fully disappear from *periphyton* , at the same time eurybiontic o-, o-b-, b-, b-a-mesosaprobic species of diatoms from geni *Achnanthes*, *Amphora*, *Caloneis*, *Cocconeis*, *Cyclotella*, *Coscinodiscus*, *Cymatopleura*, *Cymbella*, *Diatoma*, *Fragillaria*, *Gomphonema*, *Gyrosigma*, *Melosira*, *Navicula*, *Nitzschia*, *Pinnularia*, *Pleurosigma*, *Rhoicosphenia*, *Stephanodiscus*, *Surirella*, *Synedra*, develop abundantly and diversely, among which separate forms are halophilous species. Blue-green algae are presented by geni *Merismopedia*, *Gomphosphaeria*, *Gloeocapsa*, *Chroococcus*, *Nodularia*, *Anabaena*, *Oscillatoria*, *Phormidium*, *Spirulina*, *Lyngbya*. Green algae are presented by desmid protococcus species from geni *Closterium*, *Cosmarium*, *Dictyosphaerium*, *Pediastrum*, *Scenedesmus*, *Ankistrodesmus*, *Tetraedron*, *Oocystis*, *Chlorella*, *Coelastrum*, *Staurostrum*, as well as filamentous green alga from geni *Spirogyra*, *Cladophora*, *Ulothrix*, *Zygnema*, *Rhizoclonium*, *Enteromorpha*; yellow and green – *Vaucheria* and euglen algae. Organisms from consumer group, which are presented by protozoan, rotifers, chironomids, ascarids and oligochaetes which relate to trophic group of consumers also develop well during a year, among decomposers some species of thread-like and rod-like bacteria with low abundance are met.

Zoobenthos is presented mainly by wide spread species. Mountain species fully eliminate, abundance and diversity of euricetrial and brackish-water species increases in benthos communities despite upstream parts of rivers RICA. Together with dayflies and caddis flies (*Baetis buceratus*, *Baetis* sp. *Stipposus*, *Caenis macrura*, *Hydropsyche gracilis*) mollusk, freshwater shrimps larvae of dragon-flies and two-winged, bedbugs, ticks, leeches, bugs, shrimps, olygochaetes and chironomids appear (*Lymnaea ovata*, *Physa acuta*, *Gammarus lacustris*, *Calopteryx splendens*, *Ischnura pumilio*, *Crocothemis servilia*, *Onychogomphus forcipatus*, *Tubificidae gen.sp.*, *Chaetogaster diaphanous*, *Nais communis*, species of chironomids from geni *Cricotopus*, *Thienemanniella*, *Tanytarsus*, *Polypedium* etc.). In autumn on downstream cross section the following downstream brackish-water species of zoobenthos organisms develop: dayflies *Cloeon simile*, bugs *Bidessus signatellus*, bedbugs *Sigara*

striata, mollusk *Corbicula fluminalis*, chironomids *Cricotopus silvestris* and etc., shrimps *Macrobrachium nipponenseasper*. appear. During a year phytoderitophags, deritophags - gatherers, filterer, optional varmint prevail among trophic dominants. Food chains are shortened. These changes in structure of zoobenthos show increase of role of grazing way of utilization of autochthonous and allochthonous organic matter in ecosystem and increase of trophicity compared with average plain sections of rivers. On such sections associations of macrophytes develop notably: curly-leaved pondweed *Potamogeton crispus*, water milfoil *Myriophyllum spicatum*, hornweed *Ceratophyllum demersum*, water cress *Nasturtium fontanum*, moss *Fontinalis sp.* and water fern *Azolla caroliniana*, floating moss *Salvinia natans*.

In mouth reaches of rivers periphyton as a rule develops well in summer and autumn and is presented by eurybiontic b-, b-a-, a-mesosaprobic sweet water, as well as brackish water species of diatoms from geni *Achnanthes*, *Amphora*, *Cyclotella*, *Cymatopleura*, *Caloneis*, *Cocconeis*, *Cymatopleura*, *Cymbella*, *Diatoma*, *Fragilaria*, *Gomphonema*, *Melosira*, *Navicula*, *Nitzschia*, *Pinnularia*, *Rhoicosphenia*, *Synedra*, *Anomoeoneis*, *Hantzschia*, *Amphiprora*, *Bacillaria*, *Gyrosigma*, *Pleurosigma*. Blue - green algae moderately develop in summer - autumn period and are presented by geni *Merismopedia*, *Microcystis*, *Gloeocapsa*, *Oscillatoria*, *Phormidium*, *Lyngbya*. Green demised and protococcus algae from geni *Pediastrum*, *Closterium*, *Scenedesmus*, *Cosmarium* also develop moderately during this period. Filamentous green alga develops well and are mainly presented by *Cladophora glomerata*, *Spirogyra sp.*, *Oedogonium capillarum*, *Hydrodictyon reticulatum* and *Enteromorpha intestinalis*, the latter from which prefer mineralized waters. Organisms from the group of consumers and decomposers are permanently available in overgrowings with low abundance and are presented by geni *Bodo*, *Amoeba*, *Vorticella*, *Epistylis*, *Paramecium*, *Aspidisca*, *Chilodonella*, *Stylonychia*, *Loxodes*, *Uronema*, *Rotaria*, *Colurella*, *Nematoda*, *Oligochaeta*, *Flagellata*, *Sphaerotilus*, *Pelonema* etc.

Zoobenthos is also presented by widely spread euricatrial species of dayflies, mollusk, caddis flies, larvae of two-winged and dragon-flies, fresh water shrimps, shrimps, bugs, oligochaetes, chironomids which are specific for middle river section. But in mouth reaches specific ratio of a-, a-p-, p-saprobic species of dayflies *Caenis macrura*, *Baetis buceratus*, caddis flies *Hydropsyche gracilis*, mollusk *Lymnaea sp.*, *Physa acuta*, *Corbicula fluminalis*, leeches *Herpobdella octoculata*, shrimps *Macrobrachium nipponenseasper*, oligochaetes from bloodline *Tubificidae*, chironomids *Cricotopus bicinctus* and *Cricotopus silvestris* increases. Compared to previous middle sections, brackish-water species of organisms develop more notably - brackish-water species of dayflies *Cloeon simile*, mollusk *Corbicula fluminalis*, shrimps *Macrobrachium nipponenseasper*, larvae of chironomids *Cricotopus silvestris*, etc., what indicates increased level of mineralization

In mouth reaches macrophytes develop moderately or well. Edificators are curly-leaved pondweed *Potamogeton crispus*, fennel-leaved pondweed *Potamogeton pectinatus*, water milfoil *Myriophyllum spicatum*, water ferns *Azolla caroliniana*, *Salvinia natans*, hornweed *Ceratophyllum demersum*, watercress *Nasturtium fontanum*.

In upstream and middle sections of plain river depending from hydrological situation and season, the quality by combination of hydrobiological characteristics may change from transitional II-III to III class. Value of BPI - from 5-7 to 4-6 and MBI - from 5-7 to 5-6 points, IWW - from 1.52-1.65 to 1.70-2.11, invariant environmental condition - AB.

In mouth reaches water quality may change from III to transitional III-IV class (in separate cases to IV class). Value of BPI change from 4-5 to 4 and MBI - from 5-6 to 4-6 points, IWW - 2.04 - 2.28, invariant environmental condition changes from AB to AB-ab.

Observed species diversity for upstream and middle sections of river. *in zoobenthos* in different years 20-66, and in separate single probes - 5 - 33 taxa of the range lower than genus; in *periphyton* - in separate single probes - 36 - 181 taxa of the range lower than genus. Observed species diversity for mouth reaches: *in zoobenthos* in different years 31-74, and in separate single probes - 5 - 34 taxa of the range lower than genus; in *periphyton* - in separate single probes - 30-167 taxa of the range lower than genus.

In rivers with weak development of water biota due to increased turbidity of their water and unstable loose clayed sand grounds during flood period BHC of *periphyton* and *zoobenthos* are not formed, in summer - autumn single probes observed biodiversity for *periphyton* is 10 - 48, for *zoobenthos* - 2-14 taxa with the ranking lower than genus.

Description of priority BHC of plain water courses for RICA in assumed environmental row in accordance with developed environmental scheme is completed with water facilities of plain belt of anthropogenic area with strongly changed ecosystems. This is Karasu channel (downstream of Tashkent city), Salar channel (downstream of Tashkent city), river Kalgan - Chirchik (downstream of Yangiyul city), collector Siab - mouth (downstream of Samarkand city)

which in various periods of their monitoring at supervision network of Uzhydromet were qualified according to results of taxonomic analysis of priority indicator BHC as *polluted*, *dirty* and *very dirty* water courses.

Framework regional characteristics of biodiversity of BHC of periphyton and zoobenthos for their water courses are schematically reflected in box 4.

Box 4

Framework regional characteristics of biodiversity of indicator BHC in RICA which are qualified as *polluted*, *dirty* and *very dirty*

Polluted water sources exercise increased stress compared to Baz caused by mixed household and particularly industrial biogenic pollution - mineral compounds of nitrogen and phosphorus. Their average concentrations exceed Br by 20-171 times, and Baz - by 5.5-7.2 times.

In *periphyton* a specific complex of heterotrophic, but mainly autotrophic organisms develop, among which the most prevailing are filamentous blue and green algae from bloodline *Oscillatoriaceae*, green filamentous, protococcus and Volvocales algae from geni *Stigeoclonium*, *Cladophora*, *Oedogonium*, *Scenedesmus*, *Chlamidomonas*, diatoms with expressed domination of algae from geni *Navicula* and *Nitzschia* and comparatively weak development of diatoms from geni *Achnanthes*, *Cymbella*. Diatoms - indicators of dirty waters *Navicula mutica* and *Nitzschia palea* permanently dominates. From consumers infusorias develop diversely, from decomposers - thread bacterium *Sphoerotilus dichotomus* constantly dominates. In *zoobenthos* oligochaete complex which is presented by bloodline *Tubificidae* prevails. Subordinate role is played by mollusk from geni *Pisidium*, *Physa*, chironomids *Cricotopus bicincrus*. Alfa-betamezasaprobic conditions prevail, processes of eutrophication and secondary pollution flow intensively, water quality complies with IV class (polluted waters), and environmental condition is qualified as transitional - unstable (AB-Ab) or unsatisfactory (Ab) with expressed transformation of environmental structure and degradation of initial genofond of BHC compared to Baz. Values of IWW - 2.32-3.12, BPI and MBI - 3.5-4. Observed specie diversity in separate single probes of *periphyton* - 12-64, *zoobenthos* - 3-17 taxa with ranking lower than genus. Macrophytes are presented by fennel-leaved pondweed (*Potamogeton pectinatus*) and meakin (*Myriophyllum spicatum*).

The strongest degradation of BHC is seen in *dirty* and *very dirty* water courses, where their *strong organic* or *toxic* pollution takes place.

In the first case content of dissolved organic substances increases compared to Br by 12-79 times, and compared to Baz - by 5-30 times correspondingly, concentration of mineral phosphorous - by 164 -300 times and 23-41 times. And concentration of various forms of mineral nitrogen - by 13-1405 and 5-194 times. Change of BHC of periphyton goes by the type of heterotrophic succession at which autotrophic component is suppressed and processes of mineralization and decay of excessive allochtonic organics prevail with the help of heterotrophic organisms from the group of consumers and decomposers which have high metabolic activity and in the case of strong organic pollution occupy all possible niches and substrates in the reservoir. In *periphyton* from producers depending on situation species of the following geni are found *Navicula*, *Nitzschia*, *Chlamidomonas*, *Stigeoclonium*. Among them indicator of ammonia pollution - *Navicula mutica* and a-mezosaprobic *Nitzschia palea* reach marked development. From consumers various sitting infusoria from geni *Epistylis*, *Vorticella* develop abundantly, from decomposers - zoogaleal, rodlike, coccoid, filamentary and other forms of bacteria. In *zoobenthos* polisaprobic species of oligochaetes of bloodline *Tubificidae* and chironomids *Chironomus f.l.thummi* mainly develop.

From macrophytes in *dirty* sections the following species with small qualitative development are met: small duckweed (*Lemna minor*), fennel-leaved pondweed (*Potamogeton pectinatus*) and morass-weed (*Ceratophyllum demersum*).

Depending on intensity of organic load on ecosystem the values of indices BPI and MBI change from 3 to 1 point, alfamezo - or polisaprobic conditions prevail, water quality complies with V class (dirty waters) or VI (very dirty waters). Values of IWW 2.52-3.5. Observed specie diversity in separate single probes of *periphyton* - is 17-57, *zoobenthos* is 5-12 taxa of the ranking lower than genus. Environmental condition is qualified as poor or inadmissible with expressed degradation of environmental structure and initial genofond of BHC and is indicated as Ab.

In second case at toxic stress there is a full degradation of BHC, suppression of all functional groups of organisms, i.e. simultaneous metabolic and environmental regress - ab. Indices of BPI and MBI take zero values, and environmental condition is qualified as absolutely inadmissible.

Biodiversity of BHC in transformed water ecosystems of RICA

The concerned category of water ecosystems includes facilities of collector and drainage hydrographical network which scale is not less that natural hydrographical network in plain part of the basin of the Aral Sea. These are collectors which drain irrigated agricultural lands and

Irrigation-waste water lakes (IWWL) which are recipients of collector and drainage water (CDW) which are also called “wetlands”.

Distinguishing hydrochemical characteristic of these ecosystems is a higher content of salts (mineralization) in their waters compared to other plain water facilities of RICA. Based on performed ranking three groups of water facilities with different qualitative characteristics of biodiversity are identified among them: **a) collectors; b) IWWL with different level of running** with increased mineralization of water and **c) non-running IWWL** with high mineralization of water mass - collectors of collector and drainage run-off.

Group a) includes: *collectors* of “old area” of irrigation from Golodnaya (Foodless) heath in the basin of Syrdarya (GPK-S, Shuruzyak, East, North, Border, Akbula, Central Golodnaya heath Channel, Gulzar), collectors of “new area” of irrigation in downstream of Amydarya (KKS-Sudochoye, Main Karakul, Farob-1 and 2, South, Central - Bukhara, Parsankul, West Ramitan, Beruni) with later period of commissioning.

Average values of mineralization of water in collectors of old area of irrigation are 1.7-3.7 mg/dm³, of new area of irrigation - 2.5-7.1 mg/dm³. Value of IWW change within the range of 1.92-2.40. Class of water quality according to results of taxonomic analysis of indicator BHC mainly complies with transitional III-IV class, in separate situations - IC class, and environmental condition in accordance with water quality corresponds mainly to AB-Ab (transitional) and more seldom - Ab (unsatisfactory). Most of collectors are favorable environment for development of BHC except for seasons with increased turbidity which suppresses their development. During favorable hydrological phases observed biodiversity in separate single probes of overflowings at higher water vegetation including calamiform associations equals to on average 49-69 taxa with ranking lower than genus. Perithyton develops abundantly on the surface of higher vegetation, as well as on clusters of green filamentous alga and in the form of films at waterside sections of the bottom. Content of genofond of perithynon is characterized by the availability of regular species which characterize Baz, as well as halophilous brackish and fresh-water forms which in many cases dominate by diversity and quantitative development. Mane freshwater river diatoms fall out of the composition of perithyton, but species from geni *Navicula*, *Mastogloia*, *Amphora*, *Synedra*, *Nitzschia*, *Campylodiscus*, *Pleurosira*, *Diploneis*, *Bacillaria*, *Tropidoneis*, which are typical for salted waters and which in various combinations present a leading complex of species. It is possible to note significant development of various combinations of species of algae which are specific for eutrophic water in perithyton. Among this environmental group species from geni *Fragilaria*, *Rhoicosphenia*, *Rhopalodia*, *Synedra ulna* and its variants develop notably. Dominant complex includes among others such brackish-water and halophilous species as *Pleurosira laevis*, *Nitzschia obtusa*, *N. Obtusa* var. *scalpelliformis*, *N. filiformis*, *N. sigmoidea*, *N. tryblionella* var. *levidensis*, *N. lorensiana*, *N. palea*, *Navicula spicula*, *N. protracta* var. *subcapitata*, *Rhoicosphenia curvata*, *Bacillaria paradoxa*, *Caloneis amphisbaena*, *Coscinodiscus lacustris*, *Amphiprora paludosa*, *Campylodiscus aralensis*, *C. clypeus* var. *bicostatus*, *Synedra pulchella* var. *naviculaceae*, *S. tabulata* var. *acuminata*, *S. tabulata* var. *parva*, *S. tabulata* var. *fasciculata* (diatoms), filamentous alga *Enteromorpha intesninalis*, *E. pilifera*, *Cladophora fracta* var. *normalis*, as well as protococcus algae *Protococcales* (green algae), blue and green algae (*Cyanophyta*), particularly such taxa as *Anabaenaceae*, *Oscillatoriaceae*, *Chroococcales* etc.

Local biodiversity of BHC of *perithyton* for collectors of Golodnaya (Foodless) heath equals to 206, for collectors of downstream of Amudarya - for 238 taxa with ranking lower than genus.

Zoobenthos in collectors of *old irrigation area* develops moderately and includes mainly representatives of phytophilous (phytal) and brackish-water fauna. 9-30 species are met in benthal and phytal in separate probes. Dayflies - *Ephemeroptera* (*Baetis buceratus*, *Caenis macrura*, *Cloeon* sp), chironomids – *Chironomidae* (*Chironomus thummi*, *Cricotopus biconctus*, *Paratanitarsus quintuplex*, *Procladius ferrugineus*), two-winged – *Diptera* (*Simulium* sp., *Simulidae* gen.sp.), mollusks – *Mollusca* (*Physa fontinalis*), *Thienimaniella* sp., oligochaetes –

Oligochaeta (*Nais elinguis*, *Tubificidae* gen.sp.) caddis flies – *Trichoptera* (*Ecnomus tenellus*, *Hydropsyche gracilis*, *Hydroptila* sp.), bugs – *Coleoptera* (*Bidessus signatellus*) dominate in zoobenthos in various combinations. Beside them with lower abundance the representatives of phytophilous fauna are met – larvae of dragon flies, crustaceans, bedbugs.

Among macrophytes the following are noted: pondweeds (*Potamogeton pectinatus*, *P. crispus*), hornweed (*Ceratophyllum demersum*), which associations occupy 5-50% of projective cover of waterside bottom at favorable conditions or are not visually identified in the periods of high water turbidity

Collectors of new irrigation ares in downstream of Amudarya (in Bukhara province) are characterized with weak quantitative and qualitative development of benthofauna. 2-8 species are met in probes of soils. Presence of chironomids – *Chironomidae* (*Polypedilum bicrenatum*, *P. scalaenum*, *Chironomus cingulatus*, *Cryptotopus sylvestris*, *Tanytarsus* sp., *Rheocricotopus fuscipes*), gammarids – *Gammaridae* (*Gammarus lacustris*), mollusks – *Mollusca* (*Corbicula fluminalis*, *Physa fontinalis*), oligochaetes – *Oligochaeta* (*Limnodrilus* sp., *Tubificidae* gen. sp.) is registered.

This data gives some understanding on trends of changes in BHC of periphyton and zoobenthos in salted areas of hydrographical network in the region for such water ecosystems as collectors of old and new irrigation area compared to river ecosystems of RICA.

Group b) includes the following IWWL – in the basin of Syrdarya – lakes of Aydar – Arnasay system, in the basin of Amydarya – Interriver reservoirs (Shegekul, Muinak gulf, Sarbas), running lakes of wetland Sudochye (Karateren, Begdulla Aidin, Bid Sudochye), Karateren (east), Akpetki, Kattashor, Akcjakul, Bodtakul, Karakyr (west, north, east), Solenoye, Sichankul, Akchadarya lake – wetland. Range of average values of mineralization of water mass in them equals to 3.48-10.4 g/dm³, i.e. exceeds Br by 13.9 – 41.6 times, and Baz – by 9.3 – 27.9 times. Values of IWW change within the range of 1.85 – 2.35.

In periphyton in diatom complex particularly in spring period fresh and brackish algae from geni *Cyclotella* (*C. meneghiniana*, *C. kuetzingiana* var. *planetophora*), *Fragilaria* (*F. intermedia*, *Fr. develop* notably. *Construen* var. *venter*, *Fr. brevistriata*), *Diatoma* (*Delongatum*, *D. elongatum* var. *tenue*), *Achnanthes* (*A. minutissima*, *A. affinis*), *Synedra* (*S. ulna* and its multiple variants), *Navicula* (*N. Cryptocephala* with its variants, *N. oblonga*, *N. radiosa*, *N. tuscula*), *Cymbella* (*C. turgida*, *C. cymbiformis*, *C. microcephala*, *C. affinis*), *Gomphonema* (*G. olivaceum*, *G. olivaceum* var. *calcareum*), *Mastogloia* (*M. Smithii*, *M. Smithii* var. *lacustris* and var. *amphicephala*), many of which simultaneously characterize eutrophic reservoirs, as well as species which characterize biotypes with clusters of vegetative detritus (*Rhopalodia gibba*, *Rh. gibba* var. *ventricosa*, species from genus *Epithemia*). Halophilous species such as *Synedra tabulata*, *S. tabulata* var. *parva*, *S. pulchella*, *Mastogloia Braunii*, *Navicula protracta* var. *subcapitata*, *Nitzschia obtusa*, *N. closterium*, *N. spicula*, *Amphora coffeaeformis*, *Campylodiscus clypeus* var. *bicostatus* etc. are present. At the same time, processes of eutrophication pass actively what is indicated by development in dominant complex of blue and green algae, particularly such reference taxa as *Oscillatoriaceae*, *Chroococcales*, *Protococcales*, as well as abundant development of green filamentous algae from geni *Spirogyra*, *Mougeotia*, *Cladophora*. In lakes with well developed littoral area on-going processes of accumulation of silt and formation of detritus are related mainly with abundant development of cane formations at areas of lakes which simultaneously are favorable substrate for development of strong overgrowings, which actively produce initial organic substance.

Zoobenthos (benthos plus phythos) is usually characterized by fresh and brackish-water complex with elements of Baz, including dayflies from geni *Caenis*, *Cloeon*, caddis flies from geni *Ecnomus*, *Oecetis*, ticks from geni *Nepa*, *Sigara*, mollusks from geni *Lymnaea*, *Physa*, *Anisus*, mysids from geni *Paramysis* and *Dikerogammarus*, oligochaetes from bloodline *Naididae*. Simultaneous diverse development of fresh and brackish-water pelagial and scrub species of mollusks – *Mollusca* (*Lymnaea ovata*, *Physa acuta*), dayflies – *Ephemeroptera* (*Caenis macrura*, *Cloeon simile*), caddis flies – *Trichoptera* (*Ecnomus tenellus*, *Oecetis ochracea*,

Hydroptila cf. femoralis, *Setodes* sp), bedbugs - *Heteroptera* (*Ranata linearis*, *Sigara limitata*), bugs - *Coleoptera* (*Berosus* sp., *Enochrus* sp., *Aulonogyrus concinnus*, *A. striatus*, *Laccophilus* sp.), oligochaetes - *Oligochaeta* (*Chaetogaster diaphanus*, *Limnodrilus hoffmeisteri*, *Nais berbata*, *N. elinguis*), two-winged *Diptera* (*Probezzia seminigra*, *Ephydra* sp., *Tabanus* sp., *Culex modestus*), chironomids - *Chironomidae* (*Cladotanytarsus* sp., *Cryptocladopelma viridula*, *Cricotopus silvestris*, *Leptochironomus tener*, *Paratanytarsus confusus*, *P. quintuplex*, *Polypedilum bicrenatum*, *P. nubeculosum*, *P. pedestre*, *Procladius ferrugineus*, *Tanipus pumilis*), crustaceans *Crustaceae* (*Paramysis lacustris*, *P. intermedia*, *Palaemon* sp., *Gammarus lacustris*, *Dikerogammarus aralensis*), dragon flies *Odonata* (*Ichnura pumilio*, *Anax imperator*, *Enallagma cyathigerum*) is noted, Trophical structure in general is characterized with prevailing development of scrub form and phyto-detritophages, vultures at general branching of trophical network.

Local specie diversity of BHC of perithyton in the basin of Syrdarya for Aydar-Arnasay system of lakes is assessed in 276, and in background lake on left side of Syrdarya - in 136 taxa with ranking lower than genus. Local specie diversity in the basin of Amudarya is assessed for Interriver lakes (Mezhdurechye, Muinak gulf, Sarbas) in 370, for running lakes of wetland Sudoche - in 298, for non-running lakes of wetland Sudoche - in 201, for IWWL of right side of Amydarya with salinization up to 5 g/l - in 226, for IWWL of right side of Amydarya with salinization up to 12-14 g/l - in 233, IWWL of right side of Amydarya with salinization up to 18-22 g/l in 112, and in background Tyuyamuyan reservoir - In 186 taxa with ranking lower than genus.

In associations of macrophytes charophytes (*Chara tomentosa*, *Ch. strigosa*, *Ch. vulgaris*), pondweeds (fennel-leaved *Potamogeton pectinatus*, curly-leaved *P. crispus*, clasping-leaved *P. perfoliatus*), morass-weed (*Ceratophyllum demersum*), sea naiad (*Najas marina*), meakin (*Myriophyllum spicatum*) are presented in various combinations.

In dry years as a result of worsening of hydrological regime (reduction of the level of flowage and level of water) and hydrochemical regime (increase of water mineralization) the following is indicated: decrease of biocenotic diversity and loss of bioproductivity of biocoenoses of perithyton and zoobenthos or their full degradation, what was registered in lake of wetland Sudoche in 2000-2001, where monitoring research were performed at that time. Within this period in all lakes of the wetland a catastrophic transformation of specie composition and structure of BHC is noted which is expressed in replacement of fresh and brackish-water flora and fauna by brackish and sea water, at which some specific and mass species of plant and animal organisms were lost and replaced by typically sea forms. During this period due to cease of flowage in the lake Karateren suchs species of diatoms as *Licmophora abbreviata*, *L. abbreviata f. rostrata*, *Fragilaria oceanica*, *Navicula directa*, *Rhopalodia gibberula* appeared. Starting from July 2000 as a result of increase of mineralization of water in drained lakes such species as dayflies *Cloeon dipterum*, *Caenis macrura*, caddis flies *Ecnomus tenellus*, mollusk from geni *Lymnaea*, *Physa*, *Anisus* fully disappeared from the composition of their bethbenthofauna. So in the conditions of non-stability related to progressive shallowing and increase of salinization of lakes, a catastrophic transformation (degradation) of specie composition and structure of BHC of perithyton and zoobenthos took place.

Group c) includes the following IWWL - lakes of Sardobin degradation of Golodnaya (Foodless) heath, non-running lakes of wetland Sudoche (Taily, Akushpa), lakes Dengizkul, Ayazkala (east stagnant reach). Average values of mineralization of water in various water facilities of this group may reach 48.5 g/dm³.

In non-running lakes of wetland Sudoche - Taily and Akushpa in conditionally satisfactory period the range of average values of mineralization of water mass was 15.0-48.5 g/dm³, i.e. exceeded Br by 60 - 194 times, and Baz - by 40 - 130 times. Before period of drought in perithyton a complex of brackish- water and sea species dominated including *Pleurosira laevis*, *Synedra pulchella*, *S. tabulata* with its many variants, *Achnanthes brevipes*, *A. brevipes* var. *intermedia*, *Navicula peregrina* var. *lanceolata*, *N. kolbei*, *N. halophila*, *Mastogloia*

Braunii, *M. pumila*, *M. Lanceolata*, *Rhopalodia gibberula*, *Plerosigma angulatum*, *Amphora obtusa*, *A. coffeaeformis* and its variants, *Amphiprora paludosa*, *Nitzschia obtusa* (*Bacillariophyta*) and others. Abundant development of green filamentous, protococcus and desmid algae, films of blue and green algae from bloodline *Oscillatoriaceae*, plankton blue and green algae from bloodline *Chroococcales*, indicate intensive processes of eutrophication and secondary pollution which pass in ecosystems, and constant presence of littoral area of diatoms from specie *Amphipleura*, *Rhopalodia*, *Epithemia* and others indicate intensive process of formation of detritus. Before the period of drought in zoobenthos of lakes Taily and Akushpa brackish-water and sea complex presented by mollusks *Caspiahydrobia conica*, choronomids *Chironomus salinarius*, polychaete *Nereis diversicolor* with high quantitative indicators of their development prevailed.

During drought in 2001 in lakes of Taily and Akushpa average values of mineralization increased to 43,1-82,8 g/dm³ (maximum 121 g/dm³), i.e. exceeded Br by 172-331 times, and Baz - by 116 – 222 times. In BHC of perithyton new typically sea species of diatoms such as *Grammotophora marina*, *Gr. oceanica*, *Licmophora abbreviata*, *Mastogloia pusilla*, *M. pusilla* var. *linearis*, *Diploneis didyma*, *Pleurosigma angulatum* var. *finmarchicum*, *Navicula directa*, started to develop notably, and polychaetes, mollusk and chironomids, which earlier presented a specific dominant complex of organisms disappear from the composition of zoobenthos. In zoobenthos only two species survived in this crisis period: From two-winged – *Ephydra* sp., from chironomids – *Chironomus salinarius*.

So, perithyton of this group of water facilities is characterized by active metabolism of autotrophic component what is reflected in good and often abundant development of overgrowths and simultaneous well expressed degradation of initial regional genofond what is reflected in replacement of oligotrophic - mezotrophic freshwater algal flora by autotrophic brackish-water algal flora. Water quality corresponds to IV class of polluted waters, beta-alfamexosaprobic conditions prevail, environmental condition is unsatisfactory - Ab.

Due to increased solar radiation eutrophication of IWWL in our region has no so expressed negative effects as for example for European limnic systems where intensive water blooming often leads to summer suffocations of water fauna. In our case eutrophication of IWWL may be seen in general as a positive factor which stimulates their natural biological productivity. In practice, fishing was prosperous in almost all studied IWWL and it worsens during last years. Obviously this is caused by a complex of different reasons among which the most important at our view are: Intensive overgrowing with water and moor vegetation and shallowing of the most part of areas of lakes (for example, lake Solenoye, east reach of lake Ayazkala); lack of supporting measures on stocking lakes during last years (for example lake Akchakul, Karateren - east); intensive growth of the level of salinization which for example in lake Dengizkul, in east reach of lake Ayazkala, in lake Akushpa exceeded the threshold where normal generation of ichthyofauna ceases up to full suppression of freshwater productive fishes. Interconnection of specified processes and characteristics of taxonomic biodiversity of indicator BHC in IWWL is obvious. On one hand, this defines the important role of BHC of perithyton and zoobenthos in formation of biological products, on the other - their bioindicator value in environmental monitoring of IWWL which allows identification of main trends in their successions.

- It is possible to suppose that at maintenance of existing external conditions in lakes which overgrew with low of moderate number of water and moor vegetation their further overgrowing and in parallel a developing quantitative change of overgrows will take place, i.e. active processes of primary production which happen at present.
- At possible approaching of non-running lakes to a critical level of salinization and logical suppression of water and moor vegetation, a leading biological role will be played by BHC of perithyton where separate mezogalobic species of alga which characterize salted and sea waters will develop. Preserving such a trend for example in east reach of lake Ayazkala, in lake Dengizkul and other drainless accumulators of collector and drainage run-off may lead

to environmental, as well as to metabolic regress (invariant condition - ab) when active biolife will cease in them.

- Lakes which intensively overgrown with cane, for example Solenoye and Ayazkala (east reach) as a result of their catastrophic shallowing which will intensify with course of time, will obviously fully lose their fishing value and transform into biologically diverse wetlands which will constantly increase their area.

Possibility to use information on taxonomic diversity and structure of BHC of periphyton and zoobenthos for assessment of environmentally admissible (conditionally satisfactory) condition of IWWL

Ecology of IWWL to a great extent depends on forming salt balance. Important gradations of mineralization in this regard are 1 g/l and 10 g/l. In first case the direction of environmental processes depends mainly on biogenic (nutritional) substances which define initial biological productivity and trophicity level of water ecosystem and at unbalanced trophical network may cause accelerated eutrophication of a wetland. In second case reproduction of all and commercial freshwater reproductive fishes which inhabit reservoirs with mineralization up to 12 g/l ceases, reduction or full loss of their and commercial capacity happens. Due to the specified individual peculiarities specific biological complexes of organisms formed in IWWL, which on the example of BHC of periphyton and zoobenthos may consider as indicators of their environmental condition.

Complexes of indicator taxa for periphyton and zoobenthos, as well as integral structural indicators of biodiversity of these BHC were identified during monitoring, which may have negative and positive trends which correspond to environmental regress or environmental progress of IWWL what have an important methodological value for assessment of their social and environmental status and ability to provide ES. Taxonomic structure of BHC is very vulnerable to change of hydrological and hydrochemical situation in lake ecosystems where at low or moderate mineralization of water freshwater species of organisms prevail or in the case of moderate mineralization, an approximate parity in development of freshwater and brackish-water components is observed, availability in BHC of various trophic and environmental groups of organisms indicate the availability in the system of specific environmental niches which usually characterizes the condition of environmental progress and satisfactory life condition of ichthyofauna. Such characteristic at unavailability of clear methodology of division of IWWL ecosystems into *satisfactory (with satisfactory environmental condition)* and *unsatisfactory (with unsatisfactory environmental condition)*, may serve to its simplest extent as an indicator attribute of such an assessment. As a working framework version for indicator assessment of environmentally admissible condition of IWWL ecosystems which provides conservation of main ES the following characteristics of taxonomic composition and structure of BHC of periphyton and zoobenthos are suggested (box 5):

Box 5

Framework scheme of assessment of admissible (conditionally satisfactory) condition of IWWL by characteristics of taxonomic composition and structure of BHC of periphyton and zoobenthos

Specie diversity and taxonomic structure of periphyton:

High specie and taxonomic diversity on the level of species and geni at domination of freshwater and fresh and brackish-water diatoms from geni *Fragilaria*, *Diatoma*, *Achnanthes*, *Cocconeis*, *Rchoicosphenia*, *Synedra*, *Cymbella*, *Gomphonena*, *Navicula* at moderate development of representatives from geni *Epithemia*, *Rhopalodia* and weak development or absence of diatoms from geni *Mastogloia*, *Nitzschia*, *Amphora*, *Pleurosigma*, *Pleurosira*, *Diploneis*, *Amphiprora*.

Taxonomic structure of zoobenthos:

Simultaneous diverse development of fresh and brackish-water pelagial and scrub species of mollusks (*Mollusca*), day-flies (*Ephemeroptera*), caddis flies (*Trichoptera*), ticks (*Heteroptera*), bugs (*Coleoptera*), oligochaetes (*Oligochaeta*), two-winged (*Diptera*), chironomids (*Chironomidae*), mysids (*Mysidaceae*).

Trophical structure of zoobenthos:

Predominant development of scrub and phyto - detritophages, notable development of vultures at general branching

of trophical network.

In associations of macrophytes the following edificators are presented in various combinations: meakin (*Myriophyllum spicatum*), morass-weed (*Ceratophyllum demersum*), charophytes (*Chara tomentosa*, *Ch. strigosa*, *Ch. vulgaris*), pondweeds (fennel-leaved – *Potamogeton pectinatus*, curly-leaved – *P. crispus*, clasping-leaved – *P. perfoliatus*). Low abundance may be noted for sea naiad (*Najas marina*), sea rupie (*Ruppia maritima*) and filiform pondweed (*Potamogeton pusillus*), which reach notable development in IWWL with high content of salts in water.

Such taxonomic and trophical structure of indicator BHC indicates a relatively high capacity of IWWL on performance of ES such as recreation, fishing, concentration of biodiversity, provision of various types of procurement, agricultural irrigation, etc.

Revealed trends as well as approved monitoring indicators and characteristics of biodiversity of indicator BHC may be used for other wetlands of the region, including natural lakes, IWWL and collectors, which a necessity to assess or make prognosis of their condition arises due to planned reconstruction of hydrographical network or due to their supposed business development and management.

BIODIVERSITY OF UZBEKISTAN IN CONDITIONS OF CLIMATE CHANGE

According to the Report of Second Special Technical Expert Group on biodiversity and climate change (www.cbd.int/doc/publications/ahteg-brochure-ru.pdf.) “Establishment of connection between biodiversity and mitigation and adaptation to climate change” anthropogenic climate change bears among other a threat to biodiversity and continuity of ES. Due to this world community admitted a strong necessity to perform additional research and take more measures with the purpose of minimization of consequences of climate change for biodiversity and widening cooperation on conservation and sustainable use of biodiversity with measures on mitigation and adaptation to climate change. Existence of connection between biodiversity, climate change and sustainable development is admitted within framework of UNFCCC and UNCCD. Necessity of registration of climatic changes in biodiversity and performance of measures on its conservation is also reflected in Strategic plan of CBD and Aichi target 10.

Climate change significantly intensifies loads on ecosystems and may worsen influence of other loads including those what arise out of fragmentation, degradation and loss of habitats, excessive use of resources, invasion of alien species and environmental pollution. Scales and speed of influence of climate changes on biodiversity and on ES and thresholds of climate change after which change of ecosystems becomes irreversible and their functioning in its present form ceases is still unclear. Due to this an active dialog on discussion of relevant questions related to conservation of biodiversity in conditions of changing climate is on the way in the country.

Vulnerability of terrestrial ecosystems to climate change

Countrywide reduction of habitats and degradation of natural ecosystems outside PNA are registered. Global climate change is an additional factor which strengthens a threat in the context of degradation and loss of biodiversity, but existing information on this issue is limited as monitoring research of biodiversity in the context of changing regional climate are not performed. At this stage, an extrapolation of observed biota responses in dry years, considered as analogues of future increasing situations in a changing climate, is used to predict an assessment of the response of the BR components to changing climate factors.

As examples, one shall note fire increase in dry and low-water years in low-mountain (adyr) area and reeds of flat wetlands ecosystems in South Aral Sea region, where in ephemeral lakes areas the outbreaks of locust propagation were registered, and in Karakalpakstan settlements termites' invasions became more frequent according to expert assessments. In the long-term aspect the retreat of habitats of South Asian, heat-loving plant species to the north of

the southern border of occurrence and expansion to the north is observed. As a result of the drought of 1999-2000 and 2008 in the Republic of Karakalpakstan and drying out of delta water reservoir in downstream of the river Amudarya the dislocation of migrating birds changed. Mass rookeries of swimming birds during autumn pass dislocated to the reservoirs of Bukhara, Navoiy and Samarkand provinces. The possibility of increasing fluctuations of water-loving bird complexes is predicted due to drying and subsequent watering of wetland ecosystems.

Drier and hotter conditions are assumed to cause a decrease in the productivity of desert forests, a reduction of habitat of some types of juniper in the mountainous area. The reduction of forests and other vegetation, in addition to habitat loss, decreases carbon dioxide absorption.

Various anthropogenic factors enhancing adverse effects of climate change for vulnerable natural sites were identified, including: a) poor ameliorative condition of lands, irrigation and drainage systems; b) overgrazing of livestock and low watering of pastures; c) a high degree of surface discharge use for irrigation, causing the disruption of the ecological balance of aqueous ecosystems; d) significant volumes of returned waters with dominance in their composition of collector-drainage waters with a high salt content are the main and still poorly regulated source of salinification of rivers in downstream, but to a greater extent - delta and irrigation-waste water lakes; f) hydrological eutrophication of small rivers fed by snow and rain in the bottom of mountains due to withdrawal of river flow by numerous local water intakes and increased anthropogenic load from recreational and urbanized zones to river corridors.

The situation with the preservation of natural ecosystems and key habitats outside the boundaries of PNA did not undergo significant positive changes since the preparation of the Fifth National Report of the BD.

If there is a lack of the necessary time series of regular monitoring information, possible predictions of ecosystems and their components response to climate change are based on expert assessments and the results of thematic discussions at research workshops, as well as on extrapolation of the situations occurred in dry years.

The results of expert forecasts are presented below (Table 6). They are based on the fact that the majority of Uzbekistan climatic scenarios assume the air temperature rise and climate dryness, shift of climatic seasons.

Table 6

Expert predictions of ecosystems and their components response to climate change

- Temperature rise will result in long term vertical shift of zonality in the mountains, that will make such species as insect-stenophages vulnerable, while their ecological plasticity is insufficient for their survival in altered conditions. The same can be applied to plant species which vegetative reproduction prevails over seed one. As well as to species confined to narrow ecological niches;
- The upward displacement of the alpine and subalpine belts under the influence of climate change is expected to result in a reduction in the area of these habitats, which is a serious direct threat to all species, and above all the large vertebrate animals living in this belt. As a result, the reduction of habitat areas will increase the intensity of feeding migrations and the exit of high-mountain inhabitants, both large and small species, beyond the limits of natural habitats, and, consequently, will increase their mortality and / or will make them to play the role of crop pests, which will increase conflicts with local communities. The vertical shift of the boundaries of lower and middle mountain belts will also lead to reduction of tree-shrub and forest habitats, and, accordingly, to a similar process - the movement of species to unusual habitats (both up and down), where they will enter into competitive relations with typical inhabitants. In addition, for vertebrate species, including birds, a significant negative impact will be associated with anxiety and competition with domestic animals, whose number on mountain pastures and watering places will inevitably increase due to the degradation of lowland and low mountain pastures;
- The shift of climatic seasons, in particular, the main rainfall, may adversely affect the survival of ephemera and ephemeroids, and other early-flowering plants due to the mismatch of temperature and humidity regimes favorable for their growth. Accordingly, insect species associated with this vegetation may be affected;
- The increase of rainfall share causes the growth of mudflow activity in mountainous and submontane areas, and, as a result, soil erosion and habitat deterioration;
- Climate change will also have a different impact on the territorial distribution of communities of trees and shrubs;
- The tree vegetation in the area of lowland deserts is unlikely to change greatly, since salinification conditions

with close groundwater occurrence in saline basins will change little. The sandy vegetation, which lives off moisture accumulated during the winter period, will remain in approximately the same growth conditions as at present. Its adaptability to stand high summer temperatures has already formed in the process of evolution;

- Tugay tree vegetation of plain territories, confined to floodplains and river banks, which needs periodic flooding, is also likely to be affected little in conditions of river flooding. However, a partial drying of coens, a reduction of width of tugay vegetation bands and its further fragmentation may occur, if there is a significant change in the flood regime and a decrease in the flow of water in rivers;
- Xerophytic tree vegetation in the submontane and lowland belt in modern, periodically changing conditions (with the occurrence of wetter or dryer periods), developed an adequate strength in the process of evolution that guarantees survival with minimal rainfall and high summer temperatures. In addition, their habitat is quite wide and covers areas with different eco-geographical conditions they are well adapted to;
- According to the scenario estimates, the vegetation of the soft-wood juniper forest can also be affected by an increase in the hypsometric levels of the habitat boundaries and a narrowing of the altitude belt of their distribution as the temperature rises. However, some experts make favorable forecasts, referring to the fairly wide ecological amplitude of juniper growth along the vertical and their adaptability, both to temperature extremes and to a change in the mode and amount of rainfall. The most sensitive to climate change is the tree form of Turkestan juniper, which in accordance with the long term scenario may disappear;
- Almonds and pistachios are xerophytic plant species with a wide ecological amplitude and the air temperature increase should not have a strong negative impact on them;
- The tree vegetation of the middle-mountain leaf forests belt, including such mesophytic species as walnut, mahaleb cherry, white poplar, apple tree and some others, as well as mesophytic shrubs - their accompanying plants, can significantly suffer from climate change. An air temperature increase, especially in summer, with simultaneous soil moisture reduction can result in a significant habitat narrowing of these species.
- Climate change may have an impact on forest biocenoses for other reasons, for example, it may cause an outbreak of fungus diseases of tree vegetation due to reduced immunity when living conditions deteriorate. The probability of propagation outbreaks of insects-pests of tree species (leaf beetles, seed-eaters, timber worms) will increase;
- A decrease of the nectar-bearing of flowering plants is possible, which can lead to the death of some insect species, especially monophages fed by nectar (some species of butterflies, pollinator insects), etc.

As noted, ecosystem vulnerability increases significantly when anthropogenic factors overlap with the impact of adverse climate events. Consequently, any environmental activities aimed at sustainable management and use of biological components of ecosystems will contribute to the preservation of their biospheric and socially useful functions. In this regard, the restoration and preservation of BD in Uzbekistan is rational and reliable way for ensuring environmental stability and sustainable development of the country as well as for adaptation to ongoing climate change trends and processes. The approval and implementation of the updated NBSAP and the inclusion of its provisions in national, territorial and sectoral development plans will be crucial in terms of adapting BD to climate change.

Vulnerability of aquatic ecosystems to climate change and anthropogenic factors

General structure The hydrographic network of the main river basins of the Syrdarya and Amudarya in the second half of the 20th century was supplemented with numerous and diverse hydrautechnical structures and, thus, transformed into the Syrdarya and Amudarya water systems of the same name, consisting of interconnected natural and artificial water courses and water reservoirs (Table 36).

Table 36. The main types of water ecosystems in hydrographic network of the region

Ecosystems	RFA	RICA
Natural ecosystems		
Rivers	+	+
Lakes*	+	
The Aral sea		+
Artificial freshwater ecosystems		
Irrigation channels		+

Water reservoirs	+	+
Ponds		+
Artificial salinified ecosystems		
Drainage channels - collectors		+
Irrigation-waste water lakes		+

Notes: *- almost all natural lakes in RICA came into the category of irrigation-waste water lakes, fed by CDW; RFA is a run-off formation area; RICA is an area of intensive consumption of surface run-off

Climatic factors influence

The ongoing climate change in combination with anthropogenic stress can cause certain negative trends in water quality changes in aquatic ecosystems, disrupt their unstable ecological balance, reduce or lose their biospheric and social functions.

This can increase the vulnerability of aquatic ecosystems, which is already observed in dry and “critically” dry years, which, as it is noted above, should be considered as analogs of predicted warming and aridization of climate.

This methodological approach seems to be the only possible to assess vulnerability and expert forecasts due to the insufficiency and thinness of necessary monitoring data series for river ecosystems or complete absence of such series for irrigation and drainage networks, as well as for lake-type aquatic ecosystems.

Rivers in run-off formation area In RFA, where there is no noticeable anthropogenic impact, changes in the hydrological and hydrobiological characteristics of river objects are natural depending mainly on the dynamics of climatic factors, sensitivity to which depends, in its turn, on the prevailing height of water catchment area and the prevailing type of feeding (Table 37).

In general, the quality of river water in RFA, calculated by integral saprobiotic indices, remains high:

within the I-II classes, (very clean - clean water). Specific pollutants such as heavy metals, phenols, petroleum products (natural hydrocarbons), pesticides and others generally not exceeding or slightly exceeding the existing environmental standards -are of maximum permissible concentrations (MPC). Their content depends on the natural geochemical background, the level background biological processes in river ecosystems and on the regional pollution transfer and in general the water quality allows using it without restrictions for all types of water use and providing a wide range of ES.

In recent years, the area of intensive consumption of surface run-off shifts in the high-altitude direction due to the expansion of urbanized and recreation areas and related withdrawal of river run-off by numerous local water intakes. The latter causes hydrological eutrophication and deterioration of water quality of small rivers in the bottom of mountains, especially observed in dry years. These negative processes increase the vulnerability of rivers of 4-5 types of feeding to the changes of climatic factors, which, under conditions of progressive warming and high frequency of dry years, may also be accompanied by an increase in background concentrations of certain pollutants, such as natural hydrocarbons (defined as petroleum products) and phenols in natural waters determined by the trophic status of water bodies, the intensity of the biochemical transformation of organic substances and the biological situation in reservoirs.

Table 37. The typical hydrobiological features of rivers in RFA due to the their prevailing type of feeding

The prevailing type of feeding	Typical features
I. Glacier and snow	Water rich and cold-water rivers: with a stretched high water, the peak of which falls on the summer-autumn and summer vegetation period; characterized by

II. Snow and glacier	poor development of aquatic biota and higher "inertness" in relation to climatic factors
III. Snow	Intermediate type with spring-summer shorter high water and less "inertness" with respect to climatic factors
IV. Snow and rain	Low rivers: with a short spring high water, intensive summer warming of the water mass, good or even abundant development of aquatic biota; very sensitive to changes in climatic factors, and therefore characterized by strongly pronounced seasonality of the hydrological and biological phases during the annual cycle
V. Subsoil and rain	Low rivers and streams: with a very short spring high water, with abundant development of aquatic biota and the predominance of the heterotrophic component in the trophic structure of aquatic biocenoses; extremely sensitive to changes of climatic factors and the state of the surrounding terrestrial landscapes

Rivers in the area of intensive consumption of run-off. In the long-term aspect, the trends associated with the stages of development of irrigated agriculture in the Aral Sea basin can be noted. The intensive growth of river water salinity and its components in the basins of the Syrdarya and Amudarya rivers in the 60-70s and their stabilization in the late 80s - early 90s of the 20th century due to the slowdown in the reclamation of new irrigated areas and an increase of water content period in the long-term hydrological cycle. Since in the last 10–15 years, new irrigated areas are not practically developed and there is no significant increase in CDW run-off, so the widespread pronounced increase of river waters salinity is absent, while its higher level in downstream of the main rivers remains. Changing values of salinity in recent years are mainly associated with climatic factors, namely, long-term fluctuations. The quality of river waters in RICA is mainly characterized by class III (moderately polluted water), except for local impact areas of large industrial-urban agglomerations with water quality of IV and V hazard class (polluted and dirty water), into which wastewater with a high content of organic and nutrients are discharged.

In the conditions of progressive aridization of the climate and preservation of the unchanged situation in the management of surface run-off, an increase in the salinity of river water in RICA can be expected. According to the characteristics of the BD BHC, there is a steady trend to encourage eutrophication processes from: along with the water mass warming, sedimentation and contamination of bottom sediments increase, overgrowth of riverbeds with macrophytes and filamentary green algae, and brackish-water elements of flora and fauna develop in mouth area in biohydrocenoses. The latter is observed in the summer-autumn season, but especially in dry years, when the average annual values of salinity in the closing rivers reaches in areas associated with irrigated areas may increase by 1.1-1.6 times, and in some months - 2-5 times compared to the average long-term values. During such periods, the water quality in the mouth area of rivers may decline to class IV (polluted water) under hydrobiological indicators. Probably, these trends will remain or even increase due to the lengthening of dry and warm periods in conditions of ongoing climate aridization.

Mountain lakes in run-off formation area it is believed that the hydrochemical regime of most lakes in mountainous areas in the long-term aspect did not undergo any changes, like their morphological parameters, and the main features of the hydrological regime. Most mountain lakes have low salinity from 100 mg / dm³ in high-mountain lakes with a high rate of water exchange ($K_2 > 10$) and up to 200 mg / dm³ in lakes with a lower rate of water exchange ($K_2 > 1$). In high-mountain lakes, where significant transit of river water through lake basins is observed, salinity increases in dry years and decreases in high-water years. An extremely low content of mineral nutrients and, accordingly, a relatively low level of biological productivity characterize mountain lakes as a whole, i.e. they are mainly oligotrophic ecosystems.

Some forecast estimates suggest the thermal regime of lakes of all altitude zones may change towards water temperatures increase and mitigation of ice conditions under the influence

of climate change. The expected changes will be equivalent to lakes transition to lower landscape-climatic zones, corresponding to the decrease in their altitude position of 150-300 m. This can be a stimulating factor increasing the trophic status of lake ecosystems and the emergence of new dominant species in aquatic biota.

The plain lakes of the run-off consumption area are located in areas with insufficient moisture and most of them, as a result of run-off withdrawal for irrigation and water amelioration, acquired a new IWWL (irrigation-waste water lakes) status with a dominant contribution to their feeding of CDW. The IWWL have good feeding and protective conditions; therefore, they became important as a place of concentration of nesting, transient and wintering birds on the plain territory of Uzbekistan. The territorial distribution of swimming birds in the plain territory is subject to some changes. It was established that in the area of cold wintering the maximum number of birds is characteristic for the river Syrdarya, Aydar-Arnasay system of lakes and Lake Karakyr. The concentration of birds in the reservoirs of the area of warm wintering is observed on lakes Atchinsk, Dengizkul, and Talimarzhan, Tudakul and Kuyumazar water reservoirs.

Some of the IWWL are drainless, others are flow systems in different ways, with mostly prevailing weakly flowing type of lakes with a relative water exchange index significantly less than one ($K_2 < 1$). On the contrary, the index of openness for all plain lakes, in virtue of their shallowness has high values (>1). Such large lakes as the Dengizkul, Mezhdurechye, the Tuzkan, the Aydar, and Togyz-Tore have very high values of openness index - from 41 to 300. Thus, almost all plain lakes are “very open” ecosystems, which in combination with high evaporation (up to 2000 mm / year or more) makes them highly dependent on climatic factors. Dependence on climatic factors is especially pronounced for drainless lakes, characterized by a higher salt content and, upon reaching and passing a certain salinity threshold, are characterized by progressive waterlogging, which consequently narrows the range of ES they provide.

According to the available data, the Aral Sea water bodies are the most vulnerable to the changing hydrological situation associated with fluctuation of climatic characteristics. In recent decades, their total area varied from 26 to 120 km² for the Amudarya delta, and from 262.5 to 517.73 km² for the Syrdarya delta depending on water content. The lowest rates for both delta areas were observed in the dry year 2000. All lakes of the Amudarya delta are potentially unstable systems.

In 2000-2002, a crisis situation was registered in all lake ecosystems of the delta, which was coincident with extreme low water. As noted above, under the conditions of arisen instability, the ecological regression of lake ecosystems was accompanied by a catastrophic restructuring of aquatic biocenoses (replacing brackish-freshwater flora and fauna with brackish-marine ones) the degradation of the main facilities of fish and hunting. Within two years, the lake systems of the right-bank and left-bank parts of the Amudarya delta almost completely degraded and lost all their ecosystem (biodiversity) and socially useful functions and ES for an indefinite period. The same situation was observed in the dry year 2008. Progressive warming, while maintaining the feeding of the Amudarya surface run-off, residually, causes an increased vulnerability of its lake ecosystems, and when unfavorable climatic scenarios develop, it will cause a decrease in biocenotic diversity and loss of bio-productivity of aquatic biocenoses, degradation of ichthyofauna and transformation of ornithophana associated with it.

In general, in the conditions of arid climate in drainless lakes, as a rule, salt accumulation processes dominate, resulting in salinization of water bodies and their transformation into saline basins. Water salinity is stabilized to certain extent in flowing water reservoirs and accumulation of biogenic and organic substances in bottom sediments becomes the dominant processes, which causes hydrogen sulfurous pollution and waterlogging of lakes. At the same time, the preservation or loss of their social and biosphere significance largely depends on the speed and direction of the main succession processes, but to greater extent on possible hydrotechnical meliorative, biomeliorative and organizational activities and decisions that can be directed, also,

to maintain diversity (balance) the trophic structure of lake ecosystems and to prevent their overgrowth.

The Aral Sea Due to the critical decrease of water inflow to the Aral Sea, its surface has now decreased by more than 4 times, the volume by more than 10 times, the level has decreased by 22.5 m. The Aral Sea has split into two reservoirs, the Small Aral and the Large Aral. As a result, the salinity of water in the Large Aral Sea increased more than 7 times, reaching over 80‰ in the western basin and 100‰ in the eastern basin. In the early 2000s, *Artemia* brine shrimp (*Artemia parthenogenetica*), a typical inhabitant of hypersaline reservoirs, was almost completely dominant in zooplankton, and brackish-water dipterous fish larva (*Chironomus salinarius*) were dominant in zoobenthos.

The complete disappearance of the eastern basin of the Large Sea was noted on satellite images in autumn 2009. In recent years, water in the eastern basin appears for a short time when water is discharged from the Small Sea and large water flows pass through the Amudarya river down the Takhiatash hydroelectric complex. At present, only the western deep-water part of the Large Sea and the Small Aral in the territory of Kazakhstan fenced off along the Berg Strait by dam remain. Drying of the sea resulted in the emergence of thermohaline stratification in the western basin, and the formation, starting from the depth of 22 m, of a zone of hydrogen sulfide contamination that was not previously characteristic for this reservoir. The arisen stratification (temperature-saline stratification) of the water mass makes it difficult to mix, results in a decrease of the thickness of the active layer of the reservoir and, consequently, an increase of summer values of sea-surface temperature, an increase of evaporation rates and an increase of the shallowing sea rate, which can be observed in recent years.

Despite the obvious damage caused to the biological systems of the Aral Sea, the resistance of its communities in the hypersaline environment was apparently higher than previously thought and until the early 2000s, the Aral remained a “living” water reservoir with a specific ecosystem. However, in the conditions of climate warming and maintaining the existing situation, the reservoir drying up and its salinity, as well as thermohaline stratification will grow progressively, which in the nearest future will inevitably result in the suppression of active biological life in the remaining part of the western Aral basin.

Irrigation channels and collectors. Regular hydrochemical and hydrobiological monitoring of irrigation channels and collectors in Uzbekistan is absent and environmental information concerning them is limited. In the Amudarya basin, the average salinity of irrigation water in irrigation channels in 1980–1990 (that is, during a significant slowdown in the reclamation of new irrigated lands) in Surkhandarya province was 0.38–0.52, in Samarkand province - 0.24–0.34, in the Kashkadarya province - 0.85–1.13, in Bukhara province - 0.789–1.06, in Khorezm province - 0.86–1.03, in Karakalpakstan - 0.804–1.20 g / dm³. Its values in irrigation water mainly correspond to the order of its values in the feeding rivers. Therefore, the spatial and temporal trends in the quality of irrigation water can be considered identical to the trends in the quality of river water.

The average salinity of CDW varies in a rather wide range: in the Amudarya basin it is from 1.0 (Pyanj irrigation region) to 7.7 g / dm³ (Karshi irrigation region); in the Syrdarya basin - from 1.0 (upper Naryn) to 6.2 g / dm³ (Jizzakh massive). Thus, the level of water salinity in reservoirs is not critical for the development of various BHC.

Irrigation channels of the midstream and downstream of the Amudarya and Syrdarya, in addition to their main irrigation assignment, are original transit routes for the larvae and juveniles of commercial fish species, but due to the lack of fish protection devices in irrigation systems, during the growing season, a huge number of juveniles die on irrigated fields or machine water intakes, and channels of the second and third order are often overgrown with macrophytes. All functioning channels are suitable for fishing, which, despite the presence of generally favorable physiographic and hydrobiological conditions, is not organized there. By analogy with river ecosystems, against the background of progressive warming, the intensification of the overgrowing and silting processes of the irrigation network, which will be

especially marked in the channels of the second and third orders, can be expected. Uzbekistan has a positive experience of using herbivorous fish as biomelioratories in the Golodnaya (Foodless) heath irrigation channel, giving a good fish productivity at the same time. The relevance of using such experience to the irrigation network is obvious. Similar activities are also relevant for an extensive drainage network, which most collectors can be considered as ecosystems with a known and commercial fishing potential, which will allow reducing or stopping the intensity of their overgrowth in the condition of future warming and climate aridization. However, this requires additional research and justification.

Water reservoirs. The main number of reservoirs provides seasonal flow control and performs irrigation function. By the nature of their use, large and a part of medium reservoirs belong to the group of integrated ones intended for solving irrigation, energy, and fishery tasks. However, irrigation remains the main function. The water level of the reservoirs varies widely from a few meters on the plain reservoirs to tens and hundreds of meters on the submontane and mountainous ones. The amplitude of water level fluctuations is not constant and is largely determined by their water content from year to year. In extremely low water and dry years, many reservoirs reach a point below the DSL (dead storage level).

It also can be noted an inverse relationship in the change of the average values of salinity in the feeding rivers and water reservoirs depending on the water content of the year, which is most pronounced in the plain reservoirs. Studies have shown that in large flat-water bodies located in the desert areas, for example, below the Tyuyamuyun reservoir, mineralization increases by 7% compared with the initial level. Consequently, the total contribution of large plain reservoirs to the increase in river and irrigation water salinity will increase under climate warming conditions.

Due to the well-known intra-annual fluctuations of water level and periodic draining of a large bottom area, which is especially observed in dry years, aquatic vegetation and associated phytophilic biocenoses in reservoirs are very poor and, the country's reservoir belongs to medium and low-productive water bodies according to the development of the bottom fauna. The most reservoirs become problematic for fishery use in conditions of aridization growth and the intensity of the water evacuation volumes.

Ponds are small artificial water reservoirs of lake type, intended mainly for fish-breeding purposes, namely for the commercial breeding of selected commercial fish species. Since intensive pond fish farming is a process that is constantly monitored and regulated, pond ecosystems are less vulnerable to change of climatic factors in comparison with large water bodies (reservoirs and IWWL).

Thus, aquatic ecosystems are represented as highly vulnerable natural landscape objects in the conditions of the existing water deficit and the progressive climate aridization, and a certain organized strategy of their management and adaptation measures is necessary for their preservation and maintenance of ecological and socially useful functions. The measures should be aimed at:

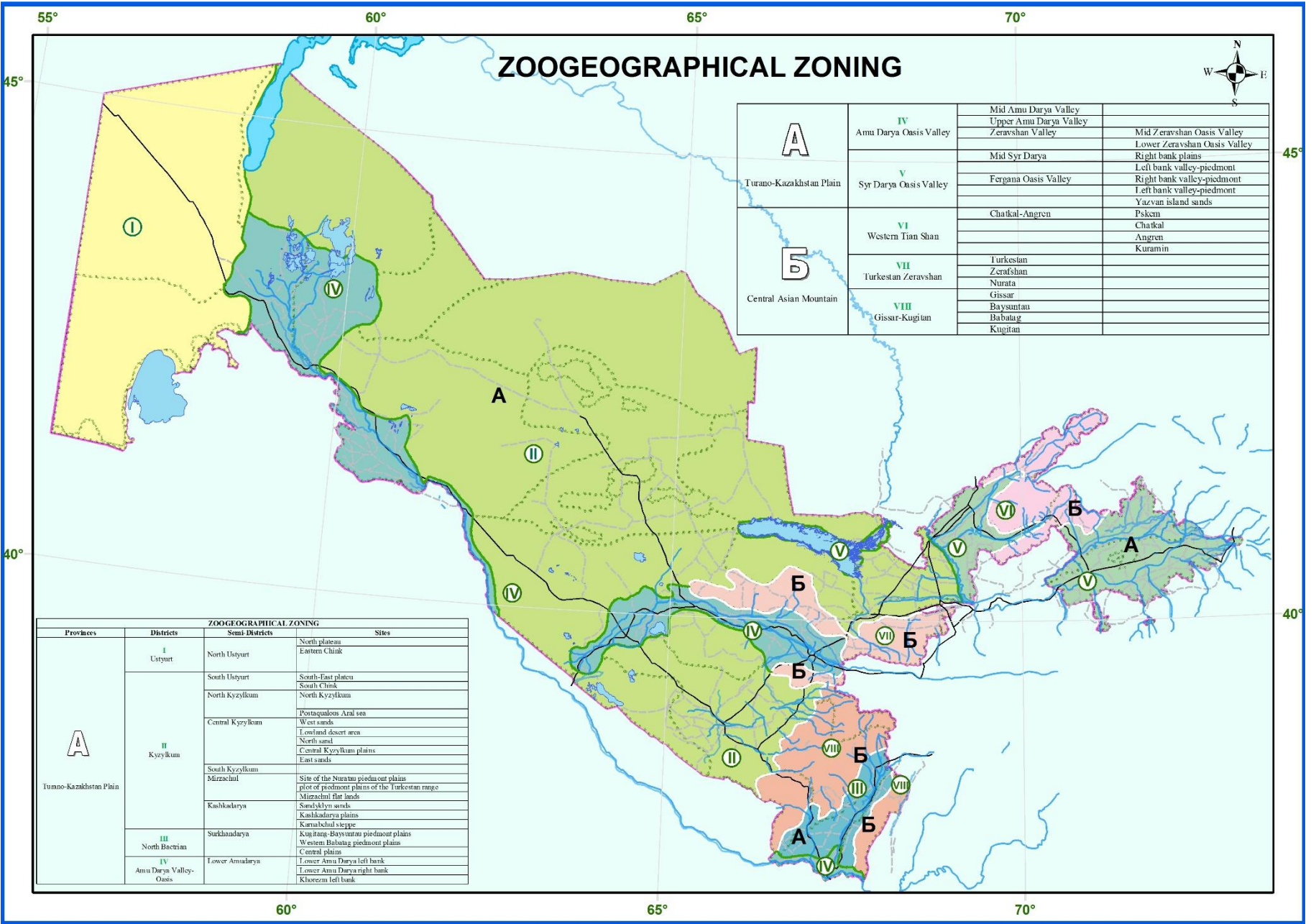
- development and improvement of the integrated environmental monitoring system for aquatic and associated coastal ecosystems;
- integrated water resources management;
- the creation of conditions ensuring a satisfactory ecology of delta lakes and IWWL;
- Ensuring strict control over the compliance with the established protection regime for the formation areas of underground fresh water fields and water protection river areas, along with the riversides;

In accordance with the recommendations contained in the Report of the Second Ad Hoc Technical Expert Group on Biodiversity and Climate Change, the resistance of BD to climate change can also be enhanced by reducing non-climatic loads combined with the implementation of conservation, restoration and sustainable management strategies that are relevant for Uzbekistan. Environmental and management strategies contributing to maintenance and restoration of the BD will provide the reduction of some of the adverse effects of climate change.

Options for enhancing the adaptive capacity of species and ecosystems due to accelerated climate change include:

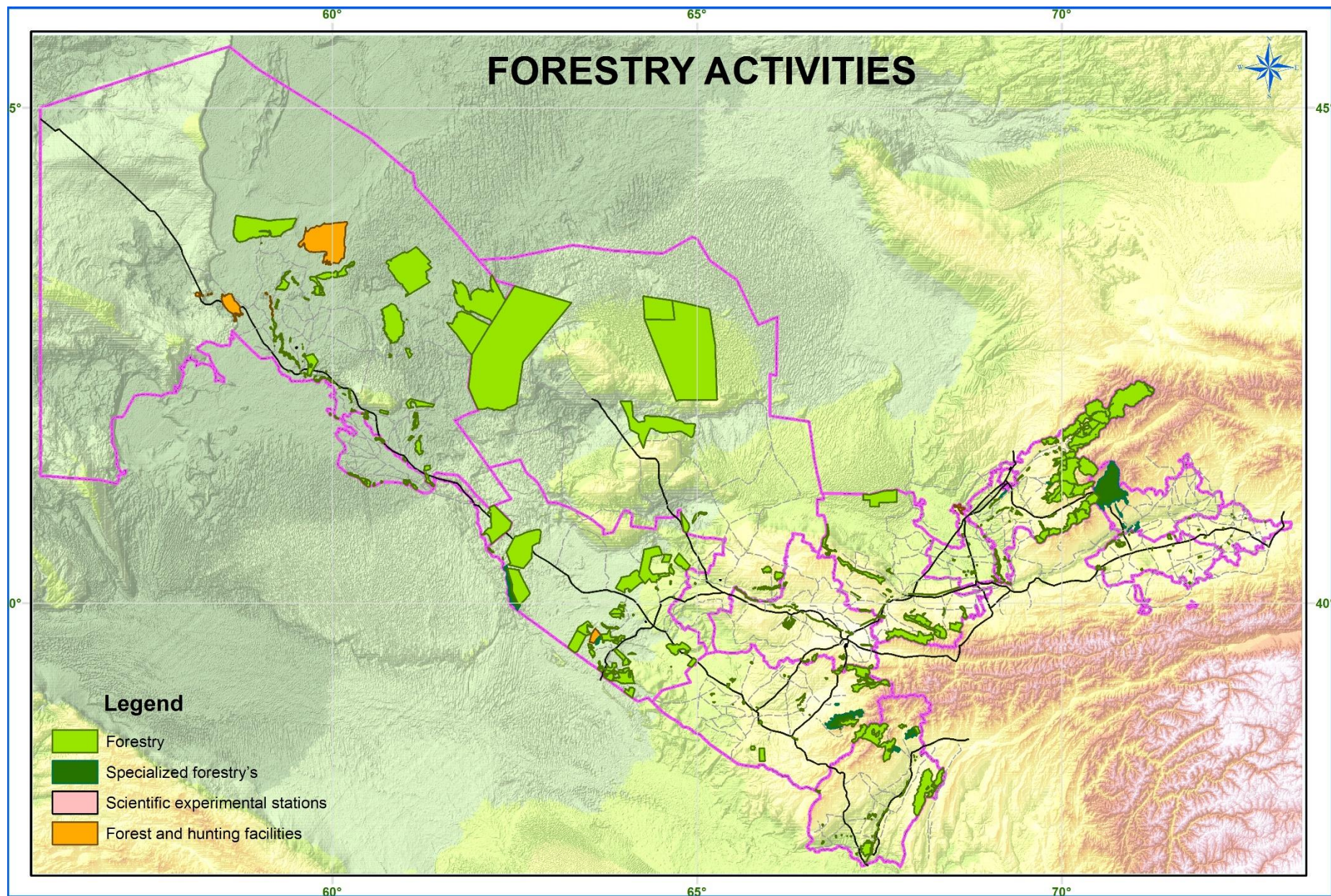
- reduction of non-climatic loads, such as environmental pollution, over-exploitation of resources, loss and fragmentation of habitats and invasion of alien species;
- wider implementation of environmental practices and sustainable use, including by strengthening and expanding the PNA system;
- providing assistance in implementation of adaptive management by strengthening monitoring and evaluation systems;
- reduction of deforestation and degradation.

ANNEX I

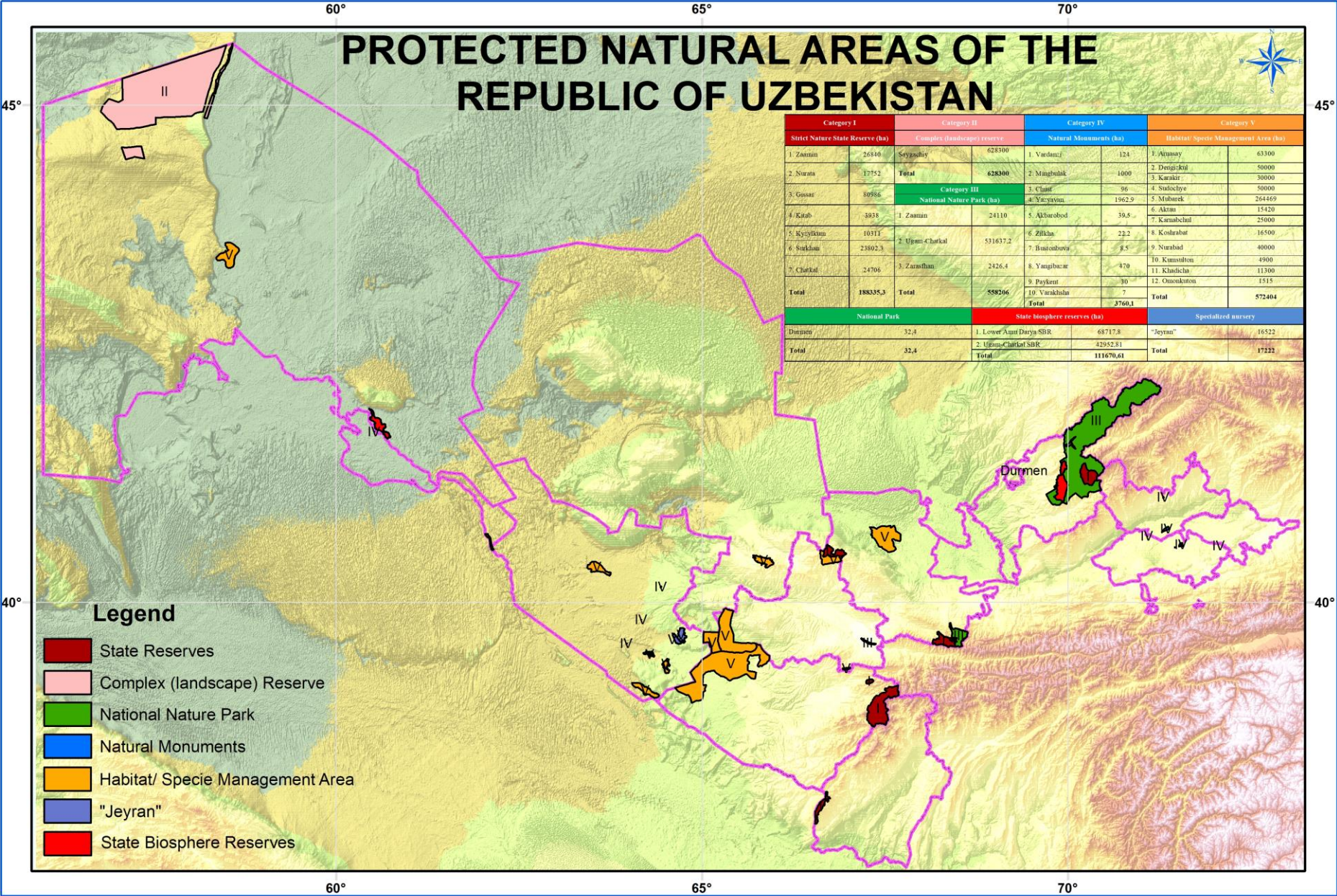


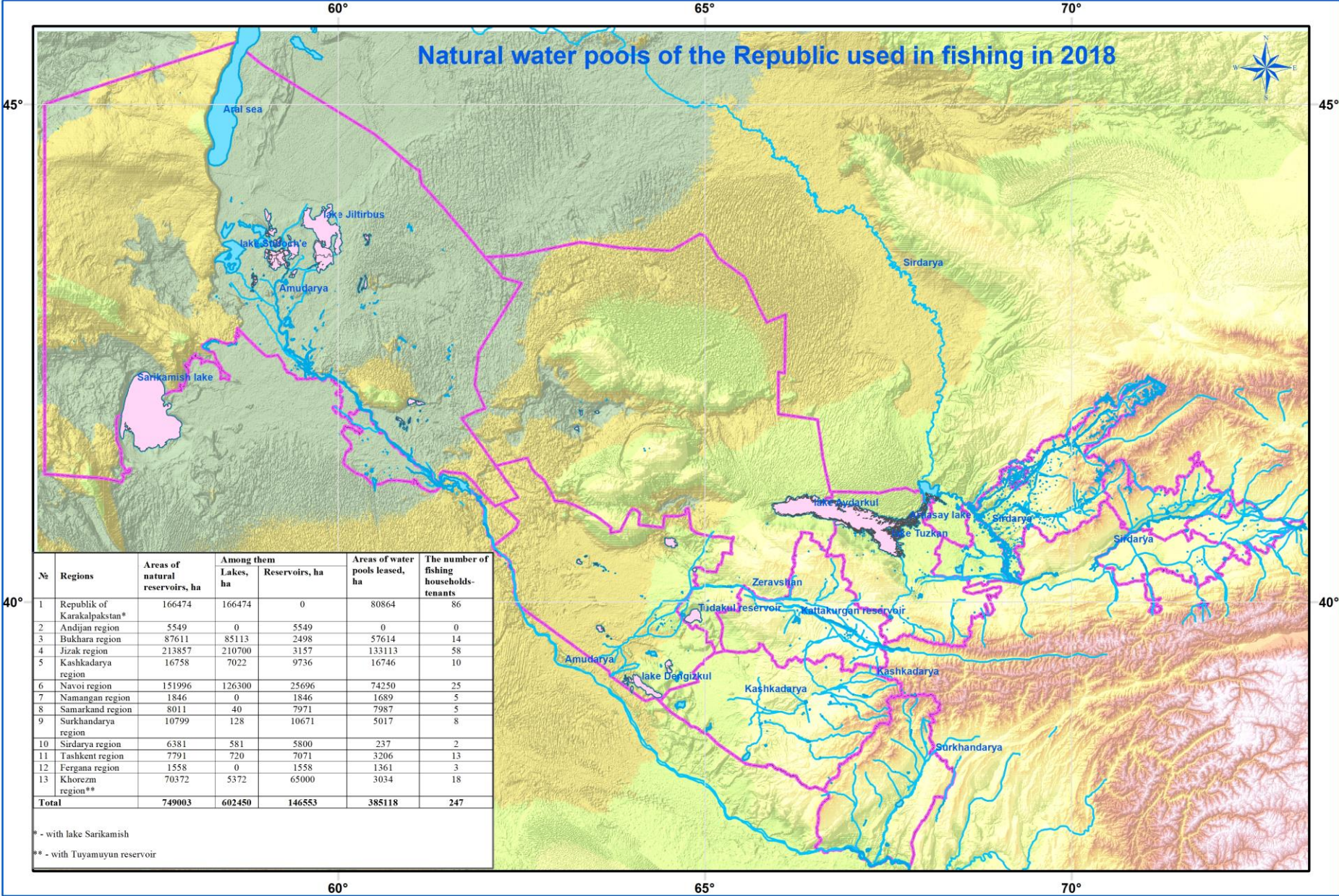


ANNEX III









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