THE SIXTH NATIONAL REPORT ON BIOLOGICAL DIVERSITY IN THE REPUBLIC OF KAZAKHSTAN

Astana, 2018

Terms and abbreviations

6NR — 6th National Report
ACBK — Association for the Conservation of Biodiversity of Kazakhstan
ADB — Asian Development Bank
AIC — Agro-Industrial Complex
AIFC - Astana International Financial Centre
and Science of RK
API — Air Pollution Index
AVRDC-WVC - World Vegetable Center
CFW- Committee for Forestry and Wildlife
CGIAR - Consultative Group on International Agricultural Research
CIMMYT — International Maize and Wheat Improvement Center (Mexico)
CIS - Commonwealth of Independent States
CITES - UN Convention on International Trade in Endangered Species of Wild Fauna and Flora
DED — Design Estimation Documentation
EBRD- European Bank for Reconstruction and Development
EIA - Environmental Impact Assessment
EKO — East Kazakhstan Oblast
ENO– Scientific Background Report
EPR - Extended Producer Responsibility
ESCAP - United Nations Economic and Social Commission for Asia and the Pacific
FAO - Food and Agriculture Organization of the United Nations
FEC - Fuel and Energy Complex
GDP – Gross Domestic Product
GEF- Global Environment Facility
GMOs — Genetically Modified Organisms
GNP — Gross National Product
GR – Genetic Resources
HEI — Higher Education Institution
HPP – Hydro Power Plant
HSTC — Higher Scientific and Technical Commission
IBA - Important Bird Areas
ICARDA - International Center for Agricultural Research in the Dry Areas
ICGT - International Center for Green Technologies
ILM - Integrated Land Management
IPGRI- International Plant Genetic Resources Institute (currently - Biodiversity International)
IUCN - International Union for Conservation of Nature
JSC – Joint-Stock Company
JV - Joint Venture
KAI MoA RK - KazAgroInnovation JSC of the Ministry of Agriculture of RK
KazNIIPiV - Kazakh Research Institute of Fruit Growing and Viticulture JSC of KazAgroInnovation JSC of the Ministry of Agriculture of RK
KazNIIRH - Kazakh Research Institute of Fishery of KazAgroInnovation JSC
KAZRIFA- Kazakh Research Institute of Forestry and Agroforestry of National Agricultural Research and Education Center non-profit JSC
LLP -Limited Liability Partnership
LULUCF - Land Use, Land-Use Change and Forestry
ME RK - Ministry of Energy of RK
MES RK- Ministry of Education and Science of RK
MEWR RK - Ministry of Environment and Water Resources of RK
MID RK - Ministry of Investment and Development of RK
MMC — Mining and Metallurgical Complex
MNE RK - Ministry of National Economy of RK
MoA RK - Ministry of Agriculture of RK
MPHI -Maximum Permissible Harmful Impacts
MSW - Municipal Solid Waste
NCB MES RK- National Center for Biotechnology of the Science Committee of the Ministry of Education
NCOC - North Caspian Operating Company
NDB - National Database
NGO – Non-Governmental Organization
National Information Exchange Mechanism on the Implementation of the Global Plan of Action (GPA) for the

Conservation of Plant Genetic Resources (PGR) in the Republic of Kazakhstan
NKO — North Kazakhstan Oblast
OECD - Organization for Economic Co-operation and Development
PA - Protected Area
PES — Payments for Ecosystem Services
PGR – Plant Genetic Resources
PGRFA - Plant Genetic Resources for Food and Agriculture
Plan of Action (GPA) for the Conservation of Plant Genetic Resources (PGR) in the Republic of Kazakhstan
POPs - Persistent Organic Pollutants
PPP— Public-Private Partnership
PRC- People´s Republic of China
R&D — Research and Development
RES — Renewable Energy Sources
RK — Republic of Kazakhstan
RLAs - Regulatory Legal Acts
RSBSE— Republican State Budget-Supported Enterprise
RSE on PVC — Republican State Enterprise on the Right of Economic Management
SC — Science Committee
SC MES RK - Science Committee of the Ministry of Education and Science
SDGs - Sustainable Development Goals
SEA - Strategic Environmental Assessment
SFE — State Forestry Estate
SINGER — System-wide Information Network for Genetic Resources of the IARC
SNFR —State Natural Forest Reservat
SNNP – State National Natural Park
SNR (IUCN category Ia) - State Nature Reserve (IUCN category Ia)
SNR (IUCN category VI) - State Natural Reservat (IUCN category VI)
SPGZ - Sanitary Protection Green Zone of Astana
SPP - Solar Power Plant
SRI-Scientific Research Institute
SRNP — State Regional Natural Park
TDP — Territorial Development Program
TEO— Feasibility Study
TL — Transmission Line
TVE—Technical and Vocational Education
UN - United Nations
UNCBD - United Nations Convention on Biological Diversity
UNCCD - United Nations Convention to Combat Desertification
UNDP - United Nations Development Programme
UNECE - United Nations Economic Commission for Europe
UNEP-United Nations Environment Programme
UNESCO-United Nations' specialized agency for Education, Science and Culture
UNFCCC - United Nations Framework Convention on Climate Change
USA - United States of America
WB — World Bank
WFCC - World Federation for Culture Collections
WIEWS –World Information and Early Warning System on PGR
WKO — West Kazakhstan Oblast
WL – Wetlands
WPI — Water Pollution Index
WPP — Wind Power Plant

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Executive Summary

The 6th National Report on the Biological Diversity in the Republic of Kazakhstan was prepared in accordance with the Guidelines for the Sixth National Report development, prepared by the Secretariat of the Convention on Biological Diversity. The 6th NR contains a final review of results achieved through implementation of the Strategic Plan for the Conservation and Sustainable Use of Biodiversity for 2011-2020 and targets for conservation and sustainable use of biodiversity adopted in Aichi, including national targets.

The 6NR contains five mandatory sections arranged in accordance with the Aichi's specific targets and a section on national contribution in achieving the targets of the Global Strategy for Plant Conservation. This National Report does not include a separate section on the contribution of indigenous and local communities as this information is reflected under Target 18 in the sections mentioned above.

The Republic of Kazakhstan doesn't have a single policy paper expressly providing for implementation of the Strategic Plan for the Conservation and Sustainable Use of Biodiversity for 2011-2020 and targets for conservation and sustainable use of biodiversity adopted in Aichi. At the same time a variety of strategic, industry-specific, regional and other policy documents specify a full range of national goals and objectives either expressly or by implication equivalent to the Aichi Targets.

These are mainly the policy documents implemented in the Republic of Kazakhstan in the period from 2013 through 2017:

- The "Kazakhstan-2050" Strategy outlined in the RK President's Address in 2012;
- The Strategic Development Plan of the Republic of Kazakhstan until 2025;
- The Concept of Transition of the Republic of Kazakhstan to Green Economy;
- The State Programme for the Agro-Industrial Complex Development for 2017-2021;
- The State Programme for Water Resources Management (repealed);
- The Republic of Kazakhstan Agro-Industrial Complex Development Programme "Agrobusiness-2017";
- The "Zhassyl Damu" industry-specific programme[1] (repealed);
- The Strategic Plan of the Ministry of Agriculture for 2014-2018;
- The Strategic Plan of the Ministry of Agriculture for 2017-2021;
- The Strategic Plan of the Ministry of Energy for 2014-2018.

Five-year territorial development programmes for each oblast and the cities of Astana and Almaty contain sections on environment and certain indicators matching sustainable development indicators that are altogether compliant with those specified in the key policy papers of the Republic of Kazakhstan should be considered too.

Apart from the plans and programmes implemented at national or local levels environmental measures are outlined in environment protection plans developed by users of natural resources with a view to obtain environmental permits. Such plans describe process, technical, institutional, social and economic arrangements designed to protect and improve the environment.

It should be noted that, in accordance with the Guidelines, both men and women were actively involved in the development of the 6NR as part of a working group to discuss the preparation of the 6NR and the Project Management Committee. Seminars, meetings and focus groups were held for discussion and preparation of the 6NR[2].

[1] *Zhassyl damu* is green development in Kazakh.

[2] According to the lists of participants, the number of women in various events ranged from 26% to 62%.

National targets delivery assessment in 6NR's Section 3 is based on indicators recommended in decision XIII/28 of the 13th meeting of the Conference of the Parties to the Convention on Biological Diversity. The recommendation sets out both generic and specific indicators. Generic indicators are applied to those aspects that can be monitored, whereas specific indicators are of dynamic nature and can be used in monitoring of changing trends within those aspects. The table includes only those indicators that are currently available or under active development.

National targets delivery assessment presented in the table is based on the national indicators developed in compliance with the above recommendations and tracked by the national monitoring systems in Kazakhstan.

References to official documents and information available online are given in footnotes.

Section 1. National goals and objectives for implementation of the Strategic Plan and meeting targets for conservation and sustainable use of biodiversity adopted in Aichi.

Strategic Goal A. Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society.

1.1. National goals and objectives adopted for meeting the Target 1.

The Concept of Conservation and Sustainable Use of Biological Diversity in the Republic of Kazakhstan until 2030 lists the following features of present-day Kazakhstan: vast variety of social, religious and national peculiarities within different groups of population; predominance of consumer's attitude to nature, focus on the use of natural resources, low biological literacy rate and lack of recognition of biodiversity conservation; rapid change of public opinion in the context of social and economic reforms[3]. The following objectives are set in the Concept in terms of environmental culture and education: 1) to develop people's environmental culture; 2) to foster a responsible and proactive civic stance in the field of biodiversity conservation; 3) to promote humane attitude to wildlife and enhance environmental ethics; 4) to improve people's biological and environmental literacy, enhance environmental knowledge of decision-makers, use environmental management methods and technologies conserving biological diversity. The main actions the Concept determines are: 1) to promote the need to conserve biological diversity in mass media; 2) to enhance environmental and biological education of population; 3) to raise awareness on the state and threats to biodiversity; 4) to support environmental initiatives. These actions are powered by international projects alone.

One of the key principles of the Concept of Transition of the Republic of Kazakhstan to Green Economy is education and environmental culture development across business and population that can qualify as a national target matching the Aichi Target 1 and similar also to the Aichi Target 18. A precondition for the above principle implementation is development of a new environment protection culture among broader communities that requires integration of environment-related topics in academic curricula[4]. This will cultivate careful attitude to natural resources among the coming generation and bring about additional benefits.

At the same time, the 2015-2020 Gender Plan of Action under the Convention on Biological Diversity (Decision XII/7) requires that countries develop and disseminate information on the Convention and biodiversity in forms that are accessible to both men and women. This creates the need to monitor men and women involvement and produce relevant reports (data disaggregated by gender).

A new mid-term strategic document is the Strategic Development Plan of the Republic of Kazakhstan until 2025 (that supersedes the Strategic Development Plan of the Republic of Kazakhstan until 2020). Reform No. 6 "Modernization of public consciousness" underlying the Strategic Development Plan provides for Initiative 6.3 "Environmental culture development among population" envisaging outreach activities to promote rational use of natural resources in both private use and industry, as well as Initiative 6.11 "Area studies and support for social initiatives". Implementation of the latter includes organization of area studies in education, environment and municipal improvement, studies of regional history, reconstruction of heritage buildings and local cultural sites. Support will also be rendered to social initiatives launched by business people, officials, intellectuals and the youth seeking development of their small motherland[5].

[3] The Concept of Conservation and Sustainable Use of Biological Diversity in the Republic of Kazakhstan until 2030.

[4] The Concept of Transition of the Republic of Kazakhstan to Green Economy approved by Decree No. 577 of the President of the Republic of Kazakhstan dated May 30, 2013.

[5] The Strategic Development Plan of the Republic of Kazakhstan until 2025 approved by Decree No. 636 of the President of the Republic of Kazakhstan dated February 15, 2018.

1.2. National goals and objectives adopted for meeting the Target 2.

The Concept of Conservation and Sustainable Use of Biological Diversity in the Republic of Kazakhstan until 2030 stipulates[6] that the need for integration of ecosystem services valuation into the national sustainable development policy stems from the fact that natural resources are of vital importance for Kazakhstan economy, but the long-term benefit gained from the same are disregarded by economic parameters. This resonates with the Aichi Target 2. Within the conceptual framework of ecosystem services economic assessment people are considered as a part of ecosystems whose dynamic interaction influences human well-being. Government policy has to account for the benefits gained from ecosystem services and economic assessment has to focus on inclusion of the key biodiversity and ecosystem parameters into a country's economic system, creation of a legal framework for environment-oriented national accounts enabling integration of biodiversity and ecosystem values into a country's macroeconomic indicators (GDP, GNP) and the international offset mechanisms.

So far economic assessment of ecosystem services (EAES) has been carried out in two protected areas (PA) in Kazakhstan. Six ecosystem services with a total value of over 86 million US dollars were assessed in Karkaraly SNNP in 2013. In 2016 ecosystem services in Ili-Balkhash State Natural Reservat were assessed under two scenarios – baseline scenario and sustainable development scenario. The total value of eleven ecosystem services under the baseline scenario accounted for around 26 million US dollars. Unfortunately, EAES hasn't been included in the current assessment tools. At the same time the relevant work is underway; following BIOFIN (the Biodiversity Finance Initiative) experts' recommendations in 2017 the Government of Kazakhstan introduced the term "forest ecosystem services" and voluntary contributions for the use of forest ecosystem services as a forest sector financing mechanism into the Forest Code.

It should be noted that the 2015-2020 Gender Plan of Action under the Convention on Biological Diversity (Decision XII/7) recommends countries to report data on gained benefits disaggregated by gender. Those aspects are underdeveloped.

1.3. National goals and objectives adopted for meeting the Target 3.

The fourth principle of the Concept of Transition of the Republic of Kazakhstan to Green Economy[7] (Investment attractiveness of measures for efficient use of resources: fair tariff-setting and pricing on resource markets for reduction of subsidies to consuming industries) is equivalent to the Aichi Target 3.

Subsidies with positive implications include subsidies for beekeeping, aquaculture, maral breeding, perennial plantations of fruit and berry crops granted under the State Programme for the Agro-Industrial Complex Development for 2017-2021[8]. Meanwhile agriculture lacks biodiversity support subsidies to organic farming and game breeding.

As per article 112-3 of the RK Forest Code forestry subsidies can be granted for development of private nurseries and plantations of fast-growing wood species. However, no actual subsidies were paid for the above activities within the period under review.

1.4. National goals and objectives adopted for meeting the Target 4.

The Aichi Target 4 to ensure sustainability of the taken path is reflected in the national target to move on to green economy. Kazakhstan President approved the Concept of Transition

[6] The Concept of Conservation and Sustainable Use of Biological Diversity in the Republic of Kazakhstan until 2030.

[7] The Concept of Transition of the Republic of Kazakhstan to Green Economy approved by Decree No. 577 of the President of the Republic of Kazakhstan dated May 30, 2013.

[8] The State Programme for the Agro-Industrial Complex Development for 2017-2021 approved by Decree No. 420 of the President of the Republic of Kazakhstan dated February 2, 2017.

of the Republic of Kazakhstan to Green Economy by his Decree No. 577 dated May 30, 2013[9]. The document defines Green Economy as an economy with high quality and standard of living of population, careful and rational use of natural resources for the benefit of present and future generations and in accordance with the country's international environmental commitments, including under the Rio Declaration on Environment and Development, Agenda 21, Johannesburg Declaration on Sustainable Development, and the UN Millennium Declaration.

In the course of transition to green economy under the Concept, measures are taken in the following areas: sustainable use of water resources, sustainable and high-yield agriculture, energy-saving and energy efficiency, power sector development, waste management system, air pollution reduction, and ecosystems conservation and efficient management.

The Concept of Transition of the Republic of Kazakhstan to Green Economy will be implemented in three stages:

- In 2013-2020 the top state priority will be resource use optimization, improvement of environmental activities efficiency and green infrastructure establishment.
- In 2020-2030 the newly established green infrastructure will serve as a basis for transformation of national economy with a focus on careful use of water, encouragement and stimulation of renewable energy technologies advancement and large-scale deployment, construction in compliance with high energy efficiency standards.
- 2030-2050 will mark the national economy transition to the principles of the so-called third industrial revolution when natural resources use will be subject to their renewability and sustainability.

It is essential for biodiversity conservation that the problem of water resources deficit is generally resolved at the basin level by 2025, and by 2030 – for each specific basin. At the same time the water resources environment – ecosystem stability, fish farming development, ecotourism and conservation of unique natural wealth – must not be compromised for the sake of industrial development.

Strategic Goal B. Reduce the direct pressures on biodiversity and promote sustainable use.

1.5. National goals and objectives adopted for meeting the Target 5.

One of the main goals of the Concept of Transition of the Republic of Kazakhstan to Green Economy is conservation, rational use and reproduction of forest, fish and animal resources, nature reserve fund objects – a national target equivalent to Aichi Strategic Goal B and Targets 5 to 10. The same target was set in the Strategic Plan of the Ministry of Agriculture of the Republic of Kazakhstan for 2017-2021[10] currently in effect. Specifically, in terms of forest conservation (the Aichi Target 5) the Plan sets performance targets for expansion of forested lands within protected areas and areas occupied by specialized forestry enterprises to 1,382,000 ha in 2015, 1,383,000 ha in 2016, and 1,409,000 ha in 2017. The priority areas of forestry development are forest management on the territory of the State Forest Estate, aircraft operations for the forest fund safeguarding and protection, forest regeneration and cultivation, artificial plants propagation, forest engineering.

Besides, all oblast territorial development programmes (TDPs) contain indicators of forested lands availability and average forest fire area. Indicators included in TDPs are subject to compulsory clearance with the Committee for Forestry and Wildlife (CFW). To achieve the above indicators, municipal public forestry institutions take measures to protect forests from fires, regenerate and cultivate forests leading to forested lands expansion.

[9] The Concept of Transition of the Republic of Kazakhstan to Green Economy approved by Decree No. 577 of the President of the Republic of Kazakhstan dated May 30, 2013.

[10] The Strategic Plan of the Ministry of Agriculture of the Republic of Kazakhstan for 2017-2021 approved by the MoA RK Order No. 541 dated December 30, 2016.

The "Zhassyl Damu" industry-specific programme for 2010-2014[11] set the following forest conservation performance targets to have been achieved by 2014:

1) forest regeneration and cultivation areas – 64,000 ha;
2) reduction in the average forest fire area to 10.5 ha;
3) annual afforestation of non-forested lands – 6,500 ha;
4) government support to private forest cultivation in the form of plantation of fast-growing wood and shrub species for industry and energy sector, forest nurseries creation and development.

The Strategic Plan of the Ministry of Agriculture of the Republic of Kazakhstan for 2010-2014 aspired to bring about 6,500 ha of forest plantations, 6,500 ha of afforestation, forest management over the area of 916,200 ha, planting stock with improved genetic merit in the amount of 1 million specimens, and expansion of State Forest Estate area covered by aircraft patrol to 30% of the total SFE area by 2014[12].

Starting from 2015 the Committee for Forestry, Protected Areas and Wildlife has operated in accordance with the Strategic Plan of the Ministry of Agriculture of the Republic of Kazakhstan for 2014-2018[13].

The main policy documents describing all the key strategies of regional (oblast) social and economic development are TDPs adopted for a five-year period. All oblast TDPs contain indicators of forested lands availability and average forest fire area. Indicators included in TDPs are subject to compulsory clearance with the CFW. To achieve the above indicators, municipal public forestry institutions take measures to protect forests from fires, regenerate and cultivate forests leading to forested lands expansion.

A new mid-term strategic document is the Strategic Development Plan of the Republic of Kazakhstan until 2025 providing, in accordance with Target 7 "Conservation of biodiversity", for further implementation of the state policy to conserve biological diversity through forest cover expansion to 4.8%[14]. Under the national strategy for sustainable land management further measures of strategic importance will be taken to address land degradation and desertification; it envisages increased volumes of forest regeneration and cultivation, creation of green spaces around oblast centres, private forest cultivation development.

1.6. National goals and objectives adopted for meeting the Target 6.

As far as conservation of fish stock and other aquatic animals is concerned, the Concept of Transition of the Republic of Kazakhstan to Green Economy envisages conservation of 52 commercially valuable fish species (the Aichi Target 6), as well as 18 rare and threatened species[15]. The same target is set in the Strategic Plan of the Ministry of Agriculture of the Republic of Kazakhstan for 2017-2021[16] currently in force attaching high importance to fisheries as an income source, a basis for economic growth, employment, increase in fish exports, other potential benefits and a source of biological diversity. Catch quotas for fish and other aquatic animals in the country's fishery waters are annually approved on the basis of biological justifications elaborated by scientific fishery organizations and positive findings of the state environmental expert review. Priority areas of fisheries development for 2017-2021 are fish

[11] "Zhassyl Damu" industry-specific programme approved by the RK Government Resolution No. 924 dated September 10, 2010 (repealed by the RK Government Resolution No. 779 dated July 8, 2014).
[12] The Strategic Plan of the Ministry of Agriculture of the Republic of Kazakhstan for 2010-2014 approved by the Government Resolution No. 2339 dated December 31, 2009.
[13] The Strategic Plan of the Ministry of Agriculture of the Republic of Kazakhstan for 2014-2018 approved by the MoA RK Order No. 1-1/665 dated December 15, 2014.
[14] The Strategic Development Plan of the Republic of Kazakhstan until 2025 approved by Decree No. 636 of the President of the Republic of Kazakhstan dated February 15, 2018.
[15] The Concept of Transition of the Republic of Kazakhstan to Green Economy approved by Decree No. 577 of the President of the Republic of Kazakhstan dated May 30, 2013.
[16] The Strategic Plan of the Ministry of Agriculture of the Republic of Kazakhstan for 2017-2021 approved by the MoA RK Order No. 541 dated December 30, 2016.

stocks conservation through their protection and reproduction, regulation of their sustainable, evidence-based and rational use.

The "Zhassyl Damu" programme for 2010-2014 was aimed at creation of favourable conditions for conservation and rehabilitation of natural ecosystems[17]. The following performance indicators were determined for fisheries development pertinent to the Aichi Target 6:

1) Increase the amount of juvenile fish released in natural bodies of water up to 158.4 million specimens; the goal was achieved with 302 million specimens of fish seeds cultivated in 2014;
2) Increase the proportion of allocated fishery waters (sites) up to 80%. The goal was not achieved – as of 2014, 292 fishery waters (sites) were allocated to 152 users out of 344 fishery waters (sites) of international or national significance; 52 fishery waters (sites) were not allocated. As for local bodies of water, out of 2,742 bodies of water accounted for by oblast akimats 1,536 bodies (56%) were allocated to 865 fisheries;
3) Keep the state record of fish stocks – completed: elaboration of biological justifications was funded from the national budget on an annual basis;
4) Develop and take measures to detect and forestall poaching activities and illegal turnover of bioresources – completed;
5) Put forward a proposal for an evidence-based recommendation to determine reasonability and sequencing of dredging towards spawning locations on fish paths of the Ural and the Kigash rivers for valuable fish species producers – completed: the scientific recommendations were developed in 2014;
6) Upgrade production facilities of state fish hatcheries and sturgeon breeding plants – not completed;
7) Put forward a proposal for formation and conservation of the Aral barbel and bastard sturgeon brood stock and replacement brood stock at fish breeding plants – biological justification was prepared, but no actions were taken;
8) Put forward a proposal for scientific research of negative factors affecting the Caspian seal population and recommendations for their elimination – the proposal was put forward; scientific research was carried out in 2015-2017.
9) A mid-term fishery development programme is being elaborated.

1.7. National goals and objectives adopted for meeting the Target 7.

The fundamental environment protection principles are formalized in the Constitution of the Republic of Kazakhstan whereunder the state aims at protection of environment favourable for human life and health. Article 6 of the Constitution states as follows: "The land and underground resources, waters, flora and fauna, other natural resources shall be owned by the state". The Constitution also stipulates that the citizens of the Republic of Kazakhstan must preserve nature and treat natural wealth with care.

"Kazakhstan-2050" Strategy[18] principles equivalent to the Aichi Target 7 are the following:

— resources performance improvement: resources performance (GDP per water, land, energy resource unit, greenhouse gas emission unit, etc.);
— responsible use of resources: responsibility for monitoring and control over sustainable use of resources and the state of environment has to be strengthened at all levels of state authority, business and communities;

[17] "Zhassyl Damu" industry-specific programme approved by the RK Government Resolution No. 924 dated September 10, 2010 (repealed by the RK Government Resolution No. 779 dated July 8, 2014).
[18] Address to the people of Kazakhstan by the President of the Republic of Kazakhstan, the Leader of the Nation, Nursultan Nazarbayev. Strategy "Kazakhstan-2050".

— economy modernization and application of the most efficient technologies in the face of the third industrial revolution;
— investment appeal of efficient resource utilization efforts: there is a need for fair tariff-setting and pricing on resource markets for reduction of subsidies to consuming industries.

The Republic of Kazakhstan Agro-Industrial Complex Development Programme for 2013-2020 "Agrobusiness-2020" envisaged the following targets[19]:

— to introduce new technologies in agriculture, including arid regions;
— to create the efficient land market based on transparent pricing and investment raising, and providing for commitments to introduce cutting-edge technologies and increase labour productivity;
— to eliminate barriers to agrobusiness, cooperation process, productive land use;
— to scale up scientific research in agriculture and healthcare, including establishment of experimental science and innovation clusters and investigation of drought-resistant genetically modified products.

The State Programme for the AIC Development for 2017-2021 is being implemented to ensure AIC competitive growth, wide engagement of small and medium farms in cooperative farming, increase in agricultural exports and efficient use of water and land resources[20].

A new mid-term strategic document is the Strategic Development Plan of the Republic of Kazakhstan until 2025 stipulating that the AIC development policy will be focused on agriculture competitive growth, deeper agro-processing, the country's food security and growth in export-oriented organic production[21]. The plan is to improve labour productivity and achieve a 2.5-fold increase in processed products export in five years as compared to 2017.

In terms of aquaculture the State Programme for the Agro-Industrial Complex Development for 2017-2021 notes that fish stocks are primarily exploited in natural bodies of water and aquaculture is underdeveloped[22]. The industry has to deal with the following problems:

1) Private fisheries can't secure sufficient amounts of special foodstuff.
2) Entrepreneurs have limited access to information and consultations on the latest rearing technologies.

Performance indicators: increase in aquaculture production up to 5,000 tons by 2021 (Table 1.7.2).

Table 1.7.2. Rearing performance targets set in the State Programme for the AIC Development for 2017-2021.

Outcome indicator	Measurement unit	2017 (actual)	2018 (assessment)	2019	2020	2021
Aquaculture products output at organized farms	Tons	2776	2290	2947	3954	5000

[19] The Republic of Kazakhstan Agro-Industrial Complex Development Programme "Agrobusiness-2017" approved by the RK Government Resolution No. 151 dated February 18, 2013, as amended and supplemented by the RK Government Resolution No. 750 dated June 30, 2014.
[20] The State Programme for the Agro-Industrial Complex Development for 2017-2021 approved by Decree No. 420 of the President of the Republic of Kazakhstan dated February 2, 2017.
[21] The Strategic Development Plan of the Republic of Kazakhstan until 2025 approved by Decree No. 636 of the President of the Republic of Kazakhstan dated February 15, 2018.
[22] The State Programme for the Agro-Industrial Complex Development for 2017-2021 approved by Decree No. 420 of the President of the Republic of Kazakhstan dated February 2, 2017.

The Programme envisages subsidies to investment in establishment and expansion of production facilities at operating fisheries (lake commercial fish farms, hatcheries) and subsidies to foodstuff expenditure by sturgeons, salmons and carps breeding farms.

State Programme for the Agro-Industrial Complex Development for 2017-2021 envisages the establishment of the Governing Council that will be given the authority to approve long-term industry-specific programs.

Therefore the Ministry of Agriculture is developing the Program for Fishery Development until 2028 with participation of scientific organizations, fishery associations and independent experts.

1.8. National goals and objectives adopted for meeting the Target 8.

The national target to reduce pollution and improve environment is equivalent to the Aichi Target 8 to improve the quality of environment and slow down the loss of natural habitats. This target is envisaged in the following documents.

In terms of air pollution reduction, the Concept of Transition of the Republic of Kazakhstan to Green Economy sets the goal to reach European levels of sulphur and nitrogen oxides emission following analysis of the current levels of pollution by industry and electric and thermal energy generation facilities[23].

The "Zhassyl Damu" programme set the following indicators for industrial enterprises adjusted in 2013[24]:

- 1 resource saving indicator will be introduced in comprehensive environmental permits in 2014;
- standard values set for gross pollutant emission will not exceed 5 million tons;
- standard values set for pollutant discharge will not exceed 5 million tons;
- waste recycling share in their generation will reach 21.9% by 2014;
- keeping within the greenhouse gas (GHG) emission limits will account for 96% by 2014 as compared with 1990;
- desertified and degraded land area dynamics will amount to 0.05% by 2014.

At present, the main short-term strategic document on environment protection is the Strategic Plan of the Ministry of Energy of the Republic of Kazakhstan for 2017-2021. Here environmental issues are addressed under Strategic Area 3 "Environment quality improvement". The Plan set out the following priority improvements in the quality of environment:

1) Emission reduction and state environmental control.
2) Renewable energy sources.
3) Transition of the Republic of Kazakhstan to low carbon development and green economy.
4) Production and consumption waste management.
5) Hydrometeorological and environmental monitoring.

The targets and performance indicators under Strategic Area 3 are specified in Table 1.8.1.

Table 1.8.1. Targets and performance indicators under Strategic Area 3.

No.	Performance indicator	Measurement unit	Actual		Prospected period				
			2015	2016	2017	2018	2019	2020	2021
Target 3.1. Emission reduction, renewable energy sources development and transition to green economy									
29	Standard pollutants volume:	million tons							
	- emission		4.372	4.9	4.9	4.8	4.8	4.7	4.7
	- discharge		3.416	4	2.9	4.8	4.8	4.7	4.7

[23] The Concept of Transition of the Republic of Kazakhstan to Green Economy approved by Decree No. 577 of the President of the Republic of Kazakhstan dated May 30, 2013.

[24] "Zhassyl Damu" industry-specific programme approved by the RK Government Resolution No. 924 dated September 10, 2010.

No.	Performance indicator	Measurement unit	Actual		Prospected period				
			2015	2016	2017	2018	2019	2020	2021
Target 3.1. Emission reduction, renewable energy sources development and transition to green economy									
29	Standard pollutants volume:	million tons							
	- emission		4.372	4.9	4.9	4.8	4.8	4.7	4.7
	- discharge		3.416	4	2.9	4.8	4.8	4.7	4.7
30	Greenhouse gas emission limits as compared to 1990*	%	81	83	86	89	92	95	94
31	Power generation from renewable energy sources	billion kWh	0.7	0.8	1.1	1.7	2.3	3	3.5
32	Mainstreaming green economy principles and the Green Bridge Partnership Programme	%	-	25	30	-	-	-	-
Target 3.2. Restoration of natural environment, production and consumption waste management									
33	Production waste recycling and handling share in its generation	%	23.12	25	27.5	26.5	27	27.5	28
34	Municipal solid waste recycling and handling share in its generation	%	1.8	2.0	7	3	3.2	3.5	4
35	Abandoned hazardous waste management efforts	%	-	6	3	15	-	-	-
36	Karasu Lake (Shchuchinsk-Borovoye Resort Area) cleaning and sanitization process completion rate	%	15	17.8	65.3	53.6	83.5	100	-
*Data obtained with the use of a new calculation method									
Target 3.3. Improvement of hydrometeorological and environmental monitoring									
40	Country monitoring coverage:	%							
	Meteorological		77	78	78	78	78	78	78
	Agrometeorological		72.5	72.5	72.5	72.5	72.5	72.5	72.5
	Hydrological		60	61	61	61	61	61	61
	air pollution status		57	58	56	56	56	56	56

The Strategic Development Plan of the Republic of Kazakhstan until 2025 set a specific target to improve environmental conditions under Reform No. 5 “Strong regions and urbanization” and the priority to ensure basic quality of life in all regions. To that end, Kazakhstan environmental standards have to be raised to the level of developed countries, including emission benchmarks for industrial enterprises and vehicles[25].

The following Initiatives were announced to achieve the target:

Initiative 5.17. Environmental legislation review.

Initiative 5.18. Municipal solid waste recycling and handling industry development.

Initiative 5.19. Enactment of ‘polluter pays’ principle.

Initiative 5.20. Introduction of comprehensive environmental permits for businesses.

Initiative 5.21. Change in environmental impact assessment procedure.

Initiative 5.22. Mainstreaming environment protection policy.

1.9. National goals and objectives adopted for meeting the Target 9.

Alien species are plants and animals that are introduced, accidentally or by human activity, in an ecosystem unnatural for them and may disrupt its sophisticated structure and natural balance causing a loss of many species and biodiversity.

Up to 55 invasive and alien species of vertebrates are found in Kazakhstan; some of them, like birds flying in from time to time, have no influence on ecosystems, others, however, have grown in numbers and make a difference in local fauna.

[25] The Strategic Development Plan of the Republic of Kazakhstan until 2025 approved by Decree No. 636 of the President of the Republic of Kazakhstan dated February 15, 2018.

The latter category includes birds, like myna, and mammals, like brown rat, Russian red tree squirrel, muskrat, American mink, jackal, etc. Invasive fish species, introduced both accidentally and intentionally, amount to 26 out of 150 species, i.e. over 17% of the country's ichthyofauna. The most notable invasive invertebrates are Mnemiopsis comb jelly eating out food reserve and spawn in the Caspian Sea and the infamous Colorado beetle – a major pest of potato crops.

The Action Plan for implementation of the Concept of Conservation and Sustainable Use of Biological Diversity in the Republic of Kazakhstan until 2030 provides for[26]:

- development of an invasive alien species (animals and plants) information and control system, and
- a list of identified species prioritized by degree of their threat to biodiversity.

The country currently lacks such invasive and alien species information system or any integrated control programme.

1.10. National goals and objectives adopted for meeting the Target 10.

This target is not particularly relative to Kazakhstan due to its landlocked status.

Vulnerable ecosystems from the point of view of biodiversity protection are Kazakhstan wetlands, 10 of which are currently of international importance, especially valuable State Forest Estate areas and important bird areas (IBAs).

The RK Law on PAs defines wetlands of international importance as natural or artificial bodies of water, including offshore zones, qualifying as reservats of considerable communities of rare, vulnerable and threatened species or subspecies of plants and animals, first and foremost, migratory waterbirds of international resource.

The PA status is assigned to wetlands of international importance and a reserve or zakaznik regime of operation, or a regulated regime of economic activity is set up there to ensure protection and recovery of waterbird habitats.

Kazakhstan has ratified the Ramsar Convention on Wetlands; its implementation was conferred to the CFW MoA RK.

The category of especially valuable State Forest Estate areas includes especially valuable forest areas, wild fruit forests, riparian and subalpine forests that can be included either in protected areas or the following categories of protected forest areas:

1) research natural areas, including forest genetic reservats;
2) nut-bearing natural forests;
3) Asian wild apple trees (Malus sieversii).
4) subalpine forests.
5) floodplain riparian forests in the desert zone.

Especially valuable State Forest Estate areas operate under reserve or zakaznik regime of their protection and use.

IBAs are areas inhabited by considerable numbers of birds, rare and threatened species, landscape-specific bird communities, nesting and migrating clusters of terrestrial birds or waterbirds and semiaquatic birds. Important bird areas follow zakaznik regime of operation.

The above vulnerable ecosystems are protected in Kazakhstan in line with policy documents on PA network protection and development.

Strategic Goal C: Improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity.

[26] The Concept of Conservation and Sustainable Use of Biological Diversity in the Republic of Kazakhstan until 2030.

1.11. National goals and objectives adopted for meeting the Target 11.

PA network development in Kazakhstan in 2013-2017 was covered in the following documents.

According to the amendments introduced into the Governmental Decree as of 30 December 2013 No 1434 'On approval of main provisions of the Republic of Kazakhstan Territory Arrangement Master Plan' approved by the Governmental Decree as of 12 May 2017 No 256 to protect and develop the network of protected areas set out the following performance indicators: expand PAs to 9.4% of the total country area or 25.6 million ha by 2020, and to 10.3% of the total country area or 28.1 million ha by 2030, and to 13% or 35.6 ha by 2050 (see Table 1.11.1.).

Table 1.11.1. Protected area network development in Kazakhstan

PA of national significance	Amount		
	2012	2020	2030
State nature reserve	10	10	13
State national nature park	12	13	20
State natural monument	26	26	26
State natural reservat	4	7	12
State natural zakaznik	50	56	60
State natural protected zone	5	6	7
State botanical garden	5	5	5

The "Zhassyl Damu" Programme for 2010-2014 set the goal to increase the share of PAs to 8.8% of Kazakhstan area by 2014[27] that conforms with the Aichi Target 11.

The Programme in general was focused on application of the advanced green economy principle delinking resource use from environmental implications of economic growth.

When "Zhassyl Damu" merits and disadvantages were analysed it was noted that the Programme includes a section on forestry and wildlife, protected areas, as one of the main society goals was conservation of biological diversity and the country's sustainable development.

The range of opportunities also included:

- establishment of protected area networks in priority regions to secure long-term conservation of biological diversity and stability of environmental conditions;
- growth in numbers of rare and threatened species of ungulate animals and saiga;
- introduction of new technologies in forest regeneration and improvement of its species composition.

The Programme emphasized the need for reliable protected areas in argali habitats (Altai, Kazakhstan, Karatau, Kyzylkum argali) and for desert mammals – goitered gazelle, koulan, manul cat, caracal, marbled polecat, desert monitor.

The Concept of Conservation and Sustainable Use of Biological Diversity in the Republic of Kazakhstan until 2030 underlines the importance of creation of an appropriate environmental network – a system of PAs, forest safeguarding institutions, hunting farms, fishery waters, health and recreation areas, resorts and wildlife corridors operating under

[27] "Zhassyl Damu" industry-specific programme approved by the RK Government Resolution No. 924 dated September 10, 2010 (repealed by the RK Government Resolution No. 779 dated July 8, 2014).

different protection regimes. This will improve geographic protection of the country's biodiversity and natural ecosystems[28].

It is noted in the Concept that the existing PAs are very unequally distributed among ecosystems. Despite large numbers of PAs of different status many key ecosystems of desert and steppe zones are omitted. Location, boundaries and size of many PAs are not appropriate. The smallest legally established protected areas (less than 1%) are located in middle and southern deserts (0.69%), lake ecosystems (0.04%) and no legally established PAs are found in the river valleys and the Caspian Sea ecosystems. In order to ensure representative distribution of protected areas their cumulative size has to reach 10% of the country area by 2030, including legally established PAs (5%).

A separate section of the Concept is dedicated to biodiversity monitoring system based on environmental approach, since any biological system is a dynamic system with many processes continually proceeding in it, often scattered over time. The biodiversity monitoring system tracks these processes and changes they entail and ensures timely decision-making.

The targets are as follows:

1) The Republican Forest and Bioresource Information Centre is set up and operates by 2020.
2) A biological diversity monitoring system is developed and functions by 2020 in PAs, and covers the whole ecological network of Kazakhstan by 2030.
3) An automated biological diversity monitoring and information system is developed by 2020 to cover all PAs.

A new mid-term strategic document is the Strategic Development Plan of the Republic of Kazakhstan until 2025 providing, in accordance with Target 7 "Conservation of biodiversity", for further efforts to expand protected areas with a view to conserve endemic, rare and threatened species, unique natural zones and natural ecosystems[29]. It is planned to establish two national parks, three natural reservats and increase the size of protected areas to 10-12% of Kazakhstan area. The state will proceed with the policy of biodiversity conservation by safeguarding the state nature reserve fund, among other measures.

The same document announced Initiative 3.33 "Enabling environment for tourism development" to improve legal framework and develop road, roadside, communal and other infrastructure, recreation facilities and nature trails, including those in protected areas and forest husbandries.

1.12. National goals and objectives adopted for meeting the Target 12.

The "Zhassyl Damu" industry-specific programme was designed to create conditions for conservation and rehabilitation of natural ecosystems.

Conservation of biodiversity and integrity of animal communities in the wild, evidence-based, rational use of wildlife resources, wildlife reproduction, artificial propagation including valuable, rare and threatened species are priority national targets under the Ministries' strategic plans equivalent to the Aichi Target 12.

More policy documents on wildlife and hunting sector have been adopted at the regional (oblast level). The regions are currently implementing territorial development programmes for 2016-2020 where conservation and recovery of region ecosystems is in the range of strategic priorities. The target "Non-government fixed investment volume index for wildlife reproduction assets" was set for wildlife conservation and hunting sector development.

[28] The Concept of Conservation and Sustainable Use of Biological Diversity in the Republic of Kazakhstan until 2030.

[29] The Strategic Development Plan of the Republic of Kazakhstan until 2025 approved by Decree No. 636 of the President of the Republic of Kazakhstan dated February 15, 2018.

Oblast departments of natural resources and environmental regulation responsible for the target implementation carry out awareness-raising and promotion events and monitor expenditures on wildlife reproduction activities.

A new mid-term strategic document is the Strategic Development Plan of the Republic of Kazakhstan until 2025 stipulating, in accordance with Target 7 "Conservation of biodiversity", that Kazakhstan will further pursue biodiversity conservation policy through wildlife conservation and development, including rare and threatened animal species, development of game breeding in captivity and semi-free conditions, among other actions.

1.13. National goals and objectives adopted for meeting the Target 13.

Kazakhstan has signed the Convention on Biological Diversity and thus committed to conserve its genetic resources and utilize them in a sustainable manner. Kazakhstan is also a party to the Cartagena Protocol on Biosafety and acceded the Nagoya Protocol under Decree No. 1025 of the President of the Republic of Kazakhstan dated March 17, 2015.

According to a confirmed hypothesis of Soviet scientist Nikolai Vavilov the territory of Kazakhstan is one of the natural centres of origin of a number of plant species. The country's genetic resources are therefore of global importance to humanity.

The Concept of Conservation and Sustainable Use of Biological Diversity in the Republic of Kazakhstan until 2030 sets Target 7: By 2030 infrastructure is set up to ensure conservation of genetic resources, access to them and their fair and equitable utilization[30] – echoing the Aichi Target 13.

Performance indicators are as follows:

1) Feasibility studies (TEO), designs and estimates for establishment of forest selection centres, protected genetic selection facilities, botanical gardens, arboreta, a genetics bank for the principal plant species, making up a national network by 2018;
2) RK Government Resolutions on establishment of forest selection centres, protected genetic selection facilities, botanical gardens, arboreta, a genetics bank for 10 principal plant species by 2020 and a genetics bank for 20 principal plant species by 2030;
3) Approved budget lines for maintenance of forest selection centres, protected genetic selection facilities, botanical gardens, arboreta, a genetics bank for the principal plant species, making up a national network;
4) Application of biotechnologies to conservation, recovery and sustainable utilization of genetic resources;
5) Species coverage by genetic selection facilities.

At the same time, the above tasks are not formalized in any strategic or policy documents.

Strategic Goal D: Enhance the benefits to all from biodiversity and ecosystem services.

1.14. National goals and objectives adopted for meeting the Target 14.

The Concept of Transition of the Republic of Kazakhstan to Green Economy, among other priorities, is aimed at improvement of (1) people's well-being and environmental quality using cost-effective ways to reduce environmental pressure and (2) national security, including water security[31] that goes in line with the Aichi Target 14.

The Concept envisages the following measures and mechanisms for reduction of water resources deficit:

1. Water saving in agriculture (6.5-7 billion m^3 by 2030). This requires action in the following three areas:

[30] The Concept of Conservation and Sustainable Use of Biological Diversity in the Republic of Kazakhstan until 2030.

[31] The Concept of Transition of the Republic of Kazakhstan to Green Economy approved by Decree No. 577 of the President of the Republic of Kazakhstan dated May 30, 2013.

1) Introduction of advanced irrigation methods and other modern water-efficient technologies (will save 1.5 billion m^3):
— drip irrigation and other modern water-efficient technologies over 15% of crop acreage by 2030; flooding reduction from 80% to 5% of irrigated areas;
— expansion of areas under grass to 1,700 ha by 2030;
2) Transition to less water intensive crops with higher added value; gradual reduction of marginal water intensive crops – rice and cotton in Balkhash-Alakol and Aral-Syr Darya basins (will save 3.5 billion m^3 by 2030):
— gradual reduction of rice and cotton crop acreage by 20-30% and their replacement with less water intensive vegetable, oil and feed crops by 2030;
3) Three-fold reduction of water loss in transportation (will save 1.8 billion m^3 by 2030):
— restoration of large infrastructure facilities, determination of property right and responsibility for their maintenance;
— water intake measurement and data collection from all end and intermediate water users. Availability of water meters have to become a precondition of any form of government support to agriculture.

2. 25% higher water use efficiency in industry (will save 1.5-2 billion m^3 by 2030):
   1) Reduction of water consumption by operating enterprises by means of:
   — introduction of energy efficiency technologies (to save water per unit of output) and water saving in energy, production and metal industries (will reduce consumption by 20%);
   — reuse of discharge waters and reverse water supply (expected growth by 4% in the next 17 years);
   2) Raising water intake and treatment standards for production enterprises.
3. Higher water use efficiency in the utilities system by 10% (will save up to 0.1 billion m^3):
   — elimination of leakage in houses and utility networks;
   — water pressure control in distribution networks;
   — raising water saving standards for household appliances and plumbing.
4. Water resources accessibility and reliability (4.5-5 billion m^3).

The issue of transborder rivers division is most pressing, and Kazakhstan has to negotiate the status of all bodies of water and enter into or update the relevant agreements with its neighbors.

A major programme most consequential for reduction of impact on ecosystems and their biodiversity was the State Programme for Water Resources Management in Kazakhstan. The aim of this Programme was to ensure the country's water security through enhancement of water resource management, similar to the Aichi Target 14[32].

At the moment the Programme is being repealed, but most of its indicators were integrated in the State Programme for the Agro-Industrial Complex Development in the Republic of Kazakhstan for 2017-2021[33].

The new Programme set out the following performance indicators for water use:

— Irrigation water reduction per 1 ha of irrigated land by 20% to the 2015 level (reduction from 9,180 m^3 in 2015 to 7,348 m^3);
— Increase in additional surface water resources by 1.9 km^3 to the 2015 level;
— Water volumes in industrial recycling and reverse water supply systems: recycling – from 0.69 km^3 in 2015 to 0.77 km^3; reverse – from 7.3 km^3 in 2015 to 7.62 km^3.

[32] The State Programme for Water Resources Management in Kazakhstan approved by Decree No. 786 of the President of the Republic of Kazakhstan dated April 4, 2014.

[33] Decree No. 420 of the President of the Republic of Kazakhstan dated February 14, 2017 on approval of the State Programme for the Agro-Industrial Complex Development in the Republic of Kazakhstan for 2017-2021 and amendment of Decree No. 957 of the President of the Republic of Kazakhstan dated March 19, 2010.

Agriculture is the major water consumer (up to 80%). One of the key tasks of the new Programme is efficient use of water resources achieved through irrigation water supply to lands with inundative and continuous flow irrigation essential for agriculture development, improvement of their meliorative condition, irrigation infrastructure restoration, higher water use efficiency in industry.

A new mid-term strategic document is the Strategic Development Plan of the Republic of Kazakhstan until 2025[34] providing, under the priority to ensure basic quality of life in all regions, that in order to improve the quality of people's life and equalize living conditions in all regions basic social services have to be provided throughout the country, including affordable and high-quality education and healthcare, security has to be guaranteed, access to water and the quality of environment have to be improved. A specific Initiative 5.15 "Access to drinking water" was also elaborated. New water supply and sewerage facilities are being built and existing facilities are being renovated in order to provide drinking water to people, of good quality and in sufficient amount, and ensure proper treatment of discharge waters. More funds will be allocated from the budget for those measures. By 2025 all towns and cities and 80% of villages will be covered by central water supply system.

Special note: the language of the abovementioned important documents is gender-neutral. The documents provide for measures designed to improve the life of population as a whole, whereas the Aichi Target 14 focuses on the needs of women, indigenous and local communities, and the poor and vulnerable. Therefore, a breakdown by gender is required.

1.15. National goals and objectives adopted for meeting the Target 15.

In accordance with the Concept of Transition of the Republic of Kazakhstan to Green Economy the country will stick to the six principles of Green Agriculture to promote the sector development and conserve and improve environment at the same time[35]. This is in line with the Aichi Target 15:

1) Reverse land degradation: better agricultural practices that minimize tillage, conserve organic matter and soil moisture, prevent soil erosion from wind and water, e.g., by using no till farming equipment and crop rotation;
2) Reverse pasture land overgrazing: preserve pasture land by improving accessibility of remote pasture grounds and restoring pastures, enforcing controlled rotation grazing and supporting water collection;
3) Use water efficiently: foster efficient water use in agriculture, for example, drip irrigation, sprinkle irrigation, discrete irrigation, use of greenhouses;
4) Use resources wisely: foster agrochemical and fuel use that protects users, respects the environment, reduces/prevents soil, air and water pollution, e.g., through Integrated Pest Management, use of fertilizers based on soil study results, and improved fuel efficiency of farm vehicles;
5) Minimize and recycle waste: encourage processing of agriculture products that maximizes added value and minimizes waste, including use of residual waste in production, e.g. as compost, biogas, etc.;
6) Capture carbon dioxide: plant permanent crops, such as agro-forestry, tree crops, perennial crops, permanent cover crops that capture carbon dioxide, are resistant to soil salinity, and contribute to climate change adaptation.

The "Zhassyl Damu" programme saw climate change adaptation as a key element of climate change policy. As the issue of vulnerability of Kazakhstan natural economy systems and economy sectors to climate change is becoming more and more pressing as the years go by, a set of adaptation measures was developed in the Programme. For instance, solution of the global

[34] The Strategic Development Plan of the Republic of Kazakhstan until 2025 approved by Decree No. 636 of the President of the Republic of Kazakhstan dated February 15, 2018.

[35] The Concept of Transition of the Republic of Kazakhstan to Green Economy approved by Decree No. 577 of the President of the Republic of Kazakhstan dated May 30, 2013.

climate change and the ozone layer protection problem was based on reduction in greenhouse gas emissions and low-carbon economic development in line with the Kyoto Protocol, as well as quantitative assessment of future climate change in Kazakhstan under different scenarios. It was also planned to stay below the emission threshold of 96% in 2014 to 1990.

In the field of forest protection from fires, violations of the forest legislation of the Republic of Kazakhstan, pests and diseases, the Programme envisaged establishment of an efficient system of land and aircraft services carrying out activities in the above areas of expYertise.

A new mid-term strategic document is the Strategic Development Plan of the Republic of Kazakhstan until 2025 that was intended to achieve the aims of the Paris Agreement. Implementation of the Paris Agreement on climate change and further steps Kazakhstan will take to set up the EXPO-based Centre for Green Technologies and Investment Projects will mark the country's progress towards green economy. Advancement of green economy will help prevent climate change and adapt to it to meet the country's commitment to reduce GHG emissions through application of green technologies.

1.16. National goals and objectives adopted for meeting the Target 16.

By Decree No. 1025 of the President of the Republic of Kazakhstan dated March 17, 2015 the country acceded the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity adopted on October 29, 2010 during the 10th meeting of the Conference of the Parties to CBD in Nagoya, Japan.

The Concept of Conservation and Sustainable Use of Biological Diversity in the Republic of Kazakhstan until 2030 sets Target 6. By 2020 a national Clearing-House mechanism under the Nagoya Protocol [36] has been set up and operates, that is equivalent to the Aichi Target 16.

The target deliverables are as follows:

1) Resolution of the Government of the Republic of Kazakhstan on establishment of a national coordination centre, competent national authorities and control stations to carry out monitoring activities;
2) Resolution of the Government of the Republic of Kazakhstan on assignment of authorized bodies for the flora and for genetic resources and allocation of government control function over genetic resources utilization;
3) Adopted Law of the Republic of Kazakhstan on genetic resources and the relevant by-laws, including regulations on access to genetic resources, information, technologies and sharing of benefits;
4) Approved budget-funded programme for personnel training in the field of genetic resources;
5) Inventory materials, genetic diversity assessment results and documents concerning government control over utilization of genetic resources.

Strategic Goal E: Enhance implementation through participatory planning, knowledge management and capacity building.

1.17. National goals and objectives adopted for meeting the Target 17.

The first National Biodiversity Strategy and Action Plan (NBSAP) was developed in 1999 by the Ministry of Natural Resources and Environment Protection of the Republic of Kazakhstan. However, the Government of the Republic of Kazakhstan didn't approve it as a binding and budget-funded policy document.

[36] Conception on the conservation and sustainable use of biological diversity of the Republic of Kazakhstan until 2030

In 2014, under the scope of the joint GEF/UNDP/Ministry of Environment and Water Resources project "National Biodiversity Planning to Support the implementation of the CBD 2011-2020 Strategic Plan in Republic of Kazakhstan", a new NBSAP was drafted and named the Concept of Conservation and Sustainable Use of Biological Diversity in the Republic of Kazakhstan until 2030. In late 2014 the draft Concept was reviewed and supplemented by international consultants.

Powered by the UNDP Biodiversity Finance Initiative (BIOFIN) the Biodiversity Concept was finalized in compliance with the UNEP-WCMC's Guidance for National Biodiversity Indicator Development and Use in 2015. The Concept defines 10 key objectives and 32 targets in two priority areas: (1) biodiversity conservation; (2) sustainable use of forest, wildlife and fish resources, pastures and organic farming development.

At the moment, there is no single policy paper on implementation of the above priorities. However, a variety of strategic, industry-specific, regional and other policy documents set national targets either expressly or by implication equivalent to the Aichi Biodiversity Targets, but they are not interrelated and lack cross-sector coordination.

1.18. National goals and objectives adopted for meeting the Target 18.

Kazakhstan accession to the Convention for the Safeguarding of the Intangible Cultural Heritage dated October 17, 2003 ratified by the Law of the Republic of Kazakhstan dated December 21, 2011 lays the foundation for efficient protection, mainstreaming and development of the Kazakh people's intangible cultural values.

In 2013, Kazakhstan adopted the Concept on the Safeguarding and Development of the Intangible Cultural Heritage in the Republic of Kazakhstan approved by the Government Resolution No. 408 dated April 29, 2013.

The Concept defines intangible cultural heritage as customs and ceremonies, forms of representation and expression, knowledge and skills, as well as related tools, objects, artefacts and cultural space recognized by communities, groups and, in some cases, individuals as part of their cultural heritage. Such intangible cultural heritage passed down from generation to generation is constantly recreated by communities and groups depending on their environment, interaction with nature and history to form a sense of identity and continuity thereby promoting respect for cultural diversity and human creativity.

The Concept is designed to create favourable environment for protection, development and mainstreaming of the intangible cultural heritage of the people of Kazakhstan – indirectly and partially in line with the Aichi Target 18.

The Concept targets are as follows:

1) identify, document and look into intangible cultural heritage;
2) support cultural institutions and culture bearers involved in preservation of Kazakhstan intangible cultural heritage;
3) preserve and restore threatened intangible cultural heritage;
4) upgrade professional skills of experts in the field of safeguarding intangible cultural heritage;
5) mainstream intangible cultural heritage in the country and abroad;
6) enhance international cooperation in the field of intangible cultural heritage.

The Concept fails to describe any specific measures and has to be implemented through other policy documents such as the Regional Development Programme and the Ministries' Strategic Plans.

The State Programme for the Agro-Industrial Complex Development for 2017-2021, among other major challenges to land conservation, highlights underdevelopment of distant pastures due to insufficient water content in those locations[37] (note: distant-pasture cattle tending

[37] The State Programme for the Agro-Industrial Complex Development for 2017-2021 approved by Decree No. 420 of the President of the Republic of Kazakhstan dated February 2, 2017.

is a traditional way of natural pasture preservation not contributing to biodiversity depletion in Kazakhstan).

The Programme envisages further flooding of pastures through subsidized construction of wells and other pasture improvement measures.

The Programme also notes that maximum utilization of soil, plant and animal bio-potential in organic agriculture can minimize environmental, social and economic risks and empower rural men and women to increase their income and improve quality of life. Eco-production is an underdeveloped, yet promising field breaking new grounds for Kazakhstan farmers. It is an innovation area intended to safeguard local traditions and culture and incorporate positive farming experience inherited from older generations.

The brand "Made in Kazakhstan" will become a standard for eco-friendly (organic) production. It will be introduced by an independent document specifying brand requirements and producers' selection criteria.

In addition to the above, the eco-friendly (organic) goods production, turnover and certification rules (standards) will be harmonized with international standards and requirements and the legislation of importers of Kazakhstan eco-friendly (organic) products. Technical standards will be elaborated to regulate production and use of crop protection bio-agents, soil amendments, growth stimulants and other biological products used in production of eco-friendly goods.

Statistical reporting on the production, sale, export and import of environmentally friendly (organic) products will be introduced.

Demand for Kazakhstan's eco-friendly (organic) goods on domestic and foreign markets will be stimulated and the results of eco-friendly (organic) production will be promoted at awareness raising and promotion events where the country's interests will be protected and represented at the international level, including international exhibitions, trading platforms and fora on eco-friendly (organic) production. Model farms will be created and supported to display eco-friendly (organic) production technologies, practices and methods and producers' cooperation.

A new mid-term strategic document is the Strategic Development Plan of the Republic of Kazakhstan until 2025 setting the target to ensure regional economic independence[38]. Its implementation can promote the Aichi Target 18. Thus, the Plan provides for Initiative 5.4 "Further strengthening of local governments". Towns of district significance, villages, settlements and rural districts with a population of over two thousand people will have an independent budget and local government municipal property. Starting from 2020, these standards will apply to all localities. This will involve people in search for solution of local issues. Creation of a representative local government body at the level of towns of district significance, villages, settlements and rural districts will be elaborated to enable local communities to take part in budget approval. Further increase in revenue sources for local government budgets will also be focused on. Capacity-building measures will be taken in maslikhats in terms of budgeting process.

Reform No. 6 "Modernization of public consciousness" provides for Initiative 6.3 "Environmental culture development among population" envisaging outreach activities to promote rational use of natural resources in both private use and industry.

Under the priority to preserve the national identity it is essential to safeguard national traditions and customs, language, music and literature. In this respect Initiative 6.10 "The Sacred Geography of Kazakhstan project development" for preparation of domestic and cross-border tourist routes to sacred locations, their promotion in Kazakhstan and beyond, and Initiative 6.11 "Area studies and support for social initiatives" were announced. Implementation of the latter includes organization of area studies in education, environment and municipal improvement,

[38] The Strategic Development Plan of the Republic of Kazakhstan until 2025 approved by Decree No. 636 of the President of the Republic of Kazakhstan dated February 15, 2018.

studies of regional history, reconstruction of heritage buildings and local cultural sites. Support will also be rendered to social initiatives launched by businesspeople, officials, intellectuals and the youth seeking development of their small motherland.

1.19. National goals and objectives adopted for meeting the Target 19.

The State Programme for the AIC Development and the Strategic Plans of the Ministry of Agriculture make provisions for applied scientific research in forestry, wildlife and PAs with further introduction of scientific developments into production[39] echoing the Aichi Target 19.

Kazakhstan scientific resources in the field of biodiversity are distributed between public and private sectors. Research is financed under government contracts and grants, including foreign ones.

The State Program for Education and Science Development in the Republic of Kazakhstan for 2016-2019 was approved by Decree No. 205 of the President of the Republic of Kazakhstan dated March 1, 2016. However, it fails to set any goals and objectives for advancement of scientific research and introduction of biodiversity technologies.

Priorities for the development of science were announced by the Higher Scientific and Technical Commission (HSTC) under the Government of the Republic of Kazakhstan. Five priorities were set for the period from 2014 to 2016:

- Rational use of natural resources;
- Raw materials and products processing;
- Energy and engineering;
- Biosciences;
- The country's intellectual potential.

The Strategic Development Plan of the Republic of Kazakhstan until 2025 sets the target to develop a scientific research system[40] and Initiative 2.22 "Enabling environment for academic development. Sustainable development of science". The plan to gradually build up science funding up to 1% by 2025 approved by the Higher Scientific and Technical Commission will be put into action. A new requirement is at least 50% co-financing of budget-funded scientific and innovative projects from non-budgetary sources (private sector). Thus, the share of private finance in applied research is expected to grow from 7% to 50%.

1.20. National goals and objectives adopted for meeting the Target 20.

All the above-mentioned policy documents are aimed at sustainable development and protection of environment in Kazakhstan. Biodiversity is an essential factor for sustainable development, its conservation requires sufficient funding from all sources.

The biodiversity targets can't be achieved with government funding alone. Being a major user of natural resources, the industry must become a major contributor to compensation of its own harmful impact on ecosystems and their biodiversity. The manufacturers' reputation and their competitive position locally and internationally largely depends on that.

The BIOFIN initiative has been implemented in Kazakhstan since 2014 with financial support from the European Union, the Governments of Switzerland, Germany, Norway and Belgium. It operates in over 30 countries. The Biodiversity Finance Initiative is a global partnership addressing biodiversity finance in a comprehensive manner. Its objective is to support governments in obtaining a coherent view of the biodiversity finance trends at the national level and covering financing gaps. The initiative has developed an innovative methodology enabling countries to measure their current biodiversity expenditures, estimate

[39] The State Programme for the Agro-Industrial Complex Development for 2017-2021 approved by Decree No. 420 of the President of the Republic of Kazakhstan dated February 2, 2017.

[40] The Strategic Development Plan of the Republic of Kazakhstan until 2025 approved by Decree No. 636 of the President of the Republic of Kazakhstan dated February 15, 2018.

mid-term financial needs, and identify the most appropriate financial and economic mechanisms to cover biodiversity financing gaps.

According to BIOFIN experts' findings biodiversity financing in Kazakhstan amounted to about 1.2 billion US dollars in 7 years (from 2008 to 2014). The need for finance in conservation and sustainable use of biodiversity in 2016-2020 was estimated at 851 million US dollars. The annual shortage of biodiversity financing is estimated at around 55% of the country's current biodiversity spending. To cover the financial deficit BIOFIN experts in Kazakhstan have developed a resource mobilization plan summing up the most promising financial solutions.

Promotion, introduction and further implementation of those solutions requires improvement of environmental legislation. In 2015-2017 the BIOFIN project team developed new regulations and took active part in improvement of the current flora and fauna legislation. These efforts resulted in introduction of the term "forest ecosystem services" and voluntary contributions for the use of forest ecosystem services as a forest sector financing mechanism into the Forest Code of Kazakhstan. Voluntary contributions for unavoidable harm from economic activities are formalized in the Law on protected areas as a new source of PAs funding. After the amendments are enacted, budget funds will be allocated to PAs in accordance with the PA Management Plan. This will significantly increase PAs funding from the budget depending on their actual needs. In general, these amendments will empower PAs and forestry enterprises to raise additional funds for conservation and restoration of ecosystems and biodiversity from private sector. At present, the BIOFIN project team carries on elaboration of recommendations on improvement of Kazakhstan environmental legislation.

The Strategic Development Plan of the Republic of Kazakhstan until 2025 sets the target to identify sources of financing, account for green finance and attract investments. International funds and private investment will support green technologies along with the national and local budgets. Investments will be made through the Green Climate Fund created by the governments of 124 countries to control and reduce greenhouse gas emissions in developing countries and assist in their adaptation to climate change. Public funds will be allocated through PPP projects. At the same time, the financial resources planning process will follow a time-sensitive and flexible timeline as green technologies are constantly upgraded and production processes are becoming cheaper. With this in mind, clear evaluation criteria will be defined for applied project technologies for further planning and accounting of funds spent on transition to green economy. Development of the emissions trading market will continue and its integration with the foreign market will be arranged. Kazakhstan aspires to become the green finance leader in the region taking advantage of resources of the Astana International Financial Centre and the newly established International Centre for Green Technologies and Investment Projects.

Section II. Measures taken for meeting Aichi national targets, assessment of their efficiency, challenges, scientific and technical needs.

Strategic Goal A. Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society.

2.1. Measures taken for meeting the national target to educate businesses and people and develop their environmental culture, assessment of their efficiency, challenges, scientific and technical needs.

The Concept of Transition of the Republic of Kazakhstan to Green Economy declares the need to update the existing curricula and develop new ones on the rational use of resources and protection of environment in education and training system, that goes in line with the Aichi Target 1.

To that end, the general education course "Ecology and Sustainable Development" (90 hours) has become a core component in the standard curricula of all areas of study. Since 2013 the following topics have been included in the standard course curriculum: "Economic aspects of sustainable development. Green economy and sustainable development. Water resources management", "Eco-energy. The strategy of global ecological energy sustainable development in the XXI century. Renewable energy sources". As they study these topics, the students look into dependence of economy on environment, the aspects of green economy and sustainable development, comparability of production and natural potentials, natural resources management, eco-energy, strategic water resource of the XXI century, and water management.

In 2014-2016, the Ministry of Education and Science of the Republic of Kazakhstan developed 10 professional standards for 20 areas of study related to water and land protection and use. In 2017, 4 professional standards were developed for the areas of "Water Management", "Fishery" and "Forestry".

An important contribution to the development of environmental culture among population was made by EXPO-2017 international exhibition held in Astana in June-August 2017. The exhibition displayed the latest generation of energy-efficient technologies and evidence of how and why they must be applied. EXPO-2017 focused on the idea of personal responsibility and personal involvement of everyone in the elaboration and implementation of a sustainable plan for production, distribution and use of Future Energy. The World Congress of Engineers and Scientists WSEC-2017 "Energy of the Future: Innovative Scenarios and Methods for Their Implementation" was organized under the auspices of EXPO-2017 along with many other events.

People's awareness on biodiversity values and measures they can take for its conservation and sustainable use is raised by the Committee for Forestry and Wildlife of the RK Ministry of Agriculture and its subordinate organizations, PAs, natural resources and environmental management departments of oblast akimats and municipal state forest management institutions, private forestry enterprises and community conservation organizations. Information on biodiversity values is communicated to the public through Visitor Centres at PAs, mass media, social media, round-table discussions and fora, leaflets, billboards, press walls, information boards and websites of environmental institutions. The CFW website is a component of the national CBD clearing-house mechanism[41].

Museums of nature have been created in all PAs, except for those established this year (2018). Visitor centres are available in 6 PAs. School forestry units operate in state forestry and environmental institutions; they annually organize and carry out environmental activities: "March for Parks", "Zhassyl Zhapyrak", "All-Nation Tree Planting Day", "Earth Day", "Plant Your Tree", "Green Kazakhstan", etc.

[41] http://fhc.kz/

Order No. 93 of the Minister of Energy of the Republic of Kazakhstan dated February 13, 2015 approved the Media Plan to cover implementation of the Concept of Transition of the Republic of Kazakhstan to Green Economy for 2015-2016. A series of events was organized in line with the Plan to cover the Concept implementation progress in a systematic and effective manner (publication and broadcasting of image promotion analytical articles, interviews, memos, detailed publications and overviews, round-table discussions, etc.).

The press office of the RK Ministry of Agriculture liaises the CFW with mass media – radio, television and the web – to share impartial information on biodiversity conservation in Kazakhstan. The press office also prepares and circulates official press releases, statements and other information materials on biodiversity conservation and posts them on the official website of the Committee; organizes and holds press conferences, briefings, round-table discussions, meetings with community representatives and the media on conservation of biological diversity; collects and analyses materials on biodiversity delivered by the public and published in mass media.

Nearly all international projects implemented in Kazakhstan feature educational and awareness-raising components where training materials and programs are developed, and various workshops, round-table discussions and conferences are held.

A number of educational materials and programs to be used throughout the education system, from schools to universities, have been developed within the scope of the joint GEF/UNDP/Kazakhstan Government project "Improving Sustainability of PA System in Desert Ecosystems through Promotion of Biodiversity-compatible Livelihoods in and around PAs" (the Desert Project). Specifically, a comprehensive master program was launched in two national agrotechnical universities to train 16 specialists majoring in PA management annually. To that end, standard training modules were prepared and approved at the national level in 5 areas: research and monitoring, protection of natural sites, environmental education and ecotourism, PA management, financial and administrative management.

A supplementary environmental education course for years 6, 7 and 8 was introduced in 4 pilot schools in 3 Desert Project areas (Ili-Balkhash, Aral-Syr Darya and Usturt) and in Astana. The course is designed to provide additional knowledge on biodiversity of desert regions of Kazakhstan. A study guide for secondary school teachers has been developed and printed in Kazakh and Russian languages. 128 natural science teachers from 3 regions and the capital of Kazakhstan have attended training seminars on introduction of this new course in their schools.

For wider public and stakeholders' information the BIOFIN[42] project has produced a film on the aspects of biodiversity financing in Kazakhstan in Russian and English languages, as well as the relevant publications. The project deliverables were presented to the general public and stakeholders at the final seminar, and over 50 people learnt the details of the resource mobilization plan. New economic mechanisms and resource mobilization, the issues of biodiversity financing were discussed with mass media in the "green café". This event is designed to build journalists' capacity and extend their knowledge of sustainable use of ecosystems and biodiversity.

In 2014-2017 a training module with interactive applications for eight (8) methods of ecosystem services valuation was developed within the scope of the project "Improvement of the Decision-making Process through Introduction of Mechanisms of Economic Assessment of Fulfilling National Obligations under Global Environmental Agreements"[43] and adopted by two institutions of higher education for introduction in the curriculum of graduate students majoring in economics and environmental management. The module was developed on the basis of economic assessment of ecosystem services in the Ili-Balkhash Natural Reservat. It was tested

[42] Report on the progress of "Building Transformative Policy and Financing Frameworks to Increase Investment in Biodiversity Management (BIOFIN)" project. UNDP in Kazakhstan. 2017.

[43] Final report on implementation of "Improvement of the Decision-making Process through Introduction of Mechanisms of Economic Assessment of Fulfilling National Obligations under Global Environmental Agreements" (CD-2) project. UNDP in Kazakhstan. 2017.

during a training session where over 20 representatives of Kazakhstan universities and research institutes acquired new knowledge on the methods of ecosystem service assessment. The project outcomes were presented to mass media in the "green café" where the issues of natural resource valuation in decision making were also highlighted. This event is designed to build journalists' capacity and extend their knowledge of sustainable use of ecosystems and biodiversity. In total over 700 representatives of research organizations, government authorities and private sector gained new knowledge and built their capacity at workshops and training sessions on economic assessment of ecosystem services over the period of the project implementation.

Despite the lack of data disaggregated by gender in international project reports both men and women actually took part in the events. This is confirmed by information collected in a focus group with the Desert Project female beneficiaries, based on analysis of mass media materials and biodiversity workshops participants' lists.

Challenges and needs.

For 10 years Kazakhstan has been in the Top 8 by the UNESCO Education for All Development Index due to high rates of enrolment in primary education, adult literacy, the proportion of students who have completed a five-year programme, and gender equality. However, the term "environmental education" is mentioned in only 47% of 78 national curricula analysed.

The UN recommends to purposefully increase education funding and allocate at least 4% to 6% of GDP to education needs in order to achieve the targets of Sustainable Development Goal (SDG) 4. Since 1991, in Kazakhstan this figure has averaged 3.8% of GDP annually. Whereas the GDP share of expenditure on secondary education in Kazakhstan is comparable to OECD (2.1% and 2.2%, respectively), expenditure on pre-school, technical and vocational training and higher education is three times lower than in OECD countries.

According to OECD experts Kazakhstan education needs to improve training of highly skilled professionals. They suggest going beyond formal education, improving management and building up professional skills with due regard to small and medium businesses development. Everything noted above applies to environmental education too.

So far, the issue of streamlining of the list of available sources and finding ways to search for information from individual sources, approach to further processing of information and ways to ensure accessibility and identify problems resulting from lack of access to information hasn't been settled. It is very important to identify risks associated with reliability of individual sources. This justifies the need for an efficient mechanism – the Inter-Agency Information and Analytical Centre.

A special system accumulating and processing information for strategic decision-making has to be developed to enable the use of available information. An important aspect of information and support system development for strategic decision-making is the analysis of current management accounting tools in the context of information gain for strategy formulation and implementation.

The most effective biodiversity conservation mechanisms are development of an information and scientific support system, raising awareness of government and community representatives in the field of conservation and sustainable use of bioresources, ensuring public involvement in resolution of the relevant issues. Achievement of the above targets requires, first of all, a full-scale awareness campaign designed to communicate the topics of ecosystem conservation and sustainable use of bioresources to everyone without exception, from an ordinary man in the street to a government official. A matter of priority is the relevance of information and its reliability.

Contemporary landscape features a vast variety of social, religious, and national peculiarities within different groups of population; predominance of consumer's attitude to nature, focus on the use of natural resources, low biological literacy rate and lack of understanding of biodiversity conservation importance; rapid change of public opinion in the context of social and economic reforms.

Priority targets:

1) to develop people's environmental culture;
2) to foster a responsible and proactive civic stance in the field of biodiversity conservation;
3) to promote humane attitude to wildlife and enhance environmental ethics;
4) to improve people's biological and environmental literacy, enhance environmental knowledge of decision-makers, use environmental management methods and technologies conserving biological diversity.

Priority actions:

1) to promote the need to conserve biological diversity in mass media;
2) to enhance environmental and biological education of population;
3) to raise awareness on the state and threats to biodiversity;
4) to support environmental initiatives.

The following actions have to be taken for effective information support:

1) organize and hold press conferences and awareness campaigns on conservation and sustainable use of biodiversity, speeches and television programmes;

2) produce and distribute visual media like booklets on safety arrangements in environmental institutions and utilization of areas with wild plants and wild animals habitats added to the Red Book of the Republic of Kazakhstan;

3) produce popular-science films about nature for different age categories with due regard to people's social status and broadcasting them in cinema and on TV;

4) develop online promotion projects;

5) post information on conservation and sustainable use of bioresources, develop incentive and educational programmes on environment for boys and girls, green model engineering, websites with content on activities of environmental organizations, availability of tourist and environmental routes, promotions offered by PAs;

6) develop a network of "green schools" (school forestry units) and ensure their functioning, raise environmental awareness of young men and women through development of "green schools", ecological tourism, "green routes" and ecological trails.

Since biodiversity protection measures have far-reaching consequences for all people living in the Republic of Kazakhstan, it is important to raise public awareness to facilitate their active voluntary involvement. The level of public awareness on biodiversity in Kazakhstan is not high enough; poaching and illegal collection of flora and fauna objects still happen here.

It is essential to enhance involvement of various stakeholders, including local communities, in the PA management process. A mechanism of mutually beneficial cooperation between PAs and local population are Community Councils facilitating effective resolution and prevention of conflicts arising from simultaneous use of nature and its protection in the same area.

The purpose of Community Councils is to facilitate direct public participation in decision-making process in the field of environmental management and nature conservation. Thus, Community Councils enable people to avail themselves of the opportunity to contribute to resolution of issues that directly affect their lives, while PAs have better chances to enlist people's support in PA management and development. Community Councils significantly reduce the risk of making a mistake, build local government capacity and nurture an active civil society.

Areas of PAs interaction with local communities:

1) sustainable (ecological) tourism development;
2) promotion of local social and economic development;
3) social planning, contribution to democratic foundation of local government;
4) preservation of nature and cultural heritage;
5) revival of traditional folk culture;
6) rational use of nature and local environmental safety.

Fulfilment of all the above measures and completion of the Aichi Target 1 is also subject to adequate funding.

2.2. Measures taken for meeting the national target to integrate ecosystem services economic assessment into the national sustainable development policy, assessment of their efficiency, challenges, scientific and technical needs.

A vulnerable spot of today's Kazakhstan ecosystem management practice and policy in the context of green economy is valuation of ecosystem services, inadequate natural capital accounting in the country's GDP. The situation is aggravated by a number of barriers, such as lack of qualified specialists, inadequate funding, etc. Yet transition to green economy can't be effective without natural capital valuation.

Kazakhstan's biodiversity and ecosystems create high economic values for many sectors of the country's economy and stakeholder groups. Diverse landscapes featuring forests, mountains, pastures, grasslands, rich fauna and flora, soil conservation, carbon dioxide capture are the values whose contribution to economy is not less than that of direct consumption resources.

Many plant species growing in Kazakhstan are known for their healing properties and used in pharmaceutical industry or as traditional remedies. In order to secure this important additional value populations of such plant have to be conserved in PAs, including those plants whose healing properties are known, but they are not yet in commercial production, and those that will develop properties of interest to medicine in the future.

Therefore, PAs are an important and productive estate streaming these economically important ecosystem services. Kazakhstan network of protected areas is of economic value for the population, business and industry in adjacent areas, national economy and even the global community; it enables gain of individual income, creates jobs, generates government profits and supplies raw materials used in production.

Pilot valuations of ecosystem services were undertaken in Karkaraly National Park and in Ili-Balkhash National Natural Reservat when its establishment was planned 2017. The study of Karkaraly National Park assessed the annual value of ecosystem goods and services flows (tourism and recreation, CO_2 uptake, forest by-products, pastures, water supply) at 12,935 million tenge or 86.2 million US dollars (2012 exchange rate)[44]. This amount is just a small part of the true value of the national park, which is very difficult to estimate in the first place. Ili-Balkhash Reservat valuation process covered 11 ecosystem services: carbon sequestration in forest ecosystems, soil protection, redistribution of precipitation, medicinal herbs, wildlife resources, maintenance of hydrological regime, fish resources, water resources, tourism and recreation, hay, carbon sequestration in pasture ecosystems. The total value of ecosystem services in the base year (2015) amounted to 25.8 million US dollars[45] - over four times the size of capital investments required for the reservat establishment and development[46].

PAs valuation is particularly important for preparation of PA feasibility study (TEO) and management plan, as well as for decision-making process in various investment projects affecting protected areas, migration routes, animals, birds and plants habitats. Existing assessment tools for bioresources and ecosystems like EIA have to be improved.

Economic assessment can also play an important role in calculation of tariffs for PA's paid services. It can ensure that the set prices reflect the real (however, not full) value of provided goods and services, and can also serve as means of obtaining accurate prices and market demand data.

In the future, economic assessment of ecosystem services will help: 1) determine the

[44] Guidelines for Economic Assessment of Ecosystem Services in Protected Areas. Astana, 2014.
[45] Economic Assessment of Ecosystem Services in Ili-Balkhash Natural Reservat. Astana, 2017.
[46] https://new-kz.chm-cbd.net/library

benefits derived from natural ecosystems in monetary terms, (2) estimate the share of natural capital in the country's GDP, (3) determine and account for economic value of natural resources in the state cadastre of flora and fauna objects, PAs and forests, (4) draw the baseline of PAs funding and justify budgetary funding, (5) identify additional sources of environmental activities funding, (6) evaluate the benefits of establishment of new PAs and expansion of existing PAs, (7) set up an adequate PES system, (8) improve management practices, (9) identify potential users of natural resources posing a threat to biodiversity and ecosystems, and engage businesses and local communities in environment protection activities.

In 2014-2017 the joint GEF/UNDP/Kazakhstan Government project "Improvement of the Decision-making Process through Introduction of Mechanisms of Economic Assessment of Fulfilling National Obligations under Global Environmental Agreements" was implemented in Kazakhstan. The following activities were carried out within the project scope to develop natural resource valuation tools with a view to integrate assessment of bioresources in EIA.

— Kazakhstan environmental legislation was reviewed for compliance with international commitments under the Convention on Biological Diversity, the Convention to Combat Desertification and Land Degradation, the UN Framework Convention on Climate Change and the Convention on Environmental Impact Assessment in a Transboundary Context;
— Recommendations were prepared on the basis of international experience for integration of ecosystem services valuation methods into the EIA and TEO processes under development projects;
— Methodological approaches were developed for estimation of greenhouse gas absorption and emission by forest and pasture ecosystems;
— Methodological framework for cadastral valuation of plant, forest, fish and wildlife resources was analysed with a view to increase the value of bioresources, and a set of proposals for its improvement was forwarded to the Committee for Forestry and Wildlife of the RK Ministry of Agriculture;
— Methodology of damage assessment to forest resources as a result of fires and illegal logging was revised and proposals for its improvement were forwarded to the CFW. The Scientific and Technical Council of the authorized body approved adjustments in assessment of compensation for damage to forest resources as a result of illegal logging and fires and amendments to the rules for setting base rates for forest use;
— A draft concept on integration of natural (biological) resources valuation into ecosystem and biodiversity management practices was prepared with a view to change current bioresource assessment tools in their entirety;
— Recommendations on integration of bioresources valuation and related obligations under the Rio Conventions into the country policy were developed on the basis of a pilot valuation of ecosystem services in Ili-Balkhash Natural Reservat.

The project assessed the carbon sequestration potential of Kazakhstan forest and pasture ecosystems and produced trend forecasts for greenhouse gas emission reduction by forests in three periods: (1) 2016-2020, (2) 2021-2025, (3) 2026-2030. Recommendations on sustainable management of pasture and forest ecosystems were prepared.

As a project outcome a proposal to include the term "forest ecosystem services" in the Forest Code of the Republic of Kazakhstan was approved by the Law on amendment of certain legislative acts of the Republic of Kazakhstan on flora and fauna dated June 15, 2017.

Challenges and needs.

Unfortunately, Kazakhstan decision makers rarely look at ecosystems from an economic

point of view. This important economic aspect has not been given the consideration it deserves by economists supplying figures for policy- and decision-making, financial planners calculating and allocating the budget, businesspeople and individuals whose economic activities affect the protected areas. In this regard, **Kazakhstan needs international assistance** to study the present situation and implement the Aichi Target 2.

At present, Kazakhstan environmental legislation does not contain any norms on allowance for the value of bioresources in environmental impact assessments and feasibility studies under major investment projects, or mechanisms for negative impact compensation. This gap is a key factor contributing to unsustainable use of bioresources and necessitates further activities in this area.

2.3. Measures taken for meeting the national target to reduce subsidies to industries consuming natural resources, assessment of their efficiency, challenges, scientific and technical needs.

Review of subsidies to economic sectors creating effect on the state of biodiversity in Kazakhstan shows prevalence of subsidies harmful to biodiversity.

President Nursultan Nazarbayev, speaking at a plenary session of 2016 Astana Economic Forum, said: "We must move away from protectionism and subsidizing of traditional energy. Economic growth must be based on the development of clean energy and the preservation of environment. The universal implementation of the Paris Agreement is important. According to international agencies, achievement of its goals will not only slow down global warming, but will also give a boost to the world economy by 20 trillion US dollars or 27%. Millions of new jobs will be created along the way"[47].

Meanwhile, traditional energy subsidies continue to take a significant share of the state budget. Subsidies to agricultural production and export are also high. The most harmful to biodiversity are subsidies for the purchase and use of pesticides in agriculture causing direct death of most insects and soil organisms, and indirect harm to birds, amphibians, reptiles and even mammals inhabiting the treated and adjacent areas.

Pursuant to the State Program for the AIC Development, the main focus of agricultural rehabilitation is government financial assistance rendered in the form of direct subsidies, as well as financial rehabilitation, loan insurance and underwriting for financial institutions, investment subsidies, funding of second-tier banks, designed to facilitate agrarians' access to financing. Government assistance creates favourable conditions for the development of business in rural areas, facilitates private investment in the industry, increases the efficiency of allocated budgetary funds. All this will contribute to **increase in labour productivity** in agriculture, **crop yields** and production rates.

The principle of subsidies has changed since 2016. The Ministry of Agriculture declared the pre-existing payments per hectare of arable land were inefficient and cancelled them. Now the budgetary funds will be mainly allocated for purchase of new equipment (reimbursement of up to 30% of machinery cost and reduced interest rate on leasing) and quality seeds, fertilizers and herbicides.

In 2017, the final rate on loans for spring sowing campaigns was brought down to 6% per annum for end borrowers against 9% in 2016 due to elimination of a number of links in the loan chain.

A list of subsidies with positive implications includes subsidies for beekeeping, aquaculture, maral breeding, perennial plantations of fruit and berry crops granted under the State Programme for the Agro-Industrial Complex Development for 2017-2021. Meanwhile, agriculture lacks biodiversity support subsidies to organic farming and game breeding.

[47] http://www.inform.kz/ru/nado-uyti-ot-subsidirovaniya-tradicionnoy-energetiki-nursultan-nazarbaev_a3036806

As per article 112-3 of the RK Forest Code positive subsidies in forestry can be granted for development of private nurseries and plantations of fast-growing wood species. However, no actual subsidies were paid for the above activities within the period under review.

Subsidy rules on partial reimbursement of expenses incurred by a subject of agro-industrial complex in the form of investment (Order No. 317 of the Ministry of Agriculture as of 23 July 2018) provide for 25% reimbursement of investments for:

- purchase of equipment and machinery by fish farms with more than 1 million yearlings;
- purchase of equipment and machinery by lake commercial fish with the areas of at least 50 hectars.

On the one hand, development of aquaculture helps to reduce pressure on "wild" populations inhabiting natural water bodies. On the other hand, in the course of aquaculture development in lakes and cages there is a risk to let the fish out of controlled conditions into the natural environment and thereby contribute to introduction of alien species into ecosystems and biological pollution. Kazakhstan has adopted the criteria for assigning fishery water bodies and/or sites to water bodies and/or sites for commercial fishing, recreational (sport) fishing, lake commercial fish farming and cage culture fish farming[10], as a legal act.

Maral breeding subsidies. Under the Order No. 3-2/340 of the Minister of Agriculture of the Republic of Kazakhstan dated July 25, 2013 **marals (deer)** are included in the List of animal breeds to be subsidized on a priority basis in order to ensure pedigree stock (material) availability for domestic agricultural producers. At present, subsidies in the maral breeding industry are paid per head of maral (deer) pedigree stock involved in selection and breeding activities.

At the same time, it is necessary to address subsidies in construction of new and expansion of existing maral nurseries, while purchase of equipment and machinery for animal farming has to be subsidized too.

Rendered assistance will stimulate creation of health centres in picturesque locations in Kazakhstan, attract investment through sale of tourist vouchers, extend the potential of local communities for further development of maral breeding and the use of the industry products in healthcare, education, tourism, physical culture and sports.

Challenges and needs.

Subsidy policy reforms addressing harmful subsidies and support for subsidies having a positive effect on biodiversity and ecosystem trends is an effective economic measure for conservation and sustainable use of biodiversity and ecosystems. Along with support of environmental activities cancellation of "negative incentives" increases economic efficiency and reduces budget deficit. Introduction of positive incentives favourable for bioresources contributes to conservation of biodiversity and is an indicator of green economy.

The subsidy scheme provides for phased implementation of the following:

1) Subsidies that adversely affect species, communities, ecosystems have to be included in the list of topics subject to state environmental expert review;
2) The scale of subsidies (their identification and classification by the degree of threat and harm) causing harm to biodiversity has to be recognized following research and analysis with the assistance of international experts, if necessary;
3) The policy of industry subsidy has to be reformed through interdepartmental planning effort;
4) Subsidies having an adverse effect on biodiversity of the Republic of Kazakhstan have to be gradually eliminated;
5) Alternative industry subsidies contributing to conservation of Kazakhstan's biodiversity have to be enhanced, namely subsidies in private afforestation, creation and maintenance of agro-protective forest stands in agriculture, aquaculture development, effective hunting farms and eco-tourism infrastructure.

The "Zhassyl Damu" programme set a national target to render government assistance to private afforestation, plantations of fast-growing tree and shrub species for industrial and energy purpose, establishment and development of forest nurseries. However, due to lack of adequate budgetary funding, the target was not achieved. With insufficient government support and investment, private afforestation in Kazakhstan is developing at a slow pace – in 2018, the area occupied by private forest fund amounts to 695 hectares.

2.4. Measures taken for meeting the national target to move on to green economy, assessment of their efficiency, challenges, scientific and technical needs.

Objectives of the Strategic Plan for the Conservation and Sustainable Use of Biodiversity for 2011-2020 and **the Aichi Target 4 can be achieved** in Kazakhstan through **implementation of the Concept of Transition of the Republic of Kazakhstan to Green Economy** and its targets. A basic list of green economy indicators recommended by the Organization for Economic Cooperation and Development (OECD, 2014) was made for assessment of the Concept implementation at the national level. Green economy indicator figures were published in the statistics digest and statistical bulletins posted on the website of the Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan (www.stat.gov.kz). Nearly all of them are sustainable development indicators.

The Concept implementation progress review has justified the choice of improvement areas and proved attainability of the set indicators.

In the course of its transition to green economy, in the period from 2013 to 2017, Kazakhstan achieved the following major results fully described in the National Report on Implementation of the Concept of Transition of the Republic of Kazakhstan to Green Economy developed by the Ministry of Energy of the Republic of Kazakhstan in 2017 with the support of Deutsche Gesellschaft fuer Internationale Zusammenarbeit (GIZ) GmbH.

Water use efficiency in Kazakhstan is defined as fresh water use rate per unit of GDP. This indicator has positive dynamics: according to the statistics, in 2000 Kazakhstan consumed 91.1 m^3 of water per 1,000 US dollars of GDP, against 50.3 m^3 in 2013 and 46.3 m^3 in 2016 demonstrating decrease in water intensity and improved water use efficiency[48].

Environmental augmentations, bank protection and dredging works are annually performed to **support natural water bodies and navigation**.

More information on the conservation of water-related ecosystems and water supply to population is provided in Section 2.14 of this Report.

Improvement of agricultural productivity is detailed in Section 2.7 of this Report.

In 2016, the **GDP energy intensity** decreased by 17.6% on the year 2008.

The most energy-intensive industries are mining and metallurgy. Industry consumes over 50% of electricity, whilst over 35% is consumed by 15 largest enterprises. Another major energy consumer is the sector of electric and thermal energy generation (20-25%). A significant share of heat energy is consumed by the housing sector (27.9%).

The RK Law on energy-saving and energy efficiency establishes the legal and economic framework for energy-saving and energy efficiency efforts. For example, energy-saving materials, energy meters, automated heat consumption control are mandatory for the construction industry. Apartment buildings have to feature energy-saving materials, energy meters, hot- and cold-water meters, gas meters, as well as automated heat consumption systems. New developments can't be commissioned without energy meters. Energy audit is mandatory for organizations mentioned in the state energy register.

Currently, one of the most effective instruments of the energy-saving system is the State

[48] The National Report on Implementation of Concept of Transition of the Republic of Kazakhstan to Green Economy http://energo.gov.kz/index.php?id=11860

Energy Register listing over five thousand organizations, which, with the exception of government institutions, are obliged to conduct energy audits at least once every 5 years, develop energy-saving action plans and ensure annual reduction in energy and water consumption per unit of production and in the area of buildings and structures to the values set upon energy audit.

UNDP supports implementation of energy efficiency projects. The following projects were implemented in Kazakhstan over the period from 2013 to 2017:

- Removing Barriers to Energy Efficiency in Municipal Heat and Hot Water Supply;
- Energy-Efficient Design and Construction of Residential Buildings;
- Climate Risk Management in Kazakhstan;
- City of Almaty Sustainable Transport.

The project profiles are available on the UNDP in Kazakhstan website[49].

Since 2012, the **share of renewable energy** in total electric energy production in the Republic of Kazakhstan has increased over two times and was expected to reach 1.1% in 2017 (Figure 2.4.1.).

By early 2017, 50 RES facilities with a total capacity of 295.7 MW (HPP – 139.8 MW; WPP – 98.2 MW; SPP – 57.3 MW; biogas plants – 0.35 MW) had been operating in Kazakhstan, and investors' interest in RES projects implementation continues to grow. The RK Law on RES support guarantees RES free access to electricity market and unencumbered, non-discriminatory and priority right to connect to the nearest transmission network point. RES fixed tariffs are also set in this Law.

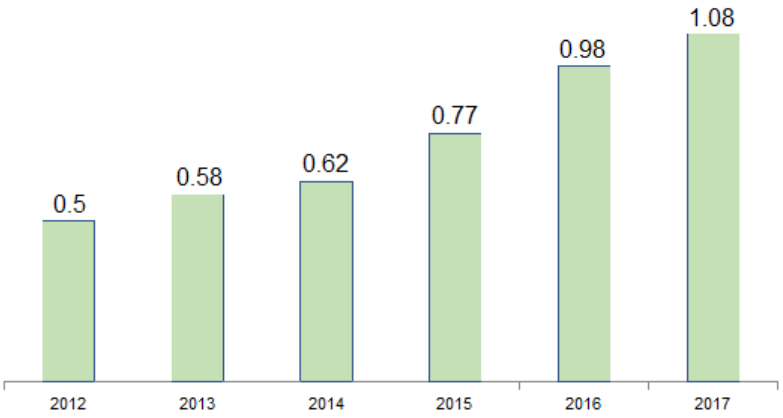

Figure 2.4.1. RES share in total electric energy production, %.

2017 was marked by completion of five RES projects with a total capacity of 35.575 MW (3 HPPs – 30.875 MW; 1 WPP – 4.5 MW; 1 SES – 0.2 MW) in Almaty and South Kazakhstan oblasts and the city of Astana.

The joint UNDP/Kazakhstan Government project "Supporting implementation of the Concept of Transition of the Republic of Kazakhstan to Green Economy and institutionalization of the Green Bridge Partnership Programme by Kazakhstan Government" implemented in 2017 developed and launched the Atlas of Solar Resources of Kazakhstan (http://atlassolar.kz). The Atlas presentation was held in 2017. This is an interactive web-resource that provides users with information on solar insolation (radiation), potential solar energy uses and efficiency, and analysis and calculation tools for pre-design activities. The Atlas was highly appreciated by the experts of the International Renewable Energy Agency (IRENA). It helps identify promising solar energy development locations, including remote ones.

Within the scope of the same project several pilot solar cells were installed in a number of PAs and small rural settlements.

Air pollution reduction measures are detailed in Section 2.8 of this Report.

[49] http://www.kz.undp.org/content/kazakhstan/ru/home/operations/projects/environment_and_energy.html

In 2016, the **greenhouse gas emission limit** amounted to 80.5% on 1990 and didn't exceed the target indicator. 2016 changes in implementation of the National Plan for GHG Allowance Allocation on the basis of specific coefficients will facilitate Kazakhstan's transition to a low-carbon economy, introduction of an efficient domestic GHG emissions trading system.

The National Emissions Trading System (ETS KZ) was launched in Kazakhstan in 2013 to become the main instrument of domestic CO_2 emission regulation and low-carbon technology development. ETS KZ currently covers all large companies in energy, oil and gas, mining, metallurgical and chemical industries.

Since 2014, the World Bank has provided technical assistance to Kazakhstan in ETS implementation and climate change mitigation within the framework of the Partnership for Market Readiness (PMR).

Kazakhstan's large emitters can use the platform carbon.energo.gov.kz to transfer and record GHG emissions data, and trade quotas online. The National Allowance Allocation Plan adopted in January 2018 sets the total emissions limit for 129 companies for the years 2018-2020 and allocates the quotas until 2020.

According to Kazakhstan National Inventory Report on anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol for 1990-2015, total GHG emissions amounted to 389 million tons CO_2 eq in 1990 and 301 million tons CO_2 eq in 2015 [50] (see Table 2.4.1.).

Table 2.4.1. Greenhouse gas emissions

	2012	2013	2014	2015
Carbon dioxide, mt/year	233.064	237.232	245.073	230.376
Nitrogen oxide (N_2O), mt/year	0.038	0.038	0.039	0.040
Methane (CH_4), mt/year	2.439	2.449	2.327	2.252
HFC (specify in the note), kt/year	987.38	998.63	929.62	938.27
PFC (specify in the note), kt/year	1554.73	1565.49	1308.49	1383.89
Sulphur hexafluoride (SF_6), kt/year	NA,NO	NA,NO	NA,NO	NA,NO
Cumulative emissions (CO_2 equivalent), mt/year	307.782	312.338	317.069	300.921
GHG absorption trends in land use, land use change and forestry (LULUCF)	-5.917	-7.351	-10.649	-13.994
Cumulative RG emissions minus LULUCF (CO_2 equivalent), mt/year	313.699	319.689	327.718	314.914
Energy (total), mt/year	257.137	261.270	264.317	246.875
including: fixed combustion sources	216.275	220.445	228.534	213.717
mobile combustion sources	25.967	22.839	19.211	22.417
non-combustion emissions	40.862	40.825	35.783	33.158
Industrial processes and products use, mt/year	18.807	18.462	18.974	19.178
Agriculture, mt/year	26.140	26.791	27.794	28.753
Land use and forestry, mt/year	5.917	7.351	10.649	13.994
Waste, mt/year	5.699	5.815	5.983	6.115
Population rate, people	16,792,089	17,035,550	17,288,285	17,542,806
Cumulative GHG emissions per capita, t CO_2 eq per capita	18.68	18.77	18.96	17.95
Country area, 1,000 km^2	2,724.9	2,724.9	2,724.9	2,724.9

[50] The Seventh National Communication and the Third Biennial Report of the Republic of Kazakhstan of the United Nations Framework Convention on Climate Change, 2017

	2012	2013	2014	2015
Cumulative GHG emissions per country area, kt CO_2 eq/km^2	115.1	117.3	120.3	115.6
GDP in real terms of 2011 (PPP), billion US dollars	369.2	391.3	407.8	412.7
Cumulative GHG emissions per unit of GDP, t CO_2 eq/USD 1,000	0.8	0.8	0.8	0.8

In 2015 emissions reduced against the base year (1990) in all sectors, with the exception of waste (see Figure 2.4.2.), and in LULUCF emissions replaced absorption in 1995. Compared to the previous year, in the 2015 reporting period emissions decreased in the energy sector alone, and increased in all other sectors. In general, the 2015 total national emissions did not reach the level of 1990 and remained below the base year by 15.3% and 22.7% with and without LULUCF, respectively.

Continuous efforts are made to maintain the national GHG emission monitoring and reporting system and the inventory of GHG emissions in the Republic of Kazakhstan; the National Inventory Report on anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol was developed. The National Inventory Report is available on the website of the secretariat of the United Nations Framework Convention on Climate Change (UNFCCC).

Annual GHG emission inventory reports are registered in the State Inventory of greenhouse gas emission sources and removals to update and use the GHG emission database by country.

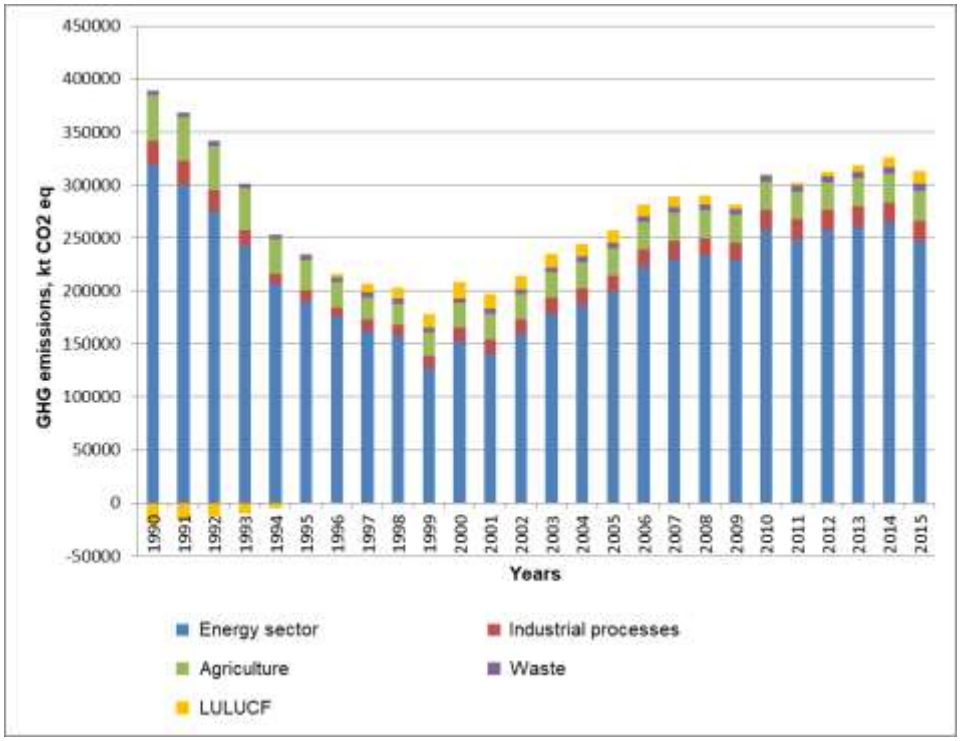

Figure 2.4.2. Total national GHG emission dynamics in 1990-2015 by sectors of Kazakhstan economy

Population coverage by **waste** collection services increased from 59% to 66% in 2015-2016.

The share of waste disposal facilities compliant with sanitary standards increased from 11% to 15% over the same period. The share of industrial waste treatment increased from 24.9% to 29.4%, and household waste treatment – from 1.3% to 2.6%.

2017 delivered the following results:

- 30.9% share of treated production waste in its total generation *(24.58% planned)*;
- 9% share of treated consumption waste in its total generation *(2% planned).*

A regulatory framework was developed for municipal solid waste collection, transportation, recycling, treatment and disposal. The relevant amendments on waste management were introduced in the Environmental Code:

- it provides for introduction of obligatory national standards setting requirements to enterprises operating on the waste management market;
- a ban was imposed on landfilling of certain waste types (plastic, polyethylene, waste paper, cardboard, glass – starting from 2019, food and construction waste – starting from 2020);
- the tariff calculation method for municipal solid waste collection and disposal was approved, including sorting and recycling, providing for a separate tariff for each activity;
- extended producer (importer) responsibility was introduced for cars, tires, oils and batteries, some municipal solid waste types *(packaging, electric appliances).* EPR will facilitate recycling of certain municipal solid waste types: plastic, polyethylene, waste paper, glass, and reduce landfilled waste by an average of 40%.

Kazakhstan continues to engage civil society in environmental conservation efforts. The law adopted in 2016 envisages increasing harmonization of the national environmental legislation with the Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters, transparency of decision-making process on environmental management.

The International Centre for Green Technologies and Investment Projects, whose establishment was initiated and announced by the Head of the State, Nursultan Nazarbayev, at the 70th session of the UN General Assembly, will be in charge of introduction of innovative approaches. The Centre will focus on seven key activities: energy sector transformation, sustainable urban development, green business development, green technologies and best practices transfer and adaptation, green finance development, renewable energy sources development, green growth capacity-building. The Centre will operate primarily in Central Asian countries (Kazakhstan, Uzbekistan, Kyrgyzstan, Tajikistan and Turkmenistan), as well as in Iran, Afghanistan, Mongolia and Azerbaijan. At the same time, the Centre will cooperate with industrialized countries within OECD and the European Union, the USA, the Russian Federation, China, and India.

Thus, review of implementation of the Concept of Transition of the Republic of Kazakhstan to Green Economy shows that all the goals set in the Concept will be achieved, and the targets will be attained within the established time frame.

Challenges and needs.

Review of international experience shows that a number of countries, including developing ones, progress faster in such areas of green economy as introduction of renewable energy sources, energy and water efficiency, waste management, organic agriculture and others. New fundamental approaches to transition to green economy, such as inclusivity, circularity, green financing and nexus approach, are also emerging around the world.

Despite the fact that legislative and institutional measures taken in Kazakhstan are, in general, consistent with international approaches, the country's overall policy in the field of energy efficiency has to be further improved, also with due regard to international best practice. Kazakhstan needs to move forward with attracting investments in the upgrade of outdated infrastructure in electric and thermal energy production, transmission and distribution to minimize losses, especially in industry.

Kazakhstan still has over 1,000 peasant and private farms and small settlements experiencing shortage or having no access to electricity. According to the results of socio-economic development monitoring of rural settlements undertaken in 2014, 50 out of 6,838 rural settlements are not covered by centralized power supply system, but have a potential for renewable energy sources development. The power grid infrastructure is often in a state of

neglect and requires repair and rehabilitation. It is necessary to support small farms and other consumers having no proper access to electricity, especially in those areas where network-wide infrastructure construction or repair is economically impractical.

On September 25, 2015, the UN member states adopted the 2030 Agenda for Sustainable Development[51]. It sets a number of goals for eradication of poverty, conservation of the planet's resources and promotion of well-being for all. Each of the 17 Goals contains a series of targets that must be achieved within 15 years. The targets of the Concept of Transition of the Republic of Kazakhstan to Green Economy and the set of statistical values of green economy are based on the previous Millennium Development Goals and therefore have to be adjusted.

The statistical values monitoring system for sustainable development has to be changed accordingly and produce data disaggregated by gender.

The actual reformation of the entire governance structure, substantial adjustment of government, industry-specific and regional development programs, approval of new programs are currently underway in the Republic of Kazakhstan in line with the Kazakhstan-2050 Strategy and the Concept of Transition to Green Economy. Considering the novelty and complexity of this effort, the country needs expert and technical assistance from international organizations to implement such massive changes. To that end, Kazakhstan has agreed introduction of green procurement with the OECD.

Strategic Goal B. Reduce the direct pressures on biodiversity and promote sustainable use.

2.5. Measures taken for meeting the national target of conservation, rational use and reproduction of forest resources, assessment of their efficiency, challenges, scientific and technical needs.

The following measures are focused on achievement of the national target in conservation, rational use and reproduction of forest resources, that is equivalent to the Aichi Target 5:

1. Expansion of areas covered by forests. The forestry policy documents targeted annual afforestation of non-forested lands at 8,000 ha per annum by 2017. The actual afforestation rate was 8,500 ha. According to the report of the Committee for Forestry and Wildlife and the data of periodic and annual accounting of the forest fund for years 2013 and 2017, as a result of those efforts forest coverage increased from 12,593.9 thousand ha in 2013 by 318.5 thousand ha to 12,912.4 thousand ha in 2017 (see Table 2.5.1.).

Another target was to expand forested lands within protected areas and areas occupied by specialized forestry enterprises to 1,382, 1,383 and 1,409 thousand ha in 2015, 2016 and 2017, respectively. The actual expansion, according to the forest fund accounting, in 2015, 2016 and 2017 reached 1,403.9, 1,418.9 and 1,422.9 thousand ha, respectively, so the target was achieved.

Table 2.5.1. The main forest fund targets (at the year-end)

Targets	2011	2012	2013	2014	2015	2016	2017
Forest fund area (including forests assigned for temporary use), million ha	28.8	28.8	29.3	29.3	29.3	29.4	29.8
Areas covered by forests, million ha	12.4	12.5	12.6	12.6	12.7	12.7	12.9
Total stock of standing forest, million m^3	380.7	380.7	412.3	412.3	412.3	412.3	421.8

[51] Resolution adopted by the General Assembly on 25 September 2015. Transforming our world: the 2030 Agenda for Sustainable Development.

Forest coverage, %	4.6	4.6	4.6	4.6	4.6	4.7	4.7

* According to the data of periodic and annual accounting of the forest fund.

Within the scope of the Strategic Plans of the Ministry of Environment and Water Resources, the Ministry of Agriculture, and the territorial development programs, in 2013-2017, forest reproduction activities (see Figure 2.5.1.) were carried out in the form of forest plantations establishment using the method of sowing and planting, and support for natural forest regeneration. The latter involved preservation of understorey and young stands of commercially valuable species in felling areas, local soil preparation for better seed germination and enclosing.

The target for forest reproduction and afforestation for 2013-2017 was achieved. The planned value for 2013 was 64.5 thousand ha, whereas the actual result was 68.5 thousand ha; in 2017 the actual value was 57.5 thousand ha against the planned amount of 57 thousand ha.

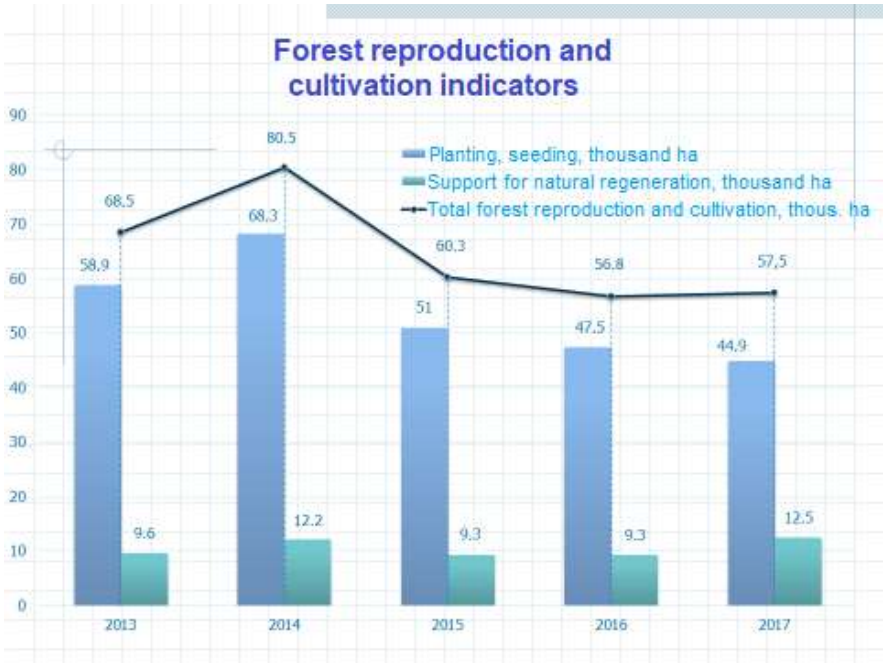

Figure 2.5.1. Forest reproduction and cultivation rate.

The scope of work for forest reproduction and afforestation was enhanced in 2013-2014 due to expansion of forest cultivation activities at “Yertys Ormany” SNFR (106% of the plan), “Semey Ormany” SNFR (103%) and in Kyzylorda oblast (151%), including on the innings of the Aral Sea (162%) at the expense of the World Bank loan under the Forest Protection and Reforestation Project, green plantations along the Astana-Shchuchinsk highway in Akmola oblast (115%), and saxaul forests in South Kazakhstan oblast.

In 2017, the forest reproduction area shrank by 23,000 ha on 2014. Forest reproduction was reduced by the state forest owners in Zhambyl (by 25%) and Kostanay (23%) oblasts, “Yertys Ormany” SNFR (30%), “Kokshetau” SNNP (51%), Sairam-Ugam SNNP (50%).

Over the years, forest reproduction and afforestation activities have been carried out on the area of 323.6 thousand ha in Kazakhstan. Despite a reduction in planting and seeding after 2014, the average annual area of artificial plantations amounted to 64.7 thousand ha over the period in question, that is 9.7 thousand ha beyond the target indicator of 55 thousand ha set in the Strategic Plan of the Ministry of Environment and Water Resources for 2014-2018.

As a result of measures taken to preserve and rehabilitate forests, include reserve and other lands in the forest fund, the total State Forest Estate area increased by 557.9 thousand ha (1.9%) from 2013 to 2017.

Expansion of forest-covered areas was mainly a result of reclassification of incomplete forest stand into a forest-covered land once it reached the density standard allowing such reclassification, renewed logging, burned-down forest areas, perished plantings and glades.

51.3 thousand hectares of reserve lands in Aktobe, East Kazakhstan, West Kazakhstan, Mangystau, Karaganda and other oblasts were added to the State Forest Estate in 2017. Some of those lands experienced natural regeneration of tree and shrub species.

In 2013, 156 forest nurseries operated in Kazakhstan with a design capacity of annual forest cultivation of up to 200 million standard seedlings of various species. If the planned yield of planting material is obtained, this number of seedlings is sufficient for forest cultivation over the area of about 80.0 thousand hectares. In 2013, those nurseries produced 81.0 million units of standard planting material. Such low output can be explained by the lack of tree and shrub seeds, equipment and irrigation systems and funds for nurseries reconstruction, poor implementation of advanced planting material growing methods.

The Strategic Plan of the Ministry of Agriculture of the Republic of Kazakhstan for 2010-2014 set a target to grow 1 million units of planting material with improved hereditary qualities per annum. According to the report of the Committee for Forestry and Wildlife, this target has been achieved until now at 110%.

"Zhassyl Damu" programme envisaged government support to private afforestation by individuals and non-government legal entities cultivating fast-growing tree and shrub species for industrial and energy purposes, establishing and developing forest nurseries. The plan was to reimburse expenses on establishment and cultivation of fast-growing tree and shrub species for industrial and energy purposes (up to 50%) and on set-up and development of private forest nurseries (up to 50%). However, due to lack of adequate budgetary funding, the above was not fulfilled. With insufficient government support and investment, private afforestation in Kazakhstan is developing at a slow pace – as on January 1, 2018, the area occupied by private forest fund amounts to 695 hectares.

Extensive stimulation of forest-related activities was carried out within the scope of the Forest Protection and Reforestation Project implemented under the RK Law No. 263-III on ratification of the loan and grant agreements between the Government of Kazakhstan and the International Bank for Reconstruction and Development dated June 7, 2007.

A whole set of measures was implemented to preserve and restore forest expanses in project areas featuring the country's major pine and saxaul reserves. Large-scale reforestation activities were carried out, new technologies were introduced in forestry operation, equipment and machinery for forest reproduction and fight against forest fires and illegal logging were upgraded, institutional bases of the forestry sector in the field of research, advanced training, economic and legal program studies were strengthened.

Upon successful project completion over 100 thousand hectares of new forest plantations appeared in the country to increase the forest coverage and improve the environment in terms of reduction in land degradation and desertification, conservation of biological diversity and carbon sequestration.

The project largely improved the poverty and employment situation in project areas having created over 7,800 jobs. The project experience is currently being applied throughout the forest sector of Kazakhstan.

Total project expenditure amounted to 9.5 billion tenge, which is equivalent to 62 million US dollars at the relevant exchange rate. Funds came from three sources: World Bank loan in the amount of 4.5 billion tenge or 47% (29.3 million US dollars), 4.3 billion tenge or 45% (27.8 million US dollars) of state budget funds, and the GEF grant in the amount of 730 million tenge or 8% (4.9 million US dollars).

For restoration of ribbon forests in the Irtysh region a forest nursery was established over the area of 30 hectares to produce 15 million pine seedlings per annum. Figure 2.5.2. shows a forest-seed complex growing ball- and bare-rooted planting material in the amount of over 9 million seedlings per annum, built at "Semey Ormany" SNFR.

Figure 2.5.2. Forest-seed complex at “Semey Ormany” SNFR.

As a result of project implementation, forest crops were cultivated over the area of 41,000 ha. Figure 2.5.3. shows forest crops planted in 2013 over the burned area in compartment No. 115 of the Akkol Forest District, Zhanasemey Branch of “Semey Ormany” SNFR.

Figure 2.5.3. Forest crops planted in 2013 at “Semey Ormany” SNFR.

In order to create a 61,000 ha saxaul plantation on the innings of the Aral Sea, a forest nursery complex with a research station and a capacity of 4.4 million seedlings per annum was built in Kazalinsk.

A unique development in Kazakhstan is a sanitary protection green zone (SPGZ) created in the arid steppe conditions of Astana city at the President’s instruction. In compliance with the Strategic Plan of the Ministry of Agriculture for 2014-2018, the total area of Astana green zone reached 75,000 ha in the period from 1997 through 2017 and is expected to expand further to 100,000 ha by 2023.

Figure 2.5.4. shows the SPGZ developed as a belt of trees on the lands adjacent to the capital of Kazakhstan, Astana.

Figure 2.5.4. Astana SPGZ.

Reliability of achievement assessment of the national target to increase the forest coverage is based on the data of the annual state accounting of the forest fund by the Kazakh Forest Inventory Management Enterprise and the reports of the Committee for Forestry and Wildlife. It is important to note integrity of data of the annual state accounting of the forest fund maintained in accordance with the Rules of state accounting of the forest fund, state forest inventory, state monitoring of forests and forest management on the State Forest Estate territory, approved by Order No. 18-02/163 of the Acting Minister of Agriculture dated February 27, 2015.

The state accounting data are used in the state forest inventory exercise. Depending on the considered forest fund indicators, accounting can be done annually or periodically as on January 1 of the year following the reporting year using the forms approved by Order No. 630 "On approval of the forms of state accounting of the forest fund" of the Minister of Agriculture dated September 28, 2010. Annual accounting considers both private and State Forest Estate areas, as well as their breakdown by categories and lands in the context of districts, towns, oblasts and nation. Periodic accounting is carried out once every five years. In addition to the annual accounting data periodic accounting contains forest lands and stocks breakdown by prevailing tree and shrub species and age groups, as well as the forest fund protection and economic features considered in forest management and forest owners' and users' performance assessment.

2. Forest protection from fires, illegal logging and pests. This task required implementation of a set of forest fire prevention measures, including arrangement of fire breaks and lines and their maintenance, repair of forestry and fire safety roads and active efforts to protect forests from pests and diseases with the use biological methods, in the first place.

The section of "Zhassyl Damu" programme dedicated to conservation and rehabilitation of natural ecosystems set a target to **reduce the average forest fire area** to 10.8 ha in 2013 and 2014. In fact, according to the reports of the Committee for Forestry and Wildlife, the area of one fire was 3.5 ha in 2013 and 5.4 ha of forest area in 2014. In 2017, it was supposed to be 10.5 ha, whereas the actual area was 11.0 ha. So, the target had not been achieved by the end of the reporting period.

However, in 2013-2017, the average area of one forest fire event was 6.5 hectares, which is 1.6 times below the planned indicator for 2017. Therefore, forest fires did not cause any significant damage to sustainable development of forests or forest coverage expansion in the Republic as a whole within the reporting period.

At the same time, it should be noted that in line with established practice, the average area of one forest fire event is calculated based on the fire area covered by forest only, and does not account for non-forested lands (logging and burned-out areas, glades, sparse stands), incomplete forest stand, special plantations, forest nurseries and other non-forested areas

(agricultural lands, compartment lines, fire breaks, etc.). Thus, the target indicator "average area of one fire event", assessed on the basis of fire over areas covered by forest only, does not reflect the true SFE fire area or encourage state forest owners to ensure reduction of fire areas on both forest and non-forest lands where biodiversity has to be conserved too.

In order to enhance forest protection from fires and illegal logging within the scope of the Forest Protection and Reforestation Project, 8 standard forest fire stations, 11 fire watch towers, six 2-flat cordons were built in the ribbon forests in the Irtysh region; a forest fire-fighting information system featuring geo-information systems that cover over 200 thousand hectares of forest land was deployed and commissioned; the First Watch optic-sensor fire detection system was added to 8 fire watch towers; a thunderstorm activity monitoring system was introduced to detect lightning discharges (lightning strikes) and lightnings in the pilot area; preventive fire-fighting measures were taken, and over 1,000 units of machinery and equipment were purchased for forestry operation.

A target of the Strategic Plan of the RK Ministry of Agriculture for 2010-2014 was to expand the State Forest Estate area covered by **aircraft patrol** to 30% of the total SFE area.

Aircraft operations for the forest fund conservation and protection are carried out by the Kazavialesookhrana State Enterprise in accordance with the Rules of aircraft operations for the forest fund conservation and protection, approved by Order No. 18-02/64 of the Minister of Agriculture dated January 30, 2015.

In 2013 and 2014, aircraft patrol covered 8,669 ha (30.8%) of the SFE in Almaty, Akmola, East Kazakhstan, Zhambyl, Karaganda, Kostanay and Pavlodar oblasts.

Despite the measures taken to enhance forest protection, many forest fire and illegal logging events occur annually on the SFE territory. According to the reporting data delivered by the Committee for Forestry and Wildlife (CFW) in the form of departmental statistical survey '1 fire (forest)'[52], 2,200 forest fire events occurred on the SFE area of 27.8 thousand ha in 2013-2017 (see Table 2.5.2.). Fire losses in the same period amounted to 450.7 million tenge.

The 2017 target was not achieved due to failure of the state forest owners to ensure the State Forest Estate protection from fires. Fires were let cover extensive forest land areas by public utility institutions in Zhambyl (68% of the total fire area in the country), Akmola (7%), Aktobe (6%), West Kazakhstan (4%), Kostanay (3%) and other oblasts, as well as by protected areas "Yertys Ormany" SNFR (8%) and "Semey Ormany" SNFR (1%). In 341 cases forest fires were caused by lightning discharges (61% of the total number of fires), 175 fires occurred for reasons unknown (31%), 27 fires started due to the fault of population (5%) and 15 fires resulted from agricultural burnings (3%). Climatic conditions also contributed to a sharp increase in the number of fires: higher average air temperature in summer and autumn than the long-term data, decrease in precipitation and lightning discharges (Annex 1).

Table 2.5.2. Forest fires in SFE in 2013-2017.

Year	Total amount of fire events	Fire area, ha			Damage, thousand tenge	Average area of one fire event, ha
		Forest		Non-forested		
		Total	Covered with forest			
2013	274	1,154	953	1,143	13,009	3.5
2014	581	3,004	1,261	2,716	74,460	2.2
2015	476	9,627	5,605	30,926	119,041	11.8
2016	306	640	275	3,345	28,686	0.9
2017	563	13,368	6,180	6,322	215,492	11.0
TOTAL	**2,200**	**27,793**	**14,274**	**44,452**	**450,688**	**6.5**

[52] CFW Report: Statistical form '1 fire (forest)' for departmental statistical survey "Forest Fire Report", approved by Order No. 231 of Acting Chairman of the RK Agency on Statistics dated December 30, 2015.

Figure 2.5.5. shows a view of a crown fire over the area of 260 ha in Krasno-Kordonsky forest district of "Semey Ormany" SNFR caused by a lightning discharge (May 2017).

Figure 2.5.5. A crown fire in the ribbon forest in the Irtysh region.

In accordance with the new Criminal Code adopted in Kazakhstan in 2014, **illegal logging**, destruction or damage to trees and shrubs belonging to the forest fund is a criminal offense. However, despite stricter penalties, illegal loggings on the SFE territory continue. According to the reporting data delivered by the Committee for Forestry and Wildlife in the form of departmental statistical survey '5-leskhoz'[53] "Report on Forest Legislation Violations", 2,895 illegal logging events were registered in 2013-2017 (see Table 2.5.3.), with a total logging volume of 58,496 cubic meters and a damage estimated at 1,854,058 thousand tenge. The average logging volume in 1 event in the reporting period was 20.2 cubic meters – 3 times beyond the target indicator of 6.9 cubic meters set in the Strategic Plan of the Ministry of Environment and Water Resources for 2014-2018.

Even though the State Forest Estate suffered some damage as a result of illegal logging, it did not cause significant harm to sustainable development of forests or forest coverage expansion in the Republic as a whole within the reporting period.

Table 2.5.3. Illegal logging in SFE in 2013-2017.

Year	Amount of illegal logging events	Illegal logging volume, m^3	Damage caused by illegal logging, thousand tenge	Volume of one illegal logging event, m^3
2013	480	2,971	42,802	6.2
2014	690	4,325	89,213	6.3
2015	650	19,426	842,063	29.9
2016	571	2,624	29,684	4.6
2017	504	29,150	481,058	57.8
TOTAL	**2,895**	**58,496**	**1,854,058**	**20.2**

The **spread of forest pests and diseases** poses a serious threat to forest resources. According to the Committee for Forestry and Wildlife, the total area affected by forest pests and diseases in Kazakhstan exceeds 161 thousand hectares or 1.2% of the country's area covered by forests. Direct control measures were taken with the use of biological protection methods, and forest pathology research was carried out to protect forest stand in the existing foci of forest pests.

Despite the overall downturn in the spread of pests and forest diseases in the period from

[53] CFW Report: Statistical form '5-leskhoz' "Report on Forest Legislation Violations", approved by Order No. 231 of Acting Chairman of the RK Committee on Statistics dated December 30, 2015.

2013 through 2017 a significant increase in the area affected by pests was observed in East Kazakhstan, Akmola, Kyzylorda and Zhambyl oblasts (see Table 2.5.4.).

Table 2.5.4. SFE area affected by forest pests and diseases.

Oblast	Area of infection sites, ha	
	2013	2017
Akmola	9,382	14,818
Aktobe	4,587	1,962
Atyrau		
Almaty	20,184	17,412
West Kazakhstan	16,775	3,318
Zhambyl	6,283	7,630
Karaganda	777	133
Kostanay	3,865	1,819
Kyzylorda	4,800	7,014
Mangystau		
South Kazakhstan	386	50
Pavlodar	5,382	3,693
North Kazakhstan	43,673	735
East Kazakhstan	74,555	102,727
Total	**190,649**	**161,321**

Forests are infected by the following pests and forest diseases: pine fungus making up 57.6% of the total infected area (EKO); apple moth – 8.3% (Almaty oblast); bacterial canker – 5.1% (Akmola, NKO, Kostanay oblasts); pamphiliid sawfly – 3.6% (East Kazakhstan, Akmola, Karaganda, Kostanay, Pavlodar oblasts); saxaul aphid – 4,3%, gypsy moth – 1% (Akmola, WKO, Karaganda, Kostanay, Pavlodar, North Kazakhstan oblasts), etc.

According to the State Forest Seed Institution, forest protection activities carried out in 2017 decreased the area of forest pests and diseases by 36,816 hectares, and 48,152 hectares recovered under the influence of natural factors. However, new outbreaks were registered on the area of 35,856 hectares.

Experts assess the general forest pathology state as satisfactory.

3. Forest management. An important activity for forest protection and forested area expansion is forest management fieldwork. These are stipulated in the Strategic Plan of the Ministry of Agriculture for 2010-2014.

Forest management activities were planned to cover 916.2 thousand hectares in 2013 and 3,714.4 thousand hectares in 2014. Due to a change in the Plan indicators and priorities, the area of forest management fieldwork decreased to 568.7 thousand hectares in 2013 and 824.6 thousand hectares in 2014.

As per Article 55 of the RK Forest Code, forest management activities focused on forest resources accounting, territorial arrangement of the forest fund, including the State Forest Estate demarcation, state forest monitoring, forest management planning and forest utilization, shall be a state monopoly, and are commissioned to the Kazakh Forest Inventory Management Enterprise.

On the SFE territory, forest management fieldwork is performed according to a unified system set out in the Rules of state accounting of the forest fund, state forest inventory, state monitoring of forests and forest management on the State Forest Estate territory, approved by Order No. 18-02/163 of the Acting Minister of Agriculture dated February 27, 2015, and the Forest Management Instructions, approved by Order No. 17-02/566 of the Minister of Agriculture dated November 9, 2012.

The technical aspect of forest management fieldwork is based on aerial photography and space imagery. The review cycle duration, for which a forest management project is developed,

depends on the intensity of forestry activities and the targets set for the state forest owners, and is determined in line with the Forest Management Instructions.

As per Article 56 of the Forest Code, forestry and forest utilization on the State Forest Estate plots shall be prohibited without completion of primary forest management fieldwork and the relevant forest management documentation. In this regard, an objective is set to improve forest management methods to enable future transition from a three-year forest management cycle to a continuous one.

Kazakhstan is implements **8 international treaties and agreements** for forestry made at the government and ministry levels:

1. The timber industry and forestry cooperation agreement (September 11, 1998, Moscow);
2. The "Altai" cross-border reservat establishment agreement between the Governments of the Republic of Kazakhstan and the Russian Federation (September 15, 2011, Astrakhan);
3. The Volga-Ural Saiga Group (Saiga tatarika tatarika) Protection, Reproduction and Utilization Agreement between the Ministry of Agriculture of the Republic of Kazakhstan and the Ministry of Natural Resources and Environment of the Russian Federation (September 19, 2012, Pavlodar);
4. The forestry cooperation agreement between the Ministry of Agriculture of the Republic of Kazakhstan and the Ministry of Forestry of the Republic of Belarus (November 9, 2012, Astana);
5. Agreement on natural fires prevention and suppression in the border areas of the CIS member states (May 31, 2013, Minsk);
6. Agreement on forest and steppe fires prevention and suppression in the border areas between the Government of the Republic of Kazakhstan and the Government of the Russian Federation (June 2, 2013, Yekaterinburg);
7. Agreement on the conservation and rational use of aquatic bioresources of the Caspian Sea (September 29, 2014, Astrakhan);
8. Memorandum of Understanding on cooperation in the field of forestry and forest regeneration in the Republic of Kazakhstan between the Ministry of Environment and Water Resources of the Republic of Kazakhstan and the Korea Forest Service (June 20, 2014).

A **number of changes was introduced in Kazakhstan environmental legislation** in 2013-2017. The Law of the Republic of Kazakhstan on amendment of certain legislative acts of the Republic of Kazakhstan on distribution of powers between government authorities dated June 13, 2013 changed certain aspects of coordination and guidelines for the forest fund conservation, protection and utilization, forest regeneration and afforestation for local executive forestry bodies of oblasts and cities of national significance, forest institutions and environmental organizations.

The Law of the Republic of Kazakhstan on amendment of certain legislative acts of the Republic of Kazakhstan to ensure their compliance with the State Planning System dated July 3, 2013 removed the powers of a forestry authority to develop forest fund conservation, protection and utilization, forest regeneration and afforestation programmes, and the Government's responsibility to approve such programmes from the Forest Code. In accordance with these changes, the Kazakhstan Forest Sector Development Programme until 2020 was not approved in 2015.

The most consequential changes in power distribution between the government levels were made by the Law of the Republic of Kazakhstan on amendment of certain legislative acts of the Republic of Kazakhstan on power distribution between the government levels dated September 29, 2014. It removed 26 functions from the Government authority and placed them under the jurisdiction of a forestry authority under the Forest Code. This empowered the forestry authority to develop and approve regulations on forestry and biodiversity conservation, take

operational measures to support the forest fund conservation, protection and utilization, forest regeneration and afforestation efforts.

The RK Law on amendment of certain legislative acts of the Republic of Kazakhstan on flora and fauna dated June 15, 2017 amended and supplemented the standards of social protection of state forest protection and environment officials, provided for a 25% pay rise for specialists working in rural areas, one-time allowances and corporate housing for young specialists. It also introduced a mechanism of lands reclassification into the forest fund land category, medicinal herbs removal from the natural environment, and the provisions on game breeding and hunting farms for intensive hunting management.

The adopted amendments have significantly improved environmental legislation, incentivized specialists' efforts and attracted more young people into the forestry and PA system.

Challenges, scientific and technical needs.

The major challenge in the forest industry of Kazakhstan is lack of a national forest policy that would determine its long-term development priorities. A national forest program has to be drawn up and approved by the Government of the Republic of Kazakhstan. Such document is currently under development at the CFW of the RK Ministry of Agriculture.

Forest fires, illegal logging and outbreaks of pests and forest diseases are the most pressing issues in the forestry sector. For a more efficient fight against forest fires and illegal logging, it is necessary to develop a Master Plan of forest fire prevention arrangements, use the Earth remote sensing data, introduce optic-sensor systems for early fire detection, create an aircraft fleet for forest protection and fire-fighting operations, procure up-to-date machinery and fire-fighting equipment, and revise the standards and regulations in force. It is high time to establish the Forest Pathology Monitoring Centre in Almaty and its branches in East Kazakhstan, North Kazakhstan, Kyzylorda and West Kazakhstan oblasts for timely detection and response to outbreaks of forest pests and diseases.

A drop in forest planting and sowing activities has led to partial loss of forest nurseries and forest seed facilities, and reduced the amounts of cultivated planting material. The protective and decorative plantings in oblast centres and other localities feature a poor variety of tree and shrub species, no new parks, squares or other common green areas are created in most towns and villages in line with their standardized per capita amounts. Not enough protective plantations are developed along roads and railways, or windbreak strips and pasture protection plantations, erosion and water protection belts. Lack of innovative technologies for accelerated cultivation of high-quality planting material, also with the use of genetic engineering methods, and effective reforestation techniques, insufficient timber plantations of fast-growing tree species interfere with forest coverage expansion progress. In this regard, the targets for forest ecosystems protection and their biodiversity conservation, advanced growth in forest regeneration, private forest fund development, amenity planting and protective afforestation as the ultimate goal, and significant increase in forest coverage in the Republic of Kazakhstan, shall be subject to conceptual revision, clarification and extension.

One of the most promising areas of progress, along with reforestation, is private forestry development. Its main objective is creation of alternative raw wood sources – timber plantations of fast-growing and other productive tree and shrub species for various purposes. Private forestry products will satisfy the demand of industries and population for commercial timber, wood biomass for pulp, paper and slab production, fuel sources, feed and dietary supplements and other biological raw materials and products, while significantly reducing the burden on natural forests. Private forest plantations should be deployed by entrepreneurs or individuals on agricultural and other types of land.

Amenity planting development requires extensive engagement of private forest owners, nongovernmental organizations and entrepreneurs in creation of common green areas and arboreta in cities and other settlements. To that end, a network of state and private forest nurseries has to be developed to grow the required number of seedlings of highly decorative and resistant tree and shrub species applying the year-round ball-rooted planting technology to ensure

their high survival rate, growth and development. Amenity planting development plans have to be implemented by oblast, city and district executive bodies at the expense of local budgets, specifically, the environmental charges.

To increase the forest cover, Kazakhstan needs to draw up an inventory of all existing windbreak strips for their subsequent allocation to the private forest fund. There is potential for agroforestry landscapes development by means of afforestation of ravines, draws and watersheds, protective planting against wind and water erosion of pasture and plough lands, droughts and dry winds. The agroforestry landscape program has to be implemented under government contracts by means of private forest melioration stations set-up in each agricultural or animal breeding area with their access to non-repayable permanent land use, interest-free long-term loans and subsidies.

Climate change adaptation in the forestry sector involves identification and preservation of reference and unique ecosystem sites, rehabilitation of disturbed natural ecosystems, optimization of natural and anthropogenic elements, control over the numbers of synanthropic animal and plant species, prevention of the spread of invasive species aggressive towards local ones, development of prompt decision-making instruments based on monitoring data and their integration in the management cycle, identification of climate change impact mechanisms on ecosystems with due regard to microclimatic parameters, short-term and long-term projection of the dynamics of vulnerable ecosystems and indicator species of flora and fauna, risk assessment for the existence of threatened populations, species and communities, development of rational and sustainable shames of resource species and ecosystems utilization, adjustment of traditional bioresources and biodiversity accounting systems to reflect changes in climatic parameters.

2.6. Measures taken for meeting the national target of conservation, rational use and reproduction of fish resources, assessment of their efficiency, challenges, scientific and technical needs.

The country's fish industry is based on commercial fish stocks inhabiting the waters of the Caspian and the Aral seas, lakes Balkhash and Zaisan, Bukhtarma, Kapshagay and Shardara reservoirs, the Alakol lake system and other water bodies with a total area of over 3 million hectares and over 70 fish species, including the most valuable ones (sturgeon, pike perch, common carp, grass carp, silver carp, etc.) and introduced fish species (peled, whitefish, etc.) of high commercial value.

The bulk of Kazakhstan's fish resources is harvested in natural waters, whereas aquaculture is underdeveloped. In 2015 the amount of bred fish equalled 0.7 thousand tons, while fish and other aquatic animals harvesting in natural waters amounted to 45 thousand tons.

Long-term allocation of water bodies and/or sites to wildlife users is underway since 2006; it guarantees access to fish resources for a long period of time, enables gradual investment of users' own funds in fisheries development in allocated water bodies and their areas, their protection, reproduction and research, and efforts to attract additional investments.

By 2017, 247 out of 362 sites of water bodies of national and international significance, or 68.2%, had been allocated to 132 users.

By oblast akimat resolutions, 1,272 out of 2,788 water bodies of local significance, or 45.6%, have been allocated to 845 fisheries.

Fisheries invest in fish industry development on an annual basis. In particular, funds are invested in reproduction of fish resources, scientific research of an allocated water body and upgrade of enterprises' technological infrastructure. Having planned to invest 1,247 million tenge in 2016, the fisheries actually invested 2,463 billion tenge in fish industry development. In the period from 2015 through 2017, the total users' investments in fisheries amounted to 5.518 billion tenge.

Catch quotas for fish and other aquatic animals in the country's fishery waters are annually approved on the basis of biological justifications elaborated by scientific fishery organizations and positive findings of the state environmental expert review.

The 2017 catch limit of 45.0 thousand tons was approved by order of the authority in charge of wildlife protection, reproduction and use.

The catch rate for fish and other aquatic animals, as well as total revenue payments for fish resources utilization in 2014-2017 are specified in Table 2.6.1.

Table 2.6.1. The catch rate for fish and other aquatic animals in Kazakhstan fishery waters.

Year	Limit, kt	Actual rate, kt	Payments for fish resources utilization, million tenge
2014	63.5	40.5	640.3
2015	64.8	45.0	695.7
2016	61.6	44.0	725.8
2017	45.0	40.4	744.9

Table 2.6.2. The key fishery indicators for 2017 (according to the Committee on Statistics)

Indicator	Value
Fishing output, thousand tenge	5,518,209.3
Yield of fish and other aquatic animals, tons	41,320

According to the Committee on Statistics, official (reported) fish catch rate in Kazakhstan amounted to 41,000 tons in 2017 (see Table 2.6.2.). Experts assess total catch rate, including unreported fishing, at 60,000 tons. If the capacity of water bodies is used to a full extent potential fish yield goes up to 100,000 tons, like it was in the 1960-s (see Figure 2.6.1.).

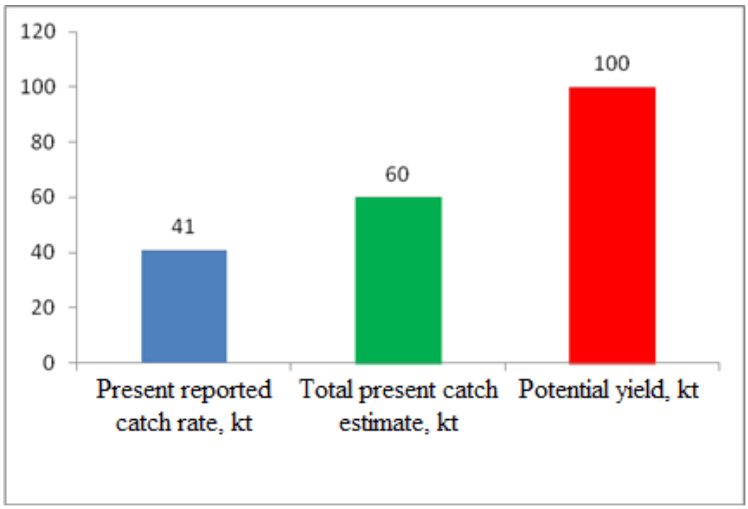

Figure 2.6.1. Fish catch opportunities in Kazakhstan.

Kazakhstan has put up a **fight against poaching**. In 2017 5980 environmental legislation violations were detected, 5001 were brought to administrative responsibility, 17 persons were arraigned on a criminal charge. Administrative fines imposed amounted to 87.8 million tenge, of which 74.5 million tenge was collected to the state budget. 161.3 tons of fish, 188 floating crafts and 4383 units of fishing gear were seized from violators. A large-scale antipoaching operation called “BEKIRE” is held annually from April 1 to May 31, during the spawning period of sturgeons and other fish species in the Zhaiyk-Caspian basin, in collaboration with law

enforcement and environmental authorities.

In order to create conditions for the natural reproduction of sturgeon species, the Akimat of Atyrau region in 2016-2017 allocated funds from its local budget for the design and estimate documentation (DED) for projects to increase the water content and improve the hydrological regime of the Ural and Kigach rivers in the Atyrau region. The development of the design and estimate documentation has been completed and a positive conclusion of the state expert review has been received.

In 2018 1,579,863 thousand tenge were allocated for these projects from the republican budget for dredging along the channels of the Ural and Kigach rivers. Today, dredging works are underway along the canals Rybohodny, Shman Uzek and Primorsky of Ural River.

Given that the Zhaiyk river is a transboundary water body, its use and protection are governed by the Agreement on joint use and protection of transboundary water bodies between the Government of the Republic of Kazakhstan and the Government of the Russian Federation dated September 7, 2010.

As agreed by the parties at the 22nd meeting of the Kazakhstan-Russian Commission, joint research was launched in 2016 to develop a strategy for adaptation to water content change in the Zhaiyk river with the financial assistance of the UN Economic Commission for Europe, and the Kazakhstan-Russian project working group was set up for that purpose.

The following activities were carried out in line with the policy documents adopted in Kazakhstan for 2013-2017:

1) Improving environmental legislation

By 2018, the following activities had been partially completed:

1) Amendment of national regulations on fish industry in compliance with international treaties and agreements: the main law on fish industry was updated in 2016-2017 (the Law on wildlife protection, reproduction and use);

2) Sustainable fishing and aquaculture principles developed in accordance with the Code of Conduct for Responsible Fisheries recommended by FAO: scientific research has been carried out, the principles have been developed and are introduced in the fishing industry of Kazakhstan;

3) Update of the Fish Resource Inventory: proposals on the Inventory improvement, including introduction of biodiversity valuations, were developed in 2017 within the scope of the joint GEF/UNDP/Kazakhstan Government projects;

4) Standards have been developed for the optimal population size of commercial fish species for water bodies taking into account boundary and target benchmarks (critical values of commercial stock biomass).

Improvement of legislation has enhanced activity in the fish industry: aquaculture production increased from 730 to 2,776 tons in 3 years (2015-2017), and the burden on fish populations inhabiting natural water bodies decreased accordingly.

2) Legal framework and a set of measures for the protection of biodiversity and natural habitats of fish and other aquatic animals.

A precautionary approach to the use of fish stocks is being introduced in Kazakhstan, for which research has been carried out as part of the state budget programs. The standards for fishing effort for each of the large fishery reservoirs have been developed and approved. Excess fishing effort on fishing reservoirs will be eliminated. Also, as part of the precautionary approach, methods have been developed for determining the total allowable catch of fish and other aquatic animals, taking into account the need to reduce the fishing burden on the overexploited fish populations.

By 2018, the following measures have been fully or partially implemented:

1) The fishing regulation promoting biodiversity conservation approved by the Government of the Republic of Kazakhstan by 2020: in 2015, the document “Restrictions and bans on utilization of fish resources and other aquatic animals” was approved by the order of the authority for fishery; in particular, it restricts fishing activities in the delta of the Ili river and in

the Shardara reservoir, extends the spring ban on fishing activities in the Zhaiyk river, and enacts a number of other measures to protect migration routes and spawning sites of aquatic animals;

3) A set of recruitment measures aimed at fish that tend to reduce in numbers in their natural habitat.

Measures have been taken to carry out 5 activities:

1) A recruitment action plan for fish that tend to reduce in numbers in their natural habitat: in 2015-2017, research was carried out and improved methodologies were prepared for total allowable catch calculation for fish populations that have reached critical stock levels; fishing standards were developed to restrict excessive fishing effort, and flow charts were produced to support fishery management decision-making process for different fish stock levels and for each individual water body.

Changes in research and total allowable catch calculation methods.

a) Provided a population is stable, the rate of removal is calculated in accordance with universally accepted methods under “Tyurin, Zykov, the Malkin’s population heterogeneity concept”. Maximum allowable rate of removal for fish populations (species) whose reserves are estimated as critical is calculated on the basis of reserve benchmarks by fish biological parameters. Fish population stock status criteria are L_{C50} and L_{M50}. L_{C50} is the fish length, at which 50 percent of fish in a population are removed in the course of fishing activity. L_{M50} is the length, at which 50 percent of fish in a population reach maturity. Equality of the criteria values $L_{C50} = L_{M50}$ is the benchmark of a particular fish stock status in a water body. When $L_{C50} \leq L_{M50}$, total allowable catch for the given fish species is calculated with the use of reduced rates of removal. When $L_{C50} \geq L_{M50}$, regular rates of removal are used.

b) When the reserve benchmarks by fish biological parameters $L_{M50} = L_{C50}$ are reached, the formula $Z = 2F$ is applied, i.e. the rate of removal F is calculated with a factor of 0.5 of the total mortality coefficient Z. The auxiliary table is used in calculations. For example, for the maximum age of the given species in catches (samples) of 5 years, the rate of removal is $F = 0.3$. If the maximum age is 13 years, the rate of removal is $F = 0.15$.

c) In order to quantify young age groups (younger than the age of maturity), the function obtained as a result of data series alignment (trend line) is used. The data obtained in this manner are recorded in the table of sizes of the relevant age groups.

d) Fishing management must be based on the concept of maximum sustainable yield (MSY). Commercial stock removal rates are verified against the MSY criterion.

2) Studies on genetic diversity of populations of rare and endangered fish species bred in aquaculture for subsequent reintroduction: a study of genetic polymorphism in sturgeon populations, genetic composition of stocked sturgeon juveniles and sturgeon producers in sturgeon plants was carried out in 2015-2017.

3) Recommendations on genetic diversity of populations of rare and endangered fish species bred in aquaculture for subsequent reintroduction developed by 2020: the recommendations on genetic polymorphism of the Caspian sturgeon juveniles released into natural water bodies have been elaborated.

4) Requirements (origin, population) to replacement brood stock of rare and endangered fish species bred in aquaculture for subsequent reintroduction approved by 2020: genetic certification of sturgeon producers (brood stock) was carried out at 2 sturgeon plants.

5) Actions for reintroduction of fish species that tend to reduce in numbers in their natural habitat by water bodies approved by 2030: recommendations on the composition and volumes of Siberian sturgeon, barbel, sterlet and ship reintroduction into native water bodies have been elaborated.

A proposal for kutum removal from the Red Book of Kazakhstan, as a species that has restored its population, has been prepared and adopted.

In 2012 within the framework of a state program, underyearlings of a rare endangered species, the Siberian sturgeon, were released into the Black Irtysh River and Lake Zaisan.

As part of the state order for the reproduction of fish resources, on the annual basis state

and private fish farms artificially grow and release juveniles of valuable fish species into the natural habitat in order to maintain the size of population. In 2015, 168.4 million juveniles of sturgeon, carp, ripus, grass carp and silver carp, in 2016 - 168.4 million, in 2017 - 127.7 million were released.

In addition to the above, fishery water users stocked their assigned water bodies with a total of over 180.0 million juveniles of valuable fish species in 2016 (against 200 million juveniles in 2015) with a view to fulfil their obligations.

Considering the continuing decline in the Caspian sturgeon populations, today's measures taken for their protection and restoration are deemed ineffective. At the same time, restoration of the kutum population – a rare and endangered fish species – to the size sufficient for its removal from the Red Book, proves that protection of rare and endangered species is somewhat effective. Measures taken to ensure genetic polymorphism of artificially reproduced sturgeon juveniles can only be assessed in a few years.

The efficiency of waters stocking with commercial fish juveniles is quite low. The catch of stocked fish species amounted to 5.7% of the total catch in 2015, 4.3% in 2016 and 5.1% in 2017.

By the RK Government Resolution No. 1141 "On privatization matters for 2016-2020" dated December 30, 2015 the republican state budget-supported enterprises the Maybalyk Fish Nursery, the Petropavlovsk Fish Nursery, the Kapshagay Fish Farm, the Kazakh Production and Acclimatization Station were included in the list of state organizations to be privatized in 2016-2020.

The Maybalyk Fish Nursery, the Kazakh Production and Acclimatization Station and the Kapshagay Fish Farm have already been sold at an auction.

4) Conservation of the Caspian Sea ecosystem.

The following activities are carried out in this area:

1) A method of time-based inventory of semianadromous fish species in the Zhaiyk River was developed and tested. It delivers more reliable results than the bio-statistical method of stock evaluation used earlier;

2) The state and number of seals population in the Kazakhstan sector of the Caspian Sea were studied in 2015-2017; threatening factors were identified, and locations of future PAs for seals protection were determined;

3) Every year, a large-scale conservation operation called "Bekire" is held in the Zhaiyk-Caspian basin to detect and prevent illegal fishing events during spring spawning. The fish inspection, environment protection and law enforcement agencies of the Republic of Kazakhstan are annually engaged in this operation;

4) Two sturgeon plants (the Atyrau Sturgeon Plant and the Ural-Atyrau Sturgeon Plant) grow and release sturgeon juveniles into the natural environment on an annual basis to conserve and reproduce sturgeons in the Caspian Sea under a government contract. 7.5 million juveniles were released in 2015, 7.86 million – in 2016 and 6.8 million – in 2017;

5) **The Agreement on the conservation and rational use of aquatic bioresources of the Caspian Sea was made on September 29, 2014 in Astrakhan, Russia.**

The purpose of the Agreement is the conservation and rational use of aquatic biological resources of the Caspian Sea, including the management of shared aquatic biological resources and the introduction of a moratorium on the commercial fishing of sturgeon fish in the Caspian Sea.

In particular, the Agreement provides for the establishment of the Commission on Aquatic Biological Resources and the vesting of its appropriate powers, which will develop and adopt concerted measures to improve the living conditions and natural reproduction of fish resources, including the fight against illegal fishing.

In addition, the Commission on the basis of scientific research will determine the volume of catch of joint fish resources and distribute them to national quotas, the distribution will take place on the basis of approved criteria. Also, the Commission, within the framework of the

Agreement, is empowered to impose restrictions or bans on fisheries with respect to a specific type of fish, as well as in certain areas of the Caspian Sea.

The Commission is authorized to regulate the timing of fishing, as well as to establish requirements for fishing gear and methods of fishing, etc.

The first meeting of the Commission was held on November 21-23, 2017 in Baku (Azerbaijan) during which the Commission's Rules of Procedure were adopted, the necessary groups were created and the draft Protocol on Cooperation of the Parties in organizing the fight against the illegal extraction of the aquatic biological resources of the Caspian Sea, etc.

The second meeting of the Commission is scheduled for November 27-29, 2018 in Baku (Azerbaijan).

6) In April 2017, Kazakhstan took part in the CBD Regional Workshop to Facilitate the Description of Ecologically or Biologically Significant Marine Areas (EBSA) in the Black Sea and the Caspian Sea. Kazakhstan nominated 5 EBSAs in the Kazakhstan sector of the Caspian Sea – the Kendirli Bay, the Durnev Islands (sealeries), the transboundary ice floe in the Northern Caspian Sea (seal breeding site), the Zhaiyk (Ural) river outflow area (location of pre-spawning assemblages of sturgeon and semianadromous fish producers and their juvenile feeding), the Kigash river outflow area (transboundary part of the Volga delta).

The current sturgeon protection actions are not effective enough. Despite artificial reproduction, sturgeon numbers continue to go down. Natural reproduction of sturgeon in the Zhaiyk river has almost stopped, no sturgeons have been spotted in the Kigash river for a number of years. At the same time, the latest efforts managed to stabilize the Caspian seal population included in the IUCN Red List.

Challenges and needs.

The main systemic problems of fish industry are as follows:

- lack of an industry-specific development program;
- low competitive positions of domestic fish products compared to imported ones;
- reduction in aquatic bioresources stock, especially valuable species in this stock, as a result of overfishing and inadequate government control over utilization of fish stocks;
- massive imbalance between fishing and fish farming, which creates dependence on climatic and other factors.

During the period from 1960 through 1990, the fish catch went down from 111.9 thousand tons to 68.6 thousand tons, and since 2010 this indicator has decreased by another 51.7 thousand tons. The number of people employed in the fish industry has dropped from 110,000 people in the 1940-s to 4,000-5,000 people. Such decline was mainly caused by the drying up of the Aral Sea; other factors include overfishing, pollution and excessive abstraction of river water.

There are many examples of successful restoration of fisheries in 10-20 years. In the conditions of decline in the number of individual commercial facilities, a fishing alternative can be development of fish rearing for sale. An incremental transition from fishing to commercial fish farming will remove the fishing burden from natural bodies of water. In its turn, commercial fish farming will produce a multiplier socio-economic effect: fish farming business development will facilitate creation of jobs, mainly in rural areas.

The fishery waters of international and national significance are under government protection and fall within the scope of reproduction activities, while allocated fishing grounds are additionally guarded by nature users' wardens. At the same time, the water area covered by protected areas (national parks, reserves, zakazniks, reservats) is too small. For example, the area of lakes covered by protected areas amounts to just 4.3% of their total area. The Northern Caspian Sea is a conservation area, however, fishing and other economic activities, in particular, oil production, are allowed there.

In this regard, Kazakhstan **needs assistance in implementation of fish industry capacity-building projects.** Particular attention must be paid to women support. For example, one woman in a focus group of the Desert Project female beneficiaries highlighted the need to support women in the fishing industry traditionally dominated by men, where women have

limited opportunities. According to women, the common stereotypes hinder their growth in this area.

An industry-specific programme envisaging the following actions has to be adopted:

- comprehensive study of valuation of all fish functions (cultural, regulating, supporting);
- identification of economic mechanisms of fish industry development and resource mobilization activities;
- delimitation of requirements (tax, subsidies, etc.) to commercial and recreational fishing activities for tourism development;
- traditional knowledge promotion;
- legislative consolidation of obligations for biodiversity conservation in aquaculture reservoirs;
- advanced training of fisheries employees and fishing industry image building;
- heavy restrictions and control over the use of fertilizers and pesticides with due regard to their potential impact on water bodies;
- incentives for production or purchase of domestic fish foodstuff and equipment, etc.

2.7. Measures taken for meeting the national target to improve the efficiency of resources (water, land, biological, etc.) utilization and management, assessment of their efficiency, challenges, scientific and technical needs.

The sector of agriculture plays a significant role in the economy of Kazakhstan and is based primarily on farming. Crop production share in the gross agricultural output is 55%, whereas the share of livestock production is 45% [54]. Higher agricultural productivity increases land use efficiency and leaves larger areas for biodiversity conservation. This also promotes rational water use in agriculture. The above targets were set in the Concept of Transition of the Republic of Kazakhstan to Green Economy.

In the 1990-s agricultural crop acreage amounted to over 34 million hectares of land. Today, agricultural activities are carried out on the area of over 21 million hectares. More than 1 million hectares of those lands are irrigated (about 5%), i.e. agricultural crops are cultivated on the remaining 95% under natural moistening conditions.

The country's crop farming industry is dominated by grain production. Boasting a good level of grain production development, Kazakhstan is one of the world leaders in wheat and wheat flour production.

The leading livestock breeding sectors are sheep and cattle breeding. Over the period from 1990 to 1998, the cattle numbers decreased from 9.8 million to 3.9 million heads, sheep and goats – from 35.7 million to 9.5 million heads. However, by 2016, sheep and goat numbers have reached almost 18 million heads, cattle – 6.2 million heads.

In general, the agro-industrial complex is experiencing a rise, as evidenced by the growth in gross agricultural output: in 2014 it amounted to 3,143.7 billion tenge, in 2015 – 3,307 billion tenge, and in 2016 it increased by 5.4% and reached 3,684.4 billion tenge.

Table 2.7.1. Achievement of target indicators in 2013-2016.

Indicator	2013	2014	2015	2016	2020 (target)
Labour productivity in agriculture (% on 2012)	Increase by 28% (781.9 thousand tenge	1.7-fold increase (1,070.2	2-fold increase (1,239.8	2.5-fold increase (1,541 thousand tenge	3-fold increase

[54] The official Internet resource of the Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan [electronic resource] - 2016. - URL:http://www.stat.gov.kz/faces/wcnav_extema

	per person)	thousand tenge per person)	thousand tenge per person)	per person)	
Wheat yield (t/ha)	1.08	1.09	1.19	1.21	1.4
Water consumption for irrigation (m^3/ha)	1,589	1,280	1,278	1,186	450

According to MoA RK

According to the Ministry of Agriculture, the target indicators of the Concept of Transition of the Republic of Kazakhstan to Green Economy were expressed in the following way:

1. Labour productivity in agriculture (planned value – a 3-fold increase in 2020 (on 2012)). In 2016, labour productivity in agriculture increased 2.5 times on 2012 and amounted to 1,541 thousand tenge per person (see Table 2.7.1.).

2. Wheat yield (planned values: 2020 – 1.4 t/ha, 2030 – 2 t/ha).

According to the Committee on Statistics of the RK Ministry of National Economy, wheat yield amounted to 1.08 t/ha in 2013, 1.09 t/ha in 2014 and 1.19 t/ha in 2015. According to MoA RK, in 2016, the gross grain harvest was 23.7 million tons in bunker weight, nearly 4 million tenge more than in the previous year. The average yield was 15.4 c/ha.

According to the Committee on Statistics (see Table 2.7.2.), the actual figures are somewhat more conservative, because the final results were taken into account. However, the yield increase is still obvious.

Table 2.7.2. Grain crops yield.

	2012	**2013**	**2014**	**2015**	**2016**
Grain crops yield, centner per hectare	8.6	11.6	11.7	12.7	13.5

Source: http://stat.gov.kz

3. Irrigation water consumption (planned values: 2020 – 450 m³/t, 2030 – 330 m³/t).

The target to reduce consumption of water and other resources is achieved through introduction of water and resource-saving technologies on most agricultural land.

It was noted in the 2016 report of the Minister of Agriculture, that "zero" technologies are currently applied in Kazakhstan on the area of 3 million hectares, resource-saving technologies – 12.6 million hectares, making up over 84% of the total grain crop farming area. For comparison, in 2013 this figure was 78%.

According to the data delivered by the Ministry of Agriculture and oblast akimats, in 2014, the total area covered by drip irrigation method amounted to 38,922 ha, which is 7,050 ha more than in 2013. Implementation of this water-saving method was expanded in Almaty oblast by 728 ha, Zhambyl oblast – by 114 ha, Karaganda oblast – by 82 hectares, Mangistau oblast – by 173 hectares, North Kazakhstan oblast – by 46 hectares, and South Kazakhstan oblast – by 5,990 hectares.

The Government Resolution No. 421 dated April 29, 2014 introduced reimbursement of 30% of expenses incurred by agricultural producers on purchase of drip and sprinkle irrigation systems and equipment commissioned after January 1, 2014.

According to the Minister of Agriculture, effective crop acreage diversification was initiated in 2017 within the framework of the State Program for the AIC Development[55]. To that

[55] On approval of the State Programme for the Agro-Industrial Complex Development for 2017-2021 and amendment of the Decree No. 957 of the President of the Republic of Kazakhstan dated March 19, 2010.

end, the ministries and akimats developed and signed memoranda providing for expansion of oil and fodder, cereals and forage crops, as well as sugar beet by a total area of about 930 thousand hectares this year.

As a result of water-saving technologies application, the productivity of water resources in agriculture has increased almost 1.5 times (Table 2.7.3.). This measure will further expand the areas covered by advanced drip irrigation to 90 thousand hectares and sprinkle irrigation – to 120 thousand hectares.

Table 2.7.3. Water productivity in agriculture, forestry and fish industry[56].

Indicator	**2012**	**2013**	**2014**	**2015**	**2016**
Water productivity in agriculture, forestry and fish industry, tenge per cubic meter	92.15	109.02	111.49	125.05	

For **organic farming** promotion, the RK Law on organic production was adopted in November 2015. Many experts believe that Kazakhstan has a significant potential for organic farming development. Its successful implementation requires improvement of regulations, awareness-raising efforts, development of a quality control and certification system, and set-up of the relevant national institutions.

According to expert estimates[57], about 30 farms operating in three oblasts (Almaty, North Kazakhstan and Kostanay) cultivate organic wheat, rapeseed, rice and soybeans on the total area of around 300 thousand hectares of agricultural land. They are certified in compliance with international standards and comply with the EU legislation.

In collaboration with the Ministry of Agriculture, UNDP in Kazakhstan has developed a single brand logo for organic food produced in Kazakhstan – 'Organic Food'. UNDP has also provided extensive support to the Government of the Republic of Kazakhstan in certification of Kazakhstan honey in the PRC and its promotion on foreign markets.

According to the Committee on Statistics, the use of mineral fertilizers has increased over the period from 2000 to 2015. In 2000, the total application of mineral fertilizers amounted to 11.5 thousand tons, and by 2015 the figure had grown to as much as 127.2 thousand tons.

The application of organic fertilizers has also increased. While in 2000, the total application of organic fertilizers amounted to 175.7 thousand tons, by 2015 it had increased to 525.6 thousand tons. At the same time, the amount of introduced pesticides is also growing (see Table 2.7.4.) contrary to organic farming principles.

Table 2.7.4. Application of pesticides.

	Unit	2013	2014	2015	2016
Total application (all pesticides)	kg	8,738.38	11,158.8	11,112.9	10,671.6
Application per area unit	kg/ha	0.41	0.45	0.52	0.52

Source: http://stat.gov.kz

[56]Source:http://stat.gov.kz/faces/wcnav_externalId/Ind_Green_Economy?_afrLoop=6424941639458267#%40%3F_afrLoop%3D6424941639458267%26_adf.ctrl-state%3Df2f0ejnhj_158

[57] V. Grigoruk, Y. Klimov. Under the general editorship of Professor Khafiz Mumindzhanov, Doctor of Agricultural Science. Organic Farming Development in the World and in Kazakhstan. Ankara, 2016.

Maral breeding in Kazakhstan. Deer and marals have been bred for velvet antlers (antlers of young maral and sika deer used in medicines production) and other products has been practiced in eastern Kazakhstan for many years. Eastern Kazakhstan is the only region of the country with developed maral breeding industry.

In early 2018, maral stock in eastern Kazakhstan amounted to 8,500 heads, and sika deer – 700 heads. Annual production of raw antlers reached 12,500-13,800 kg, canned antlers – 4,700-5,200 kg.

Maral breeding farms carry out their activity in three priority areas.

The first of them is products export. In the 1990-s, the business was highly profitable, prices went up to 1,000 US dollar per kilogram, then dropped to 120 US dollars. Today's rate of return remains below 10%. Maintenance costs are high; maral breeding farms can't afford new equipment or fencing.

The second is maral breeding products processing into dietary supplements with the use of antlers, honey, wild herbs. Several companies produce such products in EKO and sell them all over Kazakhstan, like JV Aksu-Deyen LLP in the Katon-Karagay district, the Katon-Karagay Deer Park farm, Bayan, Bagration LLP, Gemma LLP. Here, return on margin is higher – up to 40%, but sales are limited by low demand.

The third area is health and therapeutic services in health centres usually rendered by maral breeding farms in June and July when antlers are cut. These services are in great demand and are a substantial source of income. More than 30 branches of antler health centres have been established in the country. The largest ones are: the Okzhetpes sanatorium (Akmola region), the Kendirli sanatorium (Mangystau region), the Arman sanatorium (Karaganda region), the Katon-Karagay health centre in Astana and others.

The main challenges for maral farmers of Kazakhstan are low prices on the world market, poor stock breeding activity, underdeveloped market for antler products. Therefore, this area needs subsidies, as was discussed in more details in Section 2.3 of this Report.

Challenges and needs in agriculture.

The main challenges in agriculture are:

- inefficient use of agricultural lands, especially by small and medium farms;
- unsustainable water consumption by agricultural crops;
- excessive application of mineral fertilizers to commercial and vegetable crops.

To eliminate the above listed challenges, it is necessary to

- develop a network of small and medium eco-farms; develop agroecological, institutional and legal frameworks for effective operation of ecological farms in Kazakhstan;
- introduce state-of-the-art water efficient technologies in agriculture, like drip, sprinkle and discrete irrigation;
- use mineral fertilizers upon completion of soil agrochemical study.

Aquaculture development measures were approved in the state planning documents ("Zhassyl Damu" industry-specific programme for 2010-2014, Agrobusiness-2020, AIC Development Program for 2017-2021). The criteria for assigning fishery water bodies and/or sites to water bodies and/or sites for commercial fishing, recreational (sport) fishing, lake commercial fish farming and cage culture fish farming have been developed and approved. They recognize the need to use only separate (isolated) water bodies and their sites for aquaculture development in order to prevent invasion of alien grown stock into natural water bodies.

Over 121 fish farms are engaged in fish breeding in Kazakhstan: 80 lake commercial fish farms, 19 pond farms, 4 cage culture fish farms and 18 industrial fish farms with recirculating water supply systems.

The AIC Development Program for 2017-2021 envisaged growth of aquaculture production to 5,000 tons by 2021. In 2017, this indicator reached 2,776 tons. The use of specialized foodstuff for cultivation of valuable fish species is expected to increase to 12,230 tons by 2021. In 2017, 3,867 tons of foodstuff were used. Key aquaculture indicators are given in Table 2.7.5.

Table 2.7.5. Key aquaculture indicators for 2017 (according to the Committee on Statistics)

Indicator	Value
Product (service) volume in aquaculture, thousand tenge	2,262,315
Sale of fish and other aquatic animals, tons	30,337
Feed consumption of all types for commercial fish feeding and stocking material, tons	3,867.2
Stocking material grown, thousand specimens	299,070
Commercial fish and other aquatic animals grown, tons	2,776

Aquaculture amounted to just 6% of the total Kazakhstan fish production in 2017 (see Figure 2.7.1.).

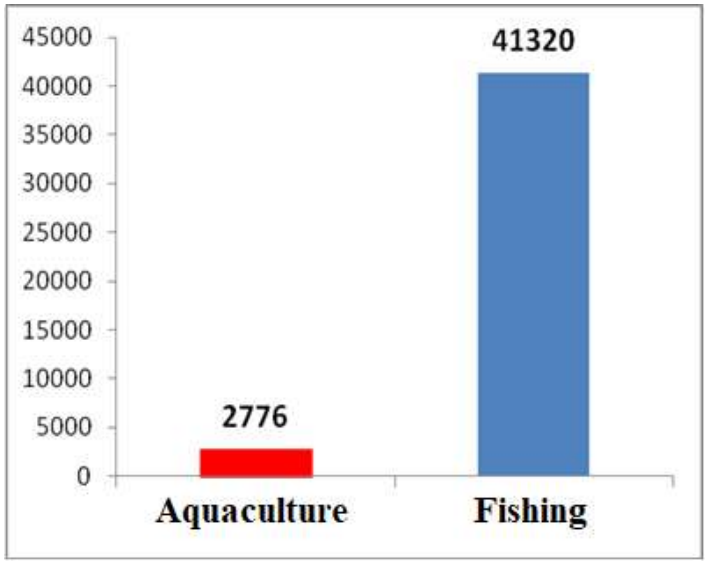

Figure 2.7.1. Aquaculture and fishing production in Kazakhstan, 2017, tons

The per capita fish consumption is estimated at 10.2 kg per year, whereas in developed countries it amounts to 26.8 kg per year. This state of things must be changed (see Figure 2.7.2.).

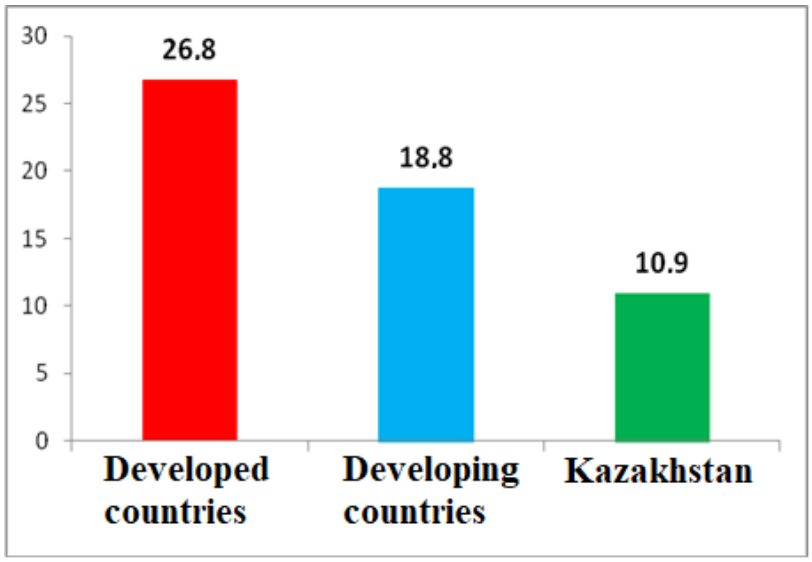

Figure 2.7.2. Fish consumption per capita (kg/year)

In 2017 aquaculture production amounted to 2,776 tons; it is expected to grow to 5,000 tons by 2021, while the potential is estimated at 50,000 tons (see Figure 2.7.3.). Such growth of aquaculture is possible provided the industry is supported by the government subsidies and incentives.

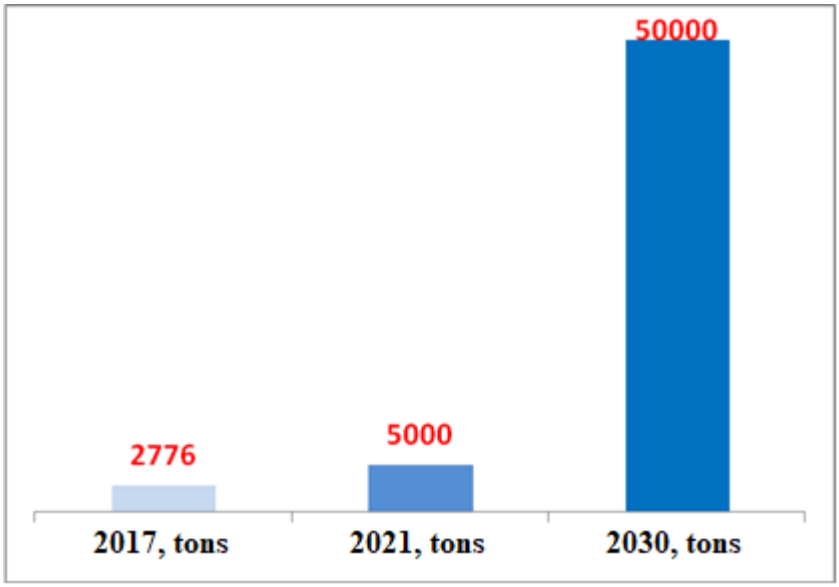

Figure 2.7.3. Aquaculture production potential in Kazakhstan.

Challenges and needs.

In Kazakhstan, fish farming standards and process schemes are underdeveloped, and the principles of organic animal breeding (fish farming) have not been implemented at all.

At the moment, the share of agricultural producers using the latest scientific achievements in the fisheries of the Republic of Kazakhstan is insignificant; this limits productivity growth and cost reduction opportunities. Natural water bodies and fish-breeding capacities are used inefficiently, and their management is complicated by large numbers of water bodies and fish sites, low population density, insufficient coverage by aquatic bioresources status and use monitoring, and inadequate forecast accuracy.

The main challenges to introduction of scientific achievements in the country are lack of a link between science and industry that would facilitate implementation of in-house developments. Unfortunately, the only specialized research institute for fisheries in the Republic of Kazakhstan does not have its own aquacultural base, and its research and financial capabilities are insufficient to cover all major users of natural resources and fish farmers with scientific research.

The introduction of intensive commercial fish farming technologies will promote rational use of Kazakhstan water resources, significantly add value to the water fund, increase fish productivity of water bodies by at least 80% and reduce the net cost by 30% compared to their operation in the industrial fishing mode. This is particularly important in climate change conditions, given potential further impoverishment of the country’s water resources. Introduction of the latest technologies into production will build the capacity of domestic fish producers, who are currently experiencing severe shortage of technologies.

2.8. Measures taken for meeting the national target to reduce pollution and improve environment, assessment of their efficiency, challenges, scientific and technical needs.

The trends in the state of environment, its components and ecosystems in Kazakhstan can be tracked to the fullest extent by review of the National Environment and Natural Resources Reports issued by the Ministry of Energy of the Republic of Kazakhstan as an annual awareness-raising activity on actual environmental situation in the country and measures taken to improve it. An interactive report is available on the website newecodoklad.ecogosfond.kz.

The National Report contains the following information:

1) qualitative and quantitative specification of environment and natural resources;

2) anthropogenic environmental impact, including public concerns of primary importance;

3) environmental situation in the regions;

4) state policy implementation in the field of environment and use of natural resources.

The Kazhydromet Republican State Enterprise (RSE) also publishes quarterly and annual newsletters containing specific environmental parameters.

The most industrialized areas in Kazakhstan and, hence, the most polluted ones are East Kazakhstan, Karaganda and Pavlodar oblasts.

In 2016, air pollutant emissions from fixed sources amounted to 2,271.6 thousand tons and their level increased by 4.2% on the previous year.

In 2012, the same emissions amounted to 2,384.3 thousand tons, i.e. they decreased by over 110 thousand tons in 5 years. The 1990 pollutant emission level was 4,649.9 thousand tons, nearly twice as high as today, and air quality is improving accordingly.

According to calculations for 2017, high pollution levels (API-7-13) are typical of Zhezkazgan, Karatau, Karaganda, Shymkent, Temirtau, Ust-Kamenogorsk, and Glubokoye village. Increased pollution levels (API) are registered in Astana, Almaty, Aktobe, Zhanatas, Semey, Ridder, Taraz, Aktau, Balkhash, and Shu. It should be noted that in the 1990-s, the API in some cities of Kazakhstan reached 30-40.

High and very high levels of air pollution are reached by such pollutants as nitrogen dioxide, carbon monoxide, sulphur dioxide, formaldehyde, hydrogen sulphide, suspended solids, phenol, ammonia emitted by motor transport, coal-fired power plants and industrial enterprises, especially mining and metallurgy.

In 2017, 990 cases of high and 98 cases of extremely high air pollution were recorded in Aktobe, Atyrau, Balkhash, Zhitikara, Karaganda, Petropavlovsk, Ust-Kamenogorsk, and Temirtau.

Outside the cities and industrial centres air quality improves dramatically, although the plumes from some large power plants (e.g. the Ekibastuz SDPP) can be traced many kilometres away and even reach Kazakhstan borders.

A somewhat different situation can be observed at water bodies that suffer intensive pollution by industrial and municipal wastewater causing significant degradation of water and coastal ecosystems. The largest epicentres of pollution can be found in the vicinity of enterprises dumping industrial waste and discharging wastewater onto the earth surface or into the river network without prior treatment (mining enterprises, certain industrial enterprises and urban agglomerations with unreliable industrial and domestic wastewater treatment systems).

Water consumption for industrial needs amounts to a little over 5 cubic km per year or 25% of the total water consumption. Water intake mainly falls on surface water sources. Heating, non-ferrous metallurgy and oil industry enterprises have the largest relative shares in water intake.

In 2017, Kazhydromet conducted observations of surface water hydrochemical parameters on 404 hydrochemical sections distributed over 133 water bodies: 86 rivers, 14 reservoirs, 28 lakes, 4 canals, and 1 sea[58]. In 2012, the same observations were conducted on 240

[58] 2017 newsletter. Kazhydromet, 2018.

hydrochemical sections distributed over 104 bodies of water (http://energo.gov.kz/index.php?id=9782)[59].

The surface and sea water pollution levels were estimated on the basis of a complex water pollution index (WPI) used to compare and identify the water quality dynamics. The main water quality criteria in terms of its hydrochemical parameters are maximum permissible concentrations (MPC) of pollutants.

Of the total number of water bodies surveyed in 2017,

"high pollution" rating was assigned to 23 rivers, 8 lakes, and 1 reservoir: the rivers Breksa, Tikhaya, Ulba Glubochanka, Krasnoyarka, Yelek (Aktobe oblast), Kargaly, Kostestek, Or, Yrgyz, Temir, Tobyl, Ayet, Obagan, Sarybulak, Zhabay, Kara Kengir, Sokyr, Sherubainura, Korgas, Yemel (Almaty oblast), Karabalta, Keles, the lakes Ulken Shabakty, Shchuchye, Kishi Shabakty, Karasye, Lebyazhye, Balkash, Alakol, Zhalanashkol, and the Karatomar reservoir;

"extremely high pollution" rating was assigned to 2 rivers and 1 lake: the rivers Kylshakty, Shagalaly, and the Maybalyk lake.

The pollution situation has deteriorated compared to 2012. 5 rivers and 1 lake were then classified as "dirty" water bodies; water quality in the lakes Biylikol and Kishi Shabakty was described as "very dirty", and the Krasnoyarka river belonged to the category of "extremely dirty" water bodies.

River pollution is particularly severe in eastern Kazakhstan where active mining operations were conducted during the Soviet period and continue today at certain fields. As a result, the rivers of eastern Kazakhstan are deemed the most polluted. At the same time, these are the mountainous rivers featuring rich but most vulnerable ecosystems. For example, according to Kazhydromet (https://news.mail.ru/incident/33228903/?frommail=1), in March 2018 – the period of maximum river flooding – one of the largest rivers of eastern Kazakhstan, Ulba, was assigned the "extremely high pollution" status. In water samples collected by Kazhydromet on March 1, zinc exceeded the maximum permissible concentration (MPC) 140.5 times, and manganese – 51.5 times. High contents of manganese and zinc were found in some water samples collected from rivers Breksa, Glubochanka and Krasnoyarka.

Operation of industrial, transport, communications, defense and other non-agricultural facilities generally has a negative impact on the state of the land and aggravates the overall ecological setting. In this regard, the state of the lands of industrial enterprises has to be continually monitored, especially those occupied by military training grounds, oil and gas pipelines, and their surrounding areas to initiate recultivation of disturbed lands in a timely manner.

Considerable degradation of natural ecosystems is observed in mining and primary processing locations. Nearly all valuable biodiversity elements disappear from such lands, and the disturbance factor expands the negative impact to many kilometres around the location. That is why quantitative land degradation assessment of the basis of statistical data is not sufficient, yet indicative, for biodiversity loss evaluation.

Industrial land area increased from 2,620.8 thousand hectares in 2012 to 2,875.4 thousand hectares in 2016 (see Table 2.8.1.).

Table 2.8.1. Lands of industry, transport, communications, defense and other non-agricultural sectors, thousand hectares.

	2012	2013	2014	2015	2016
Lands of industry, transport, communications, defense and other non-agricultural sectors,	2,620.8	2,726.4	2,778.7	2,826.0	2,875.40

[59] 2012 newsletter. Kazhydromet, 2013.

including:					
Industry	914.6	971.7	1,016.4	1,052.9	1,094.7
Motor transport	300.1	319.2	320.3	322.4	324.1
Railway transport	188.1	197.1	200.3	200.8	202.8
Communications	7.1	7.7	8.4	8.9	10.1
Other non-agricultural enterprises	1,210.9	1,230.7	1,233.3	1,241.0	1,243.7

Continuous withdrawal of the forest fund lands most valuable for biodiversity conservation is an issue of particular concern. Having withdrawn forest lands for subsurface use, the state has already lost thousands of hectares of forest together with its biodiversity. The current inadequate policy of forest land withdrawal is being cast aside by accelerated development, testing and universal introduction of economic instruments for biodiversity conservation, specifically, the compensatory measures for biodiversity loss. The urgency of pursuing policies conducive to the conservation and sustainable use of biodiversity and ecosystem services has now become more obvious than ever before.

Land disturbance and recultivation data are given in Section 2.15 of this Report.

According to the 2017 National Environment and Natural Resources Report, non-ferrous metallurgy enterprises alone generated over 22 billion tons of waste, including about 4 billion tons of mining waste, over 1.1 billion tons of toxic benefication waste and 105 million tons of metallurgical processing waste.

Non-ferrous metallurgy waste storage pits occupy the area of about 15,000 hectares, including rock dumps – 8,000 ha, benefication plant tailings – about 6,000 ha and metallurgical plant dumps – over 500 ha. Waste volumes of the same magnitude are generated by ferrous metallurgy and chemical industry.

In 2017, 1,800 hectares of land were disturbed, of them 600 hectares were prepared for further intended use and 1,200 hectares were recultivated. The largest area of disturbed lands was recultivated in Aktobe oblast (1,000 ha).

The Ministry of Energy exerts efforts in recycling and disposal of historical waste. There are 14 state-owned facilities recognized as abandoned hazardous waste. 3 of them have already been eliminated:

- mercury-containing wastes were liquidated in Karaganda oblast,
- in Kostanay oblast, 4 hectares of land were cleared of toxic chemicals in Toguzak village,
- in Mangystau oblast, 304,136 tons of oil sludge in the vicinity of Zhanaozen were liquidated by EcoOriyentir LLP.

Liquidation of the remaining facilities will continue once the funding becomes available.

Over 260 enterprises carry out their activities in the regions to develop an appropriate infrastructure for processing, neutralization and use of certain types of industrial waste (oil sludge, ash and slag, sulphur, chemical industry waste). In 2016, 26.8% of 792.9 million tons of industrial waste were recycled and disposed of.

Challenges and needs.

Kazakhstan agriculture has faced a serious challenge – management of outdated and unusable pesticides, and their chemical identification. More than 1,500 tons of such pesticides and their mixtures and containers are stored in warehouses and storage facilities throughout the country; some of them are stored in unequipped rundown buildings with leaking roofs, often dumped in one pile. About 10% are pesticides with POP properties. Inventory of pesticides with POP properties covers only 20% of the country. It is also necessary to extract and destroy buried pesticides. Soil pollution with POP-related pesticide wastes is extensive and sporadically distributed; areas contaminated with POPs must be cleaned.

Disposal of pesticide packaging remains a problem due to insufficient capacity of processing enterprises, therefore, most of it is simply buried in landfills. Containers pose a real threat to wildlife and human health, as people often unknowingly use them in their households to

store food and water.

8 persistent organic pollution foci have been identified in Kazakhstan. Information on the "flashpoints", the territories polluted by POPs, has been sent to the International POPs Elimination Network (IPEN) to be integrated in the world map of POPs contamination "flashpoints".

The information currently available is not sufficient for a complete and true understanding of the nature and level of Kazakhstan land pollution. Complete and objective evidence of land pollution, elimination of existing pollution can be obtained following in-depth environmental and geochemical studies carried out throughout the country, elaboration of recommendations on systemic approach to elimination and stabilization of negative impacts with the use of state-of-the-art technologies.

There is a huge amount of historical industrial waste locations in Kazakhstan, including man-made mineral formations. The Soviet five-year periods of accelerated industrial development generated significant amounts of waste of heavy industries, agriculture and mineral resources development. Much of this waste is highly toxic and produces high levels of radioactive contamination.

At the same time, the mining waste management industry is not developed, since technologies are costly and sophisticated, and the investment interest in waste treatment is lacking.

Another problem is the neglect of preservation of animal migration routes in construction of highways, railways, and surface trunk pipelines. At the moment, there isn't a single wildlife crossing in Kazakhstan. There are two wildlife corridors: Yrgyz-Torgai-Zhylanshyk in Kostanay oblast and Kapshagay-Balkash in Almaty oblast. However, no crossings are organized for animals at intersections of those corridors with highways and railways.

In Kazakhstan protected areas, the intersection of the designed gas pipeline (Terekty-Emba) with the Yrgyz-Torgai State Natural Reservat in Aktobe oblast can obstruct migration of the Betpak-dala saiga population in spring-summer and autumn-winter periods; the same thing can be said about the Yrgyz-Torgai-Zhylanshyk wildlife corridor created in 2014 for protection of saiga migration routes. In Almaty oblast, the operating gas pipeline section Kapshagay-Taldykorgan can obstruct migration of goitered gazelle of other large ungulate mammals along the Kapshagay-Balkhash wildlife corridor created in 2018 from the "Altyn Emel" State National Natural Park to the newly established Ili-Balkhash State Natural Reservat.

Outside the protected areas, migration of the Betpak-dala saiga group can be obstructed by latitudinal (east-west) routes of the northern branch of the designed gas pipeline (Arkalyk-Aktobe) and to the south from the designed gas pipeline (Terekty-Emba). A section of the existing gas pipeline (Beyneu-Bozoy) can obstruct migration of the Usturt saiga population.

Such obstructions for migratory animals are shown on the map developed within the scope of the joint UNECE/UNDP/ME RK project for strategic environmental assessment (SEA) introduction in Kazakhstan (Annex 2)[60].

According to the Ministry of Agriculture of the Republic of Kazakhstan (https://liter.kz/ru/articles/show/46268-most_mezhdu_lyudmi_i_zhivotnymi), in its draft law on amendment of certain legislative acts of the Republic of Kazakhstan for agro-industrial complex regulation, the Ministry has envisaged amendments obliging designers to provide for surface structures (wildlife crossings) on the roads of national significance in places of wild animals' migration. The Ministry is collaborating with research and non-governmental organizations to identify priority places of wild animals' migration.

According to the RK Ministry of Investment and Development, underground tunnels are constructed in Kazakhstan for cattle crossing. So far, 284 cattle crossings have been arranged in Aktobe, Kyzylorda, Zhambyl, Almaty and South Kazakhstan oblasts, where construction works under the major "Western Europe – Western China" project have been completed (Aktobe – 26,

[60] UNECE/UNDP/ME RK project report on SEA introduction in Kazakhstan. Astana, 2018.

Kyzylorda – 84, South Kazakhstan – 50, Almaty – 38, Zhambyl – 34), and 20 more cattle crossings were built under the completed "Aktau – Beyneu" project. There are 92 equipped cattle crossings on railway level in Akmola, Pavlodar, Kostanay, Mangystau, Aktobe, Karaganda and Kyzylorda oblasts. Things are worse with aboveground wildlife crossings: they are simply non-existent. They certainly have to be built, as wild animals are afraid to enter tunnels. According to MID RK, in collaboration with research and non-governmental organizations, the government authorities are currently working on amendment of the relevant technical specifications for road construction. At the same time, considering that a wildlife crossing is a bridge with a soil and vegetation layer, trees and shrubs planted to replicate the landscape around it, like any other bridge, each wildlife crossing should be designed individually, depending on the terrain and its geological and geodesic features.

Electricity transmission with overhead power lines has a significant impact on Kazakhstan fauna.

There are two aspects of overhead transmission lines (OHTL) negative impact on birds: physical damage or death due to direct collision with lines and electric shock.

Any OHTLs, regardless of the type of structure and voltage, can cause collision, however, the highest risk level can be assigned to high-voltage OHTLs with 220kV or more, the so-called OHTLs with bundle conductors, when several wires are suspended from each conductor. Such OHTLs pose a threat if located in close proximity to water bodies or at intersections with migration routes in places of mass gatherings of birds. Birds death rate due to electric shock is much higher than in case of collision. In this case, birds are primarily threatened by power lines with a voltage of 6-10 kV on reinforced concrete poles with pin insulators. All this justifies refitting of power lines in priority areas for urgent elimination of their harmful effect on birds.

Environmental impact reduction targets are achieved in the course of environmental measures taken by nature users.

Reducing emissions into the air.

In 2017, air pollution from fixed sources reached 2,357.8 thousand tons, 3.8% above the previous year level. The largest emissions are continually registered in Karaganda and Pavlodar oblasts (see Table 2.3.). Most pollutants are emitted into the air by industrial enterprises contributing 84.1% of all emissions.

In 2013, the same emissions amounted to 2,282.7 thousand tons, i.e. they decreased by over 75 thousand tons in 5 years. The 1990 pollutant emission level was 4,649.9 thousand tons, nearly twice as high as today.

Unfortunately, the target for transition to European benchmarks of emissions of nitrogen oxides, sulphur oxides, solids and other pollutants was not achieved.

The Technical Regulation[61] in force sets the following emission threshold values:

- nitrogen oxides NOx ≤ 500 mg/m^3;
- sulphur oxides SOx ≤ 780 mg/m^3;
- ash particles ≤ 200 mg/m^3.

In order to achieve European emission standards (nitrogen oxides NOx ≤ 200 mg/m^3; sulphur oxides SOx ≤ 200 mg/m^3; ash particles ≤ 20-30 mg/m^3) the above Technical Regulation has to be amended.

According to the Ministry of Investment and Development of the Republic of Kazakhstan, the standard dust emission in compliance with the Technical Regulation No. 1232 can be achieved with the use of advanced emulsifiers. Reconstructed burners with a low NOx output are used to reduce nitrogen oxide emissions.

A phased replacement of ash collectors with a flue gas cleaning efficiency of up to 97.5%

[61] Resolution No. 1232 of the Government of the Republic of Kazakhstan "On approval of the Technical Regulation "Requirements to emissions from fuels combustion in boiler systems at thermal power plants"" dated December 14, 2007.

with battery-powered emulsifiers of the second generation with 99.3% efficiency at central heating enterprises was planned to be completed in 2014-2016 to reduce emissions of solid particles by 70-80% and suppress sulphur oxides by 10%.

The effort of technical regulations harmonization with the European emission standards, especially in terms of sulphur oxides, nitrogen oxides and solids, must continue.

So far, the threshold values have not changed, and sulphur and nitrogen oxides emissions remain at the same level (see Table 2.8.2.). Only solids and hydrocarbon emissions have significantly reduced, while emissions of volatile organic compounds increased.

Table 2.8.2. Emissions of the most common air pollutants from fixed sources, thousand tons

	Unit	2012	2013	2014	2015	2016	2017
Sulphur dioxide	kt/year	769.6	729.2	729.1	710.6	767.5	786.4
Carbon monoxide	kt/year	446.2	457.9	478.8	451.2	473.0	491.9
Nitrogen oxides	kt/year	249.4	250.2	256.5	243.4	246.6	264.7
TSS (solids)	kt/year	593.8	551.2	494.2	466.0	460.6	475.7
Coal ash with calcium oxide 35-40%	kt/year	35.3	18.6	14.4	8.6	8.6	14.2
Soot	kt/year	9.0	8.6	8.9	7.3	8.0	8.7
NMVOC	kt/year	58.1	92.0	114.4	105.1	100.4	87.2
VOC	kt/year	-	-	-	-	-	-
Ammonia	kt/year	2.2	2.0	2.2	2.3	2.5	2.3
Hydrocarbons	kt/year	170.5	96.1	62.0	66.1	63.0	45.2
Toluene	t/year	1,688.8	1,761.4	2,075.9	2,174.1	1,941.7	2,354.9
Lead	t/year	542.0	572.4	699.4	636.3	224.5	254.8
Copper	t/year	248.8	165.9	162.6	254.5	217.7	-
Copper oxide	t/year	-	-	-	-	-	32.9
Naphthalene	t/year	69.1	51.6	54.9	54.5	56.2	58.7
Benzapyrene	t/year	17.1	35.2	23.2	49.6	22.8	24.7
Arsenic	t/year	101.3	121.8	87.7	40.5	13.4	7.9
Cadmium	t/year	1.2	1.3	1.2	1.2	1.3	6.5
Dichloroethane	t/year	201.1	0.047	0.100	1.2	1.2	1.125
Mercury	t/year	0.2	0.2	0.2	0.2	0.5	0.3

Source: http://stat.gov.kz

It is worth noting reduction in emission of other pollutants, like lead – from 542.0 to 254.8 t/year, copper – from 248.8 to 217.7 t/year, arsenic – from 101.3 to 7.9 tons/year and dichloroethane – from 201.1 to 1.12 t/year over the period from 2012 through 2017.

The main source of air pollution is industrial emissions. The table below shows changes in the size of emissions over the period of 2011-2017 based on statistical data. Industrialized Karaganda and Pavlodar oblasts produce the largest emissions, but at the same time show the sharpest drop, whereas a significant increase in emissions is registered in Aktobe, Zhambyl and South Kazakhstan oblasts (see Table 2.8.3.).

The fuel and energy complex (FEC) contribution to air pollution is shown on the map developed within the scope of the joint UNECE/UNDP/ME RK project for SEA introduction in

Kazakhstan (Annex 3)[62].

Table 2.8.3. Emissions of air pollutants from fixed sources, thousand tons.

Administrative units	2013	2014	2015	2016	2017
Republic of Kazakhstan	2,282.7	2,256.7	2,180.0	2,271.6	2,357.8
Karaganda oblast	572.6	603.6	596.4	593.0	598.7
Pavlodar oblast	650.4	610.2	552.9	542.7	609.8
Atyrau oblast	138.4	109.1	110.7	167.1	177.0
Aktobe oblast	125.4	121.8	134.3	155.6	169.5
East Kazakhstan oblast	125	129.6	127.1	128.7	129.3
Kostanay oblast	115.4	103.8	91.6	98.7	114.8
Akmola oblast	83.8	84.6	85.6	94.5	86.9
North Kazakhstan oblast	71.4	72.0	74.9	77.7	76.4
South Kazakhstan oblast	56.3	59.9	69.0	72.0	68.2
Mangystau oblast	77.5	88.3	72.5	65.8	62.6
Zhambyl oblast	33.6	38.2	41.9	52.4	51.9
Almaty oblast	68.5	51.6	55.0	50.3	43.4
West Kazakhstan oblast	60.4	44.7	42.4	42.5	41.5
Kyzylorda oblast	31.2	30.8	30.1	30.1	27.5
Astana	60.6	65.1	56.3	61.7	59.2
Almaty	12.4	43.5	39.1	38.8	41.2

Source: http://stat.gov.kz

Many power plants in Kazakhstan have developed action plans for phased implementation of emission reduction measures in the coming years. Environment protection is underway in the form of continuous parameter chart compliance monitoring, equipment repair and overhaul, performance tuning and testing, measures to reduce output of nitrogen oxides and sulphur oxides from both fixed and mobile sources.

AF-Group continues design works on improvement of environmental standards in the energy sector of Kazakhstan within the framework of the Memorandum of Understanding made between the Ministry of Energy and the European Bank for Reconstruction and Development.

Ash collectors with advanced electrostatic precipitators can't be installed at most power plants, because this would require changing the process scheme of flue gas removal, rearrangement of existing buildings, attracting extensive financial resources and time.

Innovative technologies of flue gas cleaning with the use of baghouses for dust collection, selective catalytic reduction to cut nitrogen oxide output by 90%, the ozone-ammonia method of sulphur oxide reduction to increase collection efficiency up to 99% are implemented at the following newly built TPPs:

- Ekibastuz SDPP-1 LLP – during restoration the power unit No. 1, it is planned to install an electrostatic precipitator with a design collection efficiency of 99.6%;
- Astana Energy JSC – the newly built boilers at stations No. 7 and No. 8 will be equipped with the Novel Integrated Desulphurization (NID) system with electrostatic precipitators;
- Eurasian Energy Corporation JSC – a combined fuel combustion system featuring tertiary blast unit and triple-flow burners was deployed.

Low-emission turbulent burners with a low output of nitrogen oxides are used at several existing power plants; nitrogen oxide emissions can also be reduced in furnace conditions with lower flame heart temperatures.

[62] UNECE/UNDP/ME RK project report on SEA introduction in Kazakhstan. Astana, 2018.

Kazakhstan continually decreases the amount of flared associated gas in oil production. The country annually flares 2.4 billion cubic meters of unused energy source to generate 7 million tons of emissions. These figures are specified in the World Bank report published in mid-July 2018 (https://abctv.kz/ru/news/kazahstan-snizil-obemy-szhiganiya-poputnogo-gaza). In 2017, petroleum companies operating in the country flared 2.422 billion cubic meters of unused associated gas at oil and gas fields. This is 9% below the level of 2016 (2.655 billion cubic meters). In 2015, flared gas amounted to 3.644 billion cubic meters, in 2014 – 3.932 billion cubic meters, in 2013 – 3.764 billion cubic meters. Notably, oil production has neither decreased nor increased over the years. According to the report rating, Kazakhstan ranks 13th in the world in terms of gas flaring. The World Bank estimated that given the 98% flaring efficiency 2.4 billion cubic meters of flared associated gas produce 7 million tons of emissions, 6 of which are carbon dioxide.

Reducing pollutant discharges

According to the statistics, over the past 15 years the volume of fresh water intake in the Republic of Kazakhstan increased by more than 10% and amounted to 22,102 million m³ in 2017 (see Table 2.8.4.). Of the nationwide fresh water consumption rate, 16,273 million m³ were used by agriculture, forestry and fish industry, 5,421 million m³ – by the processing industry, 624 million m³ – by power plants and 929 million m³ – by households.

FEC contribution to water pollution is shown on the map developed within the scope of the joint UNECE/UNDP/ME RK project for SEA introduction in Kazakhstan (Annex 3)[63].

Table 2.8.4. Fresh water intake

Indicators	Units	Year				
		2013	2014	2015	2016	2017
Fresh water intake (total)	mln m³	22,530	23,078	21,661	22,771	22,102
by households	mln m³	826	856	840	888	929
by agriculture, forestry and fish industry	mln m³	15,151	14,838	14,701	15,186	16,273
of them used in agricultural irrigation	mln m³	11,628	11,676	10,165	11,946	11,985
by processing industry	mln m³	5,502	5,636	5,303	5,412	5,421
by power plants	mln m³	790	788	664	624	-
by other sectors of economy	mln m³	261	960	153	1,285	521

Losses in transit make up an average of about 60% of water consumption in agriculture; about 40% – in industry and 50% – in municipal utility sector.

The total volume of municipal wastewater slightly decreased in 2012-2016 from 5,653.00 to 5,205.11 million cubic meters. The share of water discharged without treatment decreased from 3.36 to 2.79%. A negative practice is mixing up of industrial and municipal sewage in urban effluents; it considerably complicates and reduces efficiency of treatment activities. As a result of that practice, almost all urban sewage is initially discharged into wastewater storage tanks, which are often much larger than natural water bodies and are an attractive habitat for many wild fauna species, including migratory ones. For example, the Sorbulak wastewater storage tank in Almaty covers an area of many square kilometres and contains about 1 billion cubic meters of wastewater.

Since 2012, the RK Ministry of Energy has pursued a policy of lowering the discharge limit. Thus, in 2016, the discharge limit was 2.9 million tons against 4.8 million tons in 2013 (4.7

[63] UNECE/UNDP/ME RK project report on SEA introduction in Kazakhstan. Astana, 2018.

million tons in 2014, 3.5 million tons in 2015). However, the share of recycling and reverse water supply decreased from 45.1% in 2012 to 40.4% in 2016.

According to the statistics, the generation of hazardous waste at Kazakhstan enterprises continues to decrease from 355.9 million tons in 2012 to 151.4 million tons in 2016 (see Tables 2.8.5. and 2.8.6.). However, the use and disposal of hazardous waste at enterprises decreased almost three times in the same period.

By industries, the sharpest decline was registered in mining and quarry development (over three times). In other industries, the decline was insignificant.

Table 2.8.5. Hazardous production waste generation, use and neutralization, mt/year

	Hazardous waste generation	Hazardous waste use at enterprises	Hazardous waste neutralization
2012	355.9	94.7	0.8
2013	382.2	81.8	0.5
2014	337.4	110.1	0.3
2015	251.6	74.1	0.4
2016	151.4	33.3	0.3

* Data of the Ministry of Energy of the Republic of Kazakhstan.
Source: http://stat.gov.kz

Table 2.8.6. Waste generation by industries.

Industry	Unit	2012	2013	2014	2015	2016
Agriculture, forestry and fish industry	kt/year	1,136.4	1,146.8	1,049.5	1,410.8	1,804.3
Mining	kt/year	283,685.9	298,918.8	268,367.1	185,300.0	88,486.7
Processing	kt/year	46,000.0	49,402.5	44,918.2	42,929.5	39,160.9
Power, gas, vapor supply	kt/year	21,713.1	28,832.8	18,844.3	17,942.8	17,920.0
Construction	kt/year	138.8	267.6	247.4	225.6	285.6
Other sectors of economy	kt/year	3,278.3	3,645.8	3,988.3	3,756.9	3,733.6
Total municipal wastes	kt/year	3,588.3	3,547.7	3,446.3	3,235.5	2813.6
of them, wastes generated by households	kt/year	2,429.9	2,495.5	2,421.0	2,318.3	1,988.5
Total wastes	kt/year	359,540.8	385,762.0	340,861.1	254,801.1	154,204.7
of them, hazardous wastes	kt/year	355,952.5	382,214.3	337,414.8	251,565.6	151,391.1

Source: http://stat.gov.kz

In 2017, 278.2 million tons of non-hazardous waste (69%) and 126.9 million tons of hazardous waste (31%) were generated in the Republic of Kazakhstan. Relative to 2016, the 2017 hazardous waste generation decreased by 19%, whereas non-hazardous waste generation increased 1.6 times.

The major “generators” of non-hazardous waste in 2017 were: mining and quarry development – 261,943.8 thousand tons, processing industry – 9,480.1 thousand tons, construction – 277.9 thousand tons, agriculture, forestry and fish industry – 55.0 thousand tons, water supply – 50.8 thousand tons, healthcare and social services – 40.8 thousand tons,

wholesale and retail trade – 36.6 thousand tons.

The major "generators" of hazardous waste in 2017 were mining and quarry development – 79.1 million tons, power, gas, steam and air conditioning – 19.0 million tons, processing – 13.3 million tons, agriculture, forestry and fish industry – 2.1 million tons, other sectors – 13.2 million tons.

96.7% of hazardous waste generation are the green list wastes, 3.2% are in the amber list, and only 0.001% are in the red list.

In 2017, 1.4 thousand tons of the red list waste, 167,194.3 thousand tons of the amber list waste, and 23,590.1 thousand tons of the green list waste was recycled, reused or burned. 0.007 thousand tons of the red list waste, 364.6 thousand tons of the amber list waste, 92,477.6 thousand tons of the green list waste were placed at companies' own waste disposal facilities.

In 2017, 3.4 million tons of municipal solid waste (MSW) was collected and transported, the bulk of which is household waste (69.5%), 30.5% was collected separately. 11.5% was production waste (equivalent to household waste), 14.5% – garbage collected in the streets, 2.6% – market waste, 0.4% – park waste, 0.3% – construction waste and 1.2% – other waste types.

Of the total number of collected and transported waste, 7.4% was collected by state-owned enterprises, 92.4% by private companies and 0.2% by foreign companies.

In 2017, 3.2 million tons of waste were delivered to official landfills for municipal waste. 80.5% of them were further deposited, 5.8% were sorted and forwarded for further processing, 13.7% were disposed of.

Deposited waste volume included 75.8% of mixed municipal waste, 5.9% of industrial waste, 5.9% of construction waste, 12.4% of residual waste after sorting and other waste types. Table 9.4. contains data on the total volume of waste delivered for sorting, recycling and deposition.

By the end of 2017, over 45.7 million tons of waste had been accumulated at officially operating landfills.

At the moment, over 130 enterprises that sort and process waste, and produce more than 20 types of products – plastic, metal, wood, glass, paper, crumb rubber and rubber goods – are operating in Kazakhstan, and their number is growing. For example, in 2016, the number of enterprises engaged in processing and disposal of tires increased from 5 to 13, of used oils – from 2 to 8. Considering that EPR for packaging and electric equipment was introduced in 2017, the number of processing enterprises is expected to increase further.

The measures taken to improve legislation on waste management, EPR and Roadmaps implementation in general promoted phased introduction of separate collection, sorting and recycling of waste and increased the share of solid waste recycling from 2.6% in 2016 to 9% in 2017.

Challenges and needs.

An increase in pollutant emissions was caused by the following factors:

- Expansion and commissioning of new facilities, restart-up of the Kashagan field, etc.;
- In general, a number of enterprises are expanding their capacities and are continually adjusting their emission thresholds;
- New facilities are commissioned in line with the State Programme for Industrial and Innovative Development and put additional pressure on the environment.

Emission reduction efforts will be successful if environmental requirements are strengthened, transition to the standards of developed countries is completed and innovative technologies are introduced in industrial production.

2.9. Measures taken for meeting the national target to develop an invasive and alien species information system, assessment of their efficiency, challenges, scientific and technical needs.

The Committee for Forestry and Wildlife of the RK Ministry of Agriculture, being the national CITES Management Authority in the Republic of Kazakhstan, is empowered to issue permits for import and export of species of wild animals, their parts or derivatives, included in Annexes I, II and III to the CITES Convention, which are also an invasive alien species information and control mechanism.

Permits for import and export of species of wild animals, their parts or derivatives, included in Annexes I, II and III to the CITES Convention shall be issued by the CITES Management Authority in the Republic of Kazakhstan in accordance with the public service standard "Permitting procedure for import and export of species of wild animals covered by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in and out of the Republic of Kazakhstan", approved by Order No. 18-03/390 of Acting Minister of Agriculture of the Republic of Kazakhstan dated April 30, 2015.

In 2017, 223 permits for import and export of species, their parts or derivatives were issued under the CITES Convention, in 2014 – 194 permits, in 2015 – 160 permits, in 2016 – 193 permits.

The purpose of specimen import or export are commercial operations, scientific research, circus performances and mobile exhibitions, exchanges between zoos, botanical gardens and museums, as well as personal deliveries, hunting trophies, etc.

In the present situation, the permitting procedure for import and export of species of wild animals, their parts or derivatives, included in Annexes I, II and III to the CITES Convention is a practical mechanism of data collection on invasive alien species and their control.

The problem of invasive and alien species appeared quite a long time ago, and was also highlighted in the previous 5th National Report. In 2012, an analysis [64] of the distribution of species potentially dangerous to natural biodiversity was carried out. 6 species of fish, 1 species of birds, 5 species of mammals, a number of invertebrate species were identified.

Challenges and needs.

At the moment, the impact of alien species on water ecosystems in Kazakhstan is hardly studied, and no attention is paid to this issue.

Invasive alien species are known to disturb the biological balance once they are introduced in an unnatural ecosystem.

In order to take adequate measures to prevent the negative impact of invasive alien species on an ecosystem, it is essential to determine when the invasive species appeared and what area it inhabits.

Alien species invasion is one of the most important areas of fundamental and applied research and is the primary aspect of a country's environmental safety.

To some extent, accidental colonization by species of new (for this species) areas and ecosystems is a natural process. However, human activity promotes its intensity. The experts of the Institute of Zoology raised the question of the need to create a "Black Book of the Fauna of Kazakhstan" [65], but there is no progress on this issue yet.

Kazakhstan lacks a system of early detection of invasive alien species introduction events and their destruction.

Such system development will require legislative introduction of a permitting procedure for imports of animal and plant species. In particular, imports of agricultural products have to be regulated in terms of introduction of insects and their larvae (the Colorado beetle). Control over transboundary movement of such species has to be tightened accordingly.

The following activities have to be carried out in Kazakhstan:

[64] Kovshar A.F., 2012 https://zoomet.ru/zhurnal/Selevinia-2012.pdf

[65] http://uz.fondvsg.ru/kovshar-anatolij.html

- a list of identified invasive alien species by degree of threat they pose to biodiversity;
- tightened border control at veterinary and sanitary customs control points over living hydrobionts' import for timely identification of their main transit routes, forecasting, prevention of their invasions or mitigation of invasion consequences;
- an Integrated Invasive Alien Species Information and Control System;
- targeted research for elaboration of recommendations on fight against invaders;
- international bilateral agreements on alien species invasion prevention and control.

2.10. Measures taken for meeting the national target of protecting vulnerable ecosystems, assessment of their efficiency, challenges, scientific and technical needs.

Wetlands and river deltas should be classified as vulnerable aquatic ecosystems. Kazakhstani part of Eurasian wetlands is where two world's migration routes converge - these are Central Asian-Indian and Siberian-East-African. Kazakhstan is an international haven on the migratory birds' routes. Wetlands in Kazakhstan are nesting and feeding places for birds from Western Europe, Southeast Asia, Africa, and Arctic coast. Kazakhstan has the largest population of waterfowl in Asia with more than 130 species. Every six months, more than 50 million birds migrate through Kazakhstan. Of these, 20 percent nest in Kazakhstan." [66]

Through the project on wetlands conservation in Kazakhstan, supported by the Global Environmental Facility, the United Nations Development Program and the Government of the Republic of Kazakhstan, seven sites with a total area of more than 1.6 million hectares were listed as wetlands of international importance. A total of 54 sites with a total area of 3,914,639 hectares are currently registered in Kazakhstan. Of these, 10 sites are of international importance (Table 2.10.1).

Table 2.10.1. List of wetlands of international importance in Kazakhstan

No.	Name	Date of inclusion in the list	Oblast	Area (ha)	PA[2]
1	Tengiz-Korgalzhyn Lake System	October 11,1976	Akmola oblast	353,341	Korgalzhyn nature reserve
2	Lakes of the Lower Turgay and Irgiz	October 11,1976	Aktobe oblast	348,000	Irgiz-Turgay natural reservat and Turgay natural zakaznik
3	Ural River Delta and Adjacent Caspian Sea Coast	March 10, 2009	Atyrau oblast	111,500	Ak Zhaiyk natural reservat
4	Koibagar-Tyuntyugur Lake System	May 7,2009	Kostanay oblast	58,000	-
5	Kulykol-Taldykol Lake System	May 7,2009	Kostanay oblast	8,300	-
6	Zharsor-Urkash Lake System	July12,2009	Kostanay oblast	41,250	Zharsor-Urkash natural zakaznik
7	Naurzum Lake System	July12,2009	Kostanay oblast	139,714	Naurzum nature reserve
8	Alakol-Sasykkol Lake	November	Almaty oblast, East	914,663	Alakol nature reserve

[66] Kerteshev, T.S. (2011). Wetlands of Kazakhstan: role, problems and prospects.

	System	25, 2009	Kazakhstan oblasts		
9	Ili River Delta and South Lake Balkhash	January 01,2012	Almaty oblast	976,630	Balkhash, Karroy, and Kukan natural zakaznik
10	Lesser Aral Sea and Syrdarya River Delta	February 2,2012	Kyzylorda oblast	330,000	Barsakelmes nature reserve

The sites are in order of inclusion in the list

Kazakhstan's national report on the implementation of the Ramsar Convention on Wetlands for 2018 is presented on the convention website. (https://www.ramsar.org/sites/default/files/documents/importftp/COP13NR_Kazakhstan_e.pdf).

According to environmental legislation, all river deltas are zones where fishing is prohibited. In 2016, commercial fishing was prohibited in the Ili River delta; also Ili-Balkhash PA was designed and created.

There are protected areas in wetlands (Ak Zhaiyk natural reservat at the mouth of the Zhaiyk River, Alakol nature reserve, Ili-Balkhash reservat in the Ili river mouth etc.). It is planned to completely prohibit fishing in the river mouth areas of the Zhaiyk and Kigach Rivers.

Inernationally important bird areas - IBA - form networks that, if protected, play a huge role not only in preserving birds, but also maintaining biodiversity as a whole. IBA identification serves as a reliable scientific basis for planning the development of a system of protected areas at the national level. In Kazakhstan, as of January 2018, there are a total of 127 important bird areas (IBA). Together, they cover more than 15,400,000 hectares, which is equivalent to 5.7% of the country's area, with 4,584,592 hectares (39 IBA in whole or in part) being a part of protected areas (PAs). A map of the important bird areas in Kazakhstan with their numbers is presented on the ACBK website[67].

Strategic Goal C: To improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity.

2.11. Measures taken for meeting the national target of increasing area of protected areas (PAs), assessment of their efficiency, challenges, scientific and technical needs.

At present, practically in all natural zones of the country there are various types of protected areas. State nature reserves, state national natural parks, state natural reservats, state natural zakazniks, state natural protected zones, state botanical gardens have been created and are operating in the country. Depending on the significance of the sites of the reserve fund, they are classified as either of national or local importance. The list of protected areas of national importance was approved by Resolution of the Government of the Republic of Kazakhstan No. 593 of September 26, 2017. Practically all the sites are under supervision of the CFW MoA RK, with the exception of Burabay state national natural park, which is under supervision of the Department of Presidential Affairs of the Republic of Kazakhstan, and state botanical gardens which are under supervision of the Ministry of Education and Science of the Republic of Kazakhstan.

In 2017, the total area occupied by protected areas of national importance accounted for 24.4 million hectares (8.96% of total country’s area) while in 2013, it was 23.9 million hectares (8.76%) (Table 2.11.1).

Table 2.11.1. Protected areas

[67] http://acbk.kz/article/default/view?id=12

Name	Measurement	Year				
		2013	2014	2015	2016	2017
Country's total area	km^2	2,724,900	2,724,900	2,724,900	2,724,900	2,724,900
National categories of protected areas						
Total protected area	km^2	238,732	238,732	240,188	244,287	244,287
Nature reserves	km^2	16,114	16,114	16,114	16,114	16,114
	%	6.75	6.75	6.71	6.60	6.60
Natural reservats	km^2	23,041	23,041	23,041	27,141	27,141
	%	9.65	9.65	9.59	11.11	11.11
National parks	km^2	23,777	23,777	25,242	25,242	25,242
	%	9.96	9.96	10.51	10.33	10.33
Botanical gardens	km^2	4.24	4.24	4.24	4.24	4.24
	%	0.002	0.002	0.002	0.002	0.002
Regional parks	km^2	1,891	1,891	1,891	1,891	1,891
	%	0.79	0.79	0.79	0.77	0.77
Natural monuments	km^2	4.03	4.03	4.03	4.03	4.03
	%	0.002	0.002	0.002	0.002	0.002
Natural zakazniks	km^2	60,763	60,763	60,763	60,763	60,763
	%	25.45	25.45	25.3	25.87	25.87
Protected zones	km^2	113,124	113,124	113,124	113,124	113,124
	%	47.39	47.39	47.10	47.31	47.31
Percentage of protected areas to the country's area	%	8.76	8.76	8.81	8.96	8.96

according to the Committee for Forestry and Wildlife of MoA of RK

The 2013-2017 achievement is the expansion of 2 PAs:

- in 2015-Altyn-Emel state national natural park, the area of which increased by 146,500. 35 hectares and, at present, accounts for 307,653.35 hectares (*Annex 4*);

- in 2016-Irgiz-Turgay state natural reservat, the area of which increased by 409,962 hectares and accounts for 1,173,511 hectares.

Also during this period, a full package of documents was prepared and land was reserved for another 3 PAs as legal entities, but no decisions of the Government of the Republic of Kazakhstan have been adopted yet:

- expansion of the area of Barsakelmes nature reserve located in the Syrdarya River delta (2,300 hectares) at its confluence with the Lesser Aral Sea (*Annex 5*), this site is a part of the water area designated as the Ramsar wetlands of international importance;

- creation of Aral state natural reservat (415,000 hectares, dried bottom of the Aral Sea) in Kyzylorda oblast (*Annex 6*).

- creation of Zhaiyk Ormany state natural (forest) reservat (46,969 hectares) in the floodplain of the Zhaiyk River (the Ural River) in West Kazakhstan oblast (*Annex, Fig. 6*).

The work on feasibility study and the land management project for the creation of Yertis Zhaiylmasy state natural (forest) reservat (220,000 hectares in the floodplain of the Irtysh River, Pavlodar oblast) has not been completed due to arrays of unrecorded forest lands that are not included in the state forestry estate. In 2017, CFW MoA RK entrusted the Territorial Inspection

Center for Forestry and Wildlife of Pavlodar oblast to address this issue. After that, the work on the creation of this reservat will continue.

Over the period from 2013 to 2017, the areas of 2 SNNPs were reduced. This was due to the need to build principal tourist facilities (hotels, health resort hotels, holiday base), since this region has been famous for its balneological and tourist resources, the need for which has increased dramatically after the transfer of the country's capital to Astana and an increase in international tourism.

1. Ili-Alatau SNNP - the area decreased from 199,673 hectares to 198,669 hectares, totally by 1,004 hectares, of which 1,002 hectares were used for the construction of Kokzhailau ski resort (2015) and 2 hectares for the construction of the Aksai aqueduct (2016).

2. Burabay SNNP was originally created on an area of 83,511 hectares (Resolution of the Government of the Republic of Kazakhstan No. 1246 of August 12, 2000). In 2010, the area was expanded by 46,424 hectares by adding the lands of Bulandy State Institution for the Protection of Forests and Wildlife (Resolution of the Government of the Republic of Kazakhstan No. 501 of June 1, 2010) and the area increased to 129,935 hectares. After that, the area was reduced, by 636 hectares in total from 2012 to 2017, to develop tourism in Shchuchinsk-Burabay resort area.

In June 2018, the Government adopted Resolutions on 2 new PAs as legal entities, the creation of which was planned under Zhassyl Damu program over the period from 2012 to 2014, but they are not considered in this report. These are:

- creation of Tarbagatay state national natural park (143,550.5 hectares) in the Tarbagatay mountains, Urjar district, East Kazakhstan oblast (*Annex 6*);

- creation of Ili-Balkhash state natural reservat (415,164.2 hectares) in the Ili River delta, Balkhash district, Almaty oblast (*Annex 7*). The reservat was created with the financial support of UNDP in Kazakhstan. The World Wildlife Fund (WWF-Russia) also provided informational assistance.

The experience of implementing Zhassyl Damu state program shows that the most effective actions in the sphere of PAs development in Kazakhstan were undertaken within the framework of the Program over the period from 2010 to 2014. During that time, the state budget financed the costs of developing a package of documents (ENO, feasibility study, land management project, cartographic materials) required to approve Resolutions of the Government of the Republic of Kazakhstan to create and expand the area of 17 planned PAs in the status of a legal entity.

Creation of wildlife corridors as framework for environmental network of PAs.

At the end of the 90s, initiated by the World Wildlife Fund (WWF-Russia), the Econet environmental network of PAs in Kazakhstan was developed, the idea of which was to create wildlife corridors (without the status of a legal entity), ensuring unimpeded migration of wild animals, as well as promoting the spread of plant diasporas.

This initiative was first implemented in Kazakhstan more than 20 years later. The creation of environmental networks in Kazakhstan started at the intergovernmental level, within the framework of GEF-UNDP projects in the Western Tien Shan and Altai-Sayan Ecoregions (2007-2011), which are currently successfully performing their functions.

From 2012 to 2013, a wildlife corridor between Altyn-Dala state natural reservat and Irgiz-Turgay steppe zone of Kazakhstan was created for the migration of saiga and other wild animals.

From 2015 to 2017, 2 more wildlife corridors were created:

- for the migration of Karatau argali in the Western Tien Shan mountains (South Kazakhstan oblast) between Aksu-Zhabagly and Karatau reserves;

- for the migration of goitered gazelle and other ungulates between Altyn-Emel SNNP and a new Ili-Balkhash state natural reservat in Almaty oblast, including the construction of aqueducts on Almaty-Taldykorgan highway.

Such work should be initiated throughout the whole Kazakhstan, since the positive effect of such actions is quite persuasive.

It is necessary to consider the possibility of creating wildlife corridors for the

dissemination of native plant species of wild flora in vast areas of degraded pastures or plowed lands. For such cases, some countries (Israel and others) create micro-reserves, which are seed banks of wild growing plants surrounded by cultivated lands.

In 2014, in accordance with the Law of the Republic of Kazakhstan "On Specially Protected Natural Areas", new protected areas in the status of legal entity- **state dendrological parks (SDP),** started to be created in Kazakhstan. Issyk state dendrological park, with an area of 139 hectares based on the Forestry Nursery JSC (Almaty oblast) was the first to be created in 2014; it was subordinate to the Science Committee of the Ministry of Education and Science of the Republic of Kazakhstan and then it was transferred to the Committee for Forestry and Wildlife of the Ministry of Agriculture.

In 2018, initiated by CFW MoA RK, the creation of Shchuchinsk state dendrological park in the city of Shchuchinsk, Akmola oblast has begun. It is also planned to create Zhanibek SDP in West Kazakhstan oblast.

Over the past 5 years, there has been **an upward trend in attendances** of protected areas; they have been visited by a total of more than 4.5 million people. All national parks were divided into zones for tourist and recreational activities. It can be noted that the increase in the number of visitors to the protected areas is due to the creation and improvement of the tourism infrastructure of protected areas, guest houses, visitor centers, and improvement of protected areas. Currently, there are 6 visitor centers: in Aksu-Zhabagly state nature reserve, Korgalzhyn state nature reserve, Burabay state national natural park, Naurzum state nature reserve, Altyn-Emel state national natural park and Ili-Alatau state national natural park.

Kazakhstan is continuously working on the inclusion of the PAs of Kazakhstan in the World Natural Heritage List and the **UNESCO** World Network of Biosphere Reserves. Korgalzhyn and Naurzum state nature reserves became the first PAs included in the UNESCO World Natural Heritage List.

On July 10-17, 2016, Istanbul (Turkey) hosted the 40th session of the UNESCO World Heritage Committee.

For Kazakhstan, an important outcome of the Istanbul session was the approval of the Western Tien Shan transboundary serial site, prepared jointly with Kyrgyzstan and Uzbekistan as World Heritage site. International experts recognized the diverse landscapes of the site, characterized by exceptionally rich biodiversity.

The Western Tien Shan nomination includes 8 PAs located across three countries - Kazakhstan, Kyrgyzstan and Uzbekistan. The Kazakhstani part includes two state nature reserves, and one state national natural park: Sairam-Ugam SNNP, Aksu-Zhabagly SNR, Karatau SNR.

The preliminary list of the UNESCO World Natural Heritage includes the Northern Tien Shan (Ili-Alatau national park) and Aksu-Zhabagly nature reserve. [68].

Also, already 9 protected areas of Kazakhstan are included in the World Network of Biosphere Reserves. These are Korgalzhyn nature reserve (2012), Naurzum nature reserve (2012), AkZhaiyk nature reservat (2014), Katon-Karagay national park (2014), Aksu-Zhabagly (2015), Alakol (2016) and Barsakelmes nature reserves (2016). In June 2017, Altyn Emel national park and Karatau nature reserve were included as well.

Great Altai transboundary biosphere reservat, presented jointly by the Russian Federation and the Republic of Kazakhstan, was also included in the World Network of Biosphere Reserves. The Russian part of the biosphere reserve is represented by Katun biosphere reservat, included in the World Network of Biosphere Reserves in 2000; the Kazakhstani part is represented by Katon-Karagay biosphere reserve included in 2014.

The Agreement on the establishment of Altai transboundary reservat was signed by the Government of the Republic of Kazakhstan and the Government of the Russian Federation on

[68] Opportunities for Nomination of World Natural and Mixed Heritage in Central Asia. Protocol of the regional seminar of UNESCO.

September 15, 2011 in Astrakhan (Russian Federation). In March 2012, this Agreement entered into force.

To implement the Agreement, a joint Kazakhstani-Russian commission has been created. The meetings of the Commission are held once a year by each country in turn.

Altai transboundary reservat was created to preserve biological and landscape diversity of the Altai mountainous part, to promote bilateral cooperation in the field of environmental protection and rational use of natural resources.

During the period of its existence, the staff of Katon-Karagay SNNP and Katun reserve have been exchanging experience with each other. A section devoted to Katon-Karagay SNNP state institution was created on the website of Katun bioshpere reserve; it contains information on PAs and joint partnership. Currently, materials for a collection of scientific papers devoted to the study of the biodiversity of Altai are being gathered.

Giving Kazakhstani reserves, national parks and natural reservats the status of international biosphere reserves will enhance the tourist and economic potential of the regions presented, including the promotion of ecotourism, sustainable development and preservation of biological diversity in the country.

Main challenges, scientific and technical needs to meet PAs national targets

The main problem of the creation of PAs as a legal entity (state nature reserves, state national natural parks, state regional natural parks, state natural reservat) is the land issue, as many land plots are privately owned or long-term leased. In this regard, at the initial stage it is necessary to determine the area and boundaries of the planned PA, taking into account the land use status. To do this, it is necessary to have an access to the latest State Land Cadastre data. They are provided by the regional research and production centers for land resources and land management on a fee basis, and often their price exceeds the cost of developing ENO and feasibility study. This issue needs to be resolved so that these data intended for public purposes to create PA are provided free of charge. It is also necessary to increase the cost of work on the development of ENO and feasibility study documents, taking into account the area planned for the creation of PAs.

In addition, in recent years, due to amendments in the Land Code of the Republic of Kazakhstan, especially in terms of development and approval of land management projects, the rates for carrying out these types of work have increased significantly. This should be taken into account when planning funding for the development of ENO and feasibility study from the state or local budget.

As mentioned above, some of the measures for the creation or expansion of PAs, planned by Zhassyl Damu program remained unfinished. Some of them were not created due to the transfer of land to private property at the stage of development of ENO and feasibility study of the project, when it is still impossible to reserve them for the creation of PA. The allocated financial resources were spent on the examination, preparation and approval of documents (ENO, feasibility study and land management project) within the planned limits. Due to changes in the area and boundaries of PAs with time, to complete the work, financial resources are needed to conduct additional field research, adjustments to ENO, feasibility study, cartographic materials and land management project.

ENO, feasibility study, land management project and cartographic materials after the adoption of government resolution on the establishment of PAs should be integrated into the relevant database of CFW MoA RK or departments on PA under the regional departments of natural resources and environmental management. For this, it is necessary to develop a uniform format for providing data.

To reduce the impact of industrial enterprises on PAs, Article 34 of the Law of the Republic of Kazakhstan “On Specially Protected Natural Areas” in 2017 added such sources of funding to PA, as donations, voluntary contributions of natural and legal persons, including for the harm to the objects of the state natural reserve fund that is being caused and (or) unavoidable, in the course of their economic and other activities.

Achievement of the target of monitoring biodiversity in PAs is carried out by keeping Nature Records obligatorily by all PAs, in accordance with the Law of the Republic of Kazakhstan "On Specially Protected Natural Areas".

The Nature Records are one of the main documents of state nature reserves, national and regional natural parks, and natural reservats. The basis of their creation is direct primary observations, which accumulate all information about the state of PAs and their changes, including the annexed areas. The collection of material for the Nature Records and their design is carried out in accordance with the guidance manual, approved by Order of FHC (Forestry and Hunting Committee) No. 156 of April 18, 2007.

Reliability of information presented in the Nature Records, its representativeness, systematic, methodical contingency ensure the continuity and comparability of data, which is of great importance for understanding global and regional natural and anthropogenically stimulated processes and phenomena.

The main work on the collection of information for the compilation of the Nature Records is performed by the scientific departments of PAs. Security service is obligatorily involved in collecting information (mainly in compiling the Nature Calendar) and, to the extent possible, the rest of PAs staff. The processing and review of information collected in the framework of the Nature Records (Annals) is carried out by the scientific department staff. The results are presented in accordance with the approved guidelines, as annual volumes. Once every five years, the accumulated data are compiled and conclusions are drawn about the state and trends in PAs.

Significant support was provided to PAs in the framework of the GEF-UNDP-Government of RK project entitled "Development and Implementation of Information System on the Monitoring of Biodiversity in Pilot Specially Protected Natural Areas project (2012-2014)". The goal of this project was to improve the biodiversity monitoring system in PAs of Kazakhstan by creating a database using GIS technologies as the basis for making economic and scientifically based decisions in the field of flora and fauna resources management and conservation.

The results of this project are as follows:

1. Information System for biodiversity monitoring has been developed and installed in pilot PAs.
2. Automation of existing business processes for monitoring biodiversity in PAs has been enhanced.
3. Structural branches of state authorities, involved in biodiversity monitoring have been institutionally enforced and structured.
4. System of biodiversity monitoring facilitating economically and scientifically proved decision making in management and conservation of flora and fauna resources has been created

The system is an online portal containing data on flora and fauna of PAs. Information on the portal is regularly updated by PAs scientific staff. This information resource allows users to obtain data on flora and fauna of PAs, and ensures accuracy, integrity and efficiency of data dissemination among interested authorities.

Also over the period from 2013 to 2017, several projects related to biodiversity monitoring were implemented. These projects were mainly carried out by the staff of research institutes of the SC MES RK; their list is given in Table 2.11.2.

Table 2.11.2. List of projects on biodiversity monitoring in Kazakhstan (implemented from 2013 to 2017)

Projects supported by SC MES RK grants and on topics	Goals, objectives	Achievement of goals and objectives (sufficient/insufficient)

agreed with PAs		
Institute of Zoology RSE Project No.0112PK00484	Snow leopard in Kazakhstan: population, ways to conserve and reproduce (2012-2014)	Snow leopard in Kazakhstan was monitored. Monitoring continues to date in the framework of another project
Institute of Zoology RSE Project No 0112PK00489:	Fauna of bloodsucking Diptera of South Kazakhstan and identification of effective bioregulators of their population (2012-2014)	Population and distribution of mosquitoes in a number of water bodies of South Kazakhstan oblast was monitored
Institute of Zoology RSE Project No 0112PK0486:	Problems of biodiversity conservation of terrestrial and aquatic fauna of vertebrates in modern conditions of economic development of the south-east Kazakhstan (2012-2014)	A number of species of vertebrates and invertebrates in the south-east Kazakhstan were monitored
Institute of Zoology RSE Project No 0112PK00485:	Assessment of the status of wetland birds, aquatic and riparian invertebrates of the Tengiz-Korgalzhyn lake system in modern environmental conditions (2012-2014)	Zoobenthos, entomofauna, birds, and some mammals in Tengiz-Korgalzhyn lake system were monitored
Institute of Zoology RSE Project No 0112PK00488	Status of invertebrate fauna (insects, arachnids, mollusks) in protected areas of the Western Tien Shan, its monitoring, conservation and use in modern environmental conditions (2013-2015)	Invertebrates in the following PAs were monitored: Aksu-Zhabagly state nature reserve, Karatau state nature reserve, Sairam-Ugam state national natural park
Institute of Zoology RSE Project No 0115PK00894	Demographic analysis of populations of desert monitor (Sauria, Reptilia) in Kazakhstan (2015-2017)	Populations of desert monitor were monitored; including in the Kyzylkum sands, which is the main range
Institute of Zoology RSE Project No 0115PK00893	Development of methods for monitoring ecological status of water bodies in Kazakhstan (2015-2017)	Phytoplankton and zooplankton communities of model water bodies of Balkhash-Alakol and Aral-Syrdarya basins were monitored
Institute of Zoology RSE Project No 0115PK00896	Modern threats to survival, population trends and conservation of vertebrates included in World Red List in the deserts of the Southern Balkhash region (2015-2017)	Some rare and endangered species of animals were monitored: saker falcon, saxaul desert jay, goitered gazelle, Central Asian tortoise etc.
Institute of Zoology RSE Project No 0115PK00888	Current status of natural populations of insects –insect pests of stems in mountain forests of Almaty oblast (2015-2017)	Pests of stems in Almaty oblast were monitored
Institute of Zoology RSE Project No 0115PK00892	Transcontinental migrations of riparian birds of Kazakhstan (2015-2017)	A number of species of riparian birds were monitored
Institute of Zoology RSE Project No 0115PK00889	Assessment of insect fauna diversity of Zhongar-Alatau state national natural park, its monitoring, conservation and sustainable use (2015-2017)	Invertebrates in Zhongar-Alatau SNNP were monitored
Institute of Zoology RSE	Contractual work on monitoring fauna in protected areas (2015-2016)	Monitoring and recording of rare and endangered species in Andasay state natural zakaznik and Zhusandaly state natural protected zone of national importance
Institute of	Contractual work on monitoring fauna in	Recording of the number of wild animals living in

Zoology RSE	protected areas (2015-2016)	Charyn SNNP
Institute of Zoology RSE	Contractual work on monitoring fauna in protected areas (2015-2016)	Monitoring and recording of rare and endangered species in South Kazakhstan, Arys, and Karaktau state natural protected zones of national importance
Institute of Zoology RSE	Contractual work on monitoring fauna in protected areas (2015-2016)	Monitoring and recording of rare and endangered ungulate species in the Republic of Kazakhstan
Institute of Zoology RSE	Contractual work on monitoring fauna in protected areas (2013-2017)	Monitoring and recording, as well as preparation of data on changes in the number of houbara bustard in Kenderli-Kayasan, Zhusandaly, South Kazakhstan, Arys and Karaktau state natural protected zones of national importance (SNPZNI) and Andasay state natural zakaznik (SNZ)
Institute of Zoology RSE	Contractual work on monitoring fauna in protected areas (2012-2014)	Monitoring of current status of wild animals in Mangystau oblast (mammals, birds, insects, parasites)
Institute of Zoology RSE	Contractual work on monitoring fauna in protected areas (2012-2014)	Assessment of current status of snow leopard populations and its habitat under conditions of intensive anthropogenic development of mountain ecosystems in Almaty area.
Institute of Zoology RSE	Contractual work on monitoring fauna in protected areas (2013-2015)	Monitoring and recording of the number of ungulates and large predators in Kulsay kulderi SNNP using photo traps
Institute of Zoology RSE	Contractual work on monitoring fauna in protected areas (2015-2017)	Monitoring and recording of the number of ungulates and large predators in Zhongar-Alatau SNNP
Institute of Zoology RSE	Initiative of Institute of Zoology staff (2014-2017) Aichi Target 20.	Blacklist of invasive alien species that are spread in Kazakhstan was created

Main challenges in scientific research

The main problem of monitoring biodiversity in PAs is poor material and technical resources and insufficient funding for such work. For example, it is not possible to analyze samples of soil, water, etc., as there are no specialized laboratories, equipment and financial resources in PAs to conduct analyzes in other laboratories.

The main disadvantage is the fact that the staff of PAs research departments do not participate in competitions for scientific grants from the Science Committee of the Ministry of Education and Science of the Republic of Kazakhstan. The main reason is the lack of scientific degrees, low level of professional preparation to create work programs, and the small number of researchers.

The staff of research institutes have the same weak capabilities, but the most noticeable point here is poor material and technical resources. Considering that by scientific grants, in most projects, there is a very small amount of funding, and there is only enough money for field research, preparation of reports and few opportunities to acquire the necessary equipment, in recent years new forms of scientific cooperation have appeared.

A common problem for all PAs is the number of biologists specialized in flora and fauna. Unfortunately, there are very few of them, and sometimes not at all, therefore biodiversity monitoring is carried out in limited areas, a maximum of 4-8 sites of no more than 4-8 m^2. These are mainly areas of rare and endangered plant species. There is no representativeness, as not all types of ecosystems, vegetation and habitats of key fauna species are monitored. It is necessary to conduct regular audits of PAs monitoring and make timely adjustments.

Scientific and technical needs to meet national PAs targets:

The review of the existing experience of the country in the development of PA system and biodiversity monitoring clearly indicates that a separate state program is needed. It should identify all the targets for the development of PAs, including monitoring the status of ecosystems, including flora and fauna through the Ministry of Agriculture. To create such a program, interested parties, together with scientists, must first prepare appropriate rationale. In particular, monitoring should be carried out according to a specially developed, unified methodology for specific planned areas, taking into account diverse ecosystem types of all PAs.

The primary task to resolve this issue is to create a map of PAs ecosystems, then select monitoring sites taking into account the diversity of ecosystem types. Currently, this task is greatly facilitated by the use of modern GIS and remote sensing technologies. It is possible to create an electronic map of ecosystems for the main test sites spotted by GPS, taking into account the diversity of ecosystem types. At the same time, areas of different types of ecosystems of different ranks can be easily and quickly calculated. With regular updates, changes are well traced. These technologists are available; there is need for training of PAs specialists and the availability of material and technical resources (GPS, software, printers, plotters, etc.).

The implementation of specific projects under the Program (development of ENO, feasibility study, land management projects) and their coordination at all levels, in addition to performers, should be carried out by representatives of state bodies of district and regional levels. Decisions on the creation or expansion of PAs should be made with the participation of the public, local population and other stakeholders.

Issues of biodiversity conservation should not be limited to PAs. It is necessary to identify key areas in all oblasts that should be monitored by scientists of scientific research institutes or specialized organizations that have qualified specialists.

It is necessary to solve the issues of attracting scientific staff to PAs; currently there are big problems, both in terms of professionalism and remuneration. Wages are very low, and there is no housing for young professionals, so they do not stay in PAs for a long time; there is a large turnover everywhere. These problems require specific measures, especially for professionals working in PAs. There is a need for the increase in wages, provision of housing, as well as increase in material and technical resources of PAs and continuing education to increase qualification.

Administration and scientific departments of PAs need to develop a system of continuous improvement of staff knowledge in the field of biology and ecology, since the reliability of monitoring data reflected in the Nature Records depends on staff preparedness. It is necessary to have electronic databases for each PA, including monitoring data, which should be an integral part of the Unified State Monitoring System.

In accordance with the priority direction of development of space industry in Kazakhstan, it is necessary to develop new efficient and cost-effective monitoring methods using satellite images of different resolutions. It is necessary, at the state level, to ensure free provision of data from a space survey of Kazakhstani satellites to PA staff responsible for monitoring. Also, in PAs it is advisable to introduce unmanned aerial vehicles, since these technologies significantly save time, money and human resources.

2.12. Measures taken for meeting the national target of conservation, rational use and reproduction of fauna resources, including selective breeding of animal species, in particular valuable, rare and endangered, assessment of their effectiveness, obstacles arising, as well as scientific and technical needs to be met.

Fauna of vertebrates of Kazakhstan, according to the latest data, consists of 890 species, including 178 species of mammals, 500 species of birds (388 of them nest in Kazakhstan, others

arrive only for wintering or migrate in spring and autumn), 49 species of reptiles, 13 species of amphibians, 147 species of fish and 3 species of cyclostomes, that are combined into 418 genera, 129 families, 50 orders and 6 classes – from lamprey to mammals (Kovshar A.F. and others).

Also about 100 thousand species of invertebrates inhabit it, including no less than 50 thousand species of insects. One hundred twenty-eight species and subspecies of vertebrates and 96 species of invertebrates are listed in the Red Book of Kazakhstan (Table 2.12.1).

Table 2.12.1. Number of species and subspecies of animals included in the Red Book of the Republic of Kazakhstan.

Vertebrates	**128 species and subspecies**	**Invertebrates**	**96 species**
Fish	18	annelids	2
Amphibians	3	molluscs	6
Reptiles	10	crustaceans	1
Birds	57	arachnids	2
Mammals	40	insects	85

One hundred ten species of fauna of Kazakhstan are included in Annexes of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), including 20 species in Annex I and 90 species in Annex II.

Rare and endangered animal species are included in the Red Book of Kazakhstan: Volume 1, Part 1 Vertebrates; Volume 1, Part 2 Invertebrates.

The latest fourth revised edition of the Red Book of the Republic of Kazakhstan (Vertebrates) of 3,500 copies was issued in 2010.

Achievement of national targets equivalent to Aichi Target 12 was mainly carried out through the implementation of the Strategic Plan of the Ministry of Agriculture for 2014-2018. In general, the planned tasks and activities on wildlife and hunting for 2013-2017 were completed successfully, with the exception of 2016, when the 10% increase in the number of saiga in comparison with the previous year was not achieved, due to high mortality rates of Betpakdala population of saiga.

Between 2013 and 2017, in Kazakhstan, as a result of the implementation of effective measures, the number of rare and endangered species of wild ungulates in their ranges (tugai red deer, kulan, goitered gazelle, argali) was stabilized, and the upward trend in the population of saiga and hunted species was achieved. (Table 2.12.2).

Table 2.12.2. Population dynamics of rare ungulates

Population, individuals	**2013**	**2014**	**2015**	**2016**	**2017**
Tugai red deer	465	481	503	716	825
Goitered gazelle	12,888	12,994	13,197	13,218	13,727
Kulan	3,222	3,420	3,595	3,807	3,984
Argali	14,525	14,737	15,710	15,979	16,802

The most effective measures were the following:

- inter-farm hunting management of hunting lands, as well as biological and economic surveys were conducted, on the basis of which the reserve fund of hunting lands was consolidated;

- recording was carried out and, based on the results of the biological study, limits were established for the number of hunted species allowed for hunting; these limits contribute to their

natural reproduction and sustainable use;

- reintroduction of rare and endangered species of wild ungulates and other planned activities defined for the implementation of national objectives on wildlife and hunting were completed.

Saiga

As is known, saiga is one of the oldest preserved species of the Mammoth period. Today, the main part of habitat and saiga populations (Betpakdala, Ural and Ustyurt populations) are in Kazakhstan.

The modern range of saiga in Kazakhstan covers ten oblasts: Akmola, Aktobe, Atyrau, Zhambyl, East Kazakhstan, West Kazakhstan, Karaganda, Kostanay, Kyzylorda and Mangystau. The range also extends to neighboring regions of Uzbekistan and the Russian Federation.

The scale of the expansion of the saiga range as their numbers increase is shown on the map in Annex 9.

In the second half of the 20th century, the number of saigas in the country reached 1,200 individuals. However, in the 1990s, there was a substantial decline in the number to have reached 21,000 by 2001.

The main reason for the decline is poaching, mainly hunting of male saigas for horns, which are widely used in Chinese traditional medicine.

In addition, due to excessive decline in male species, biological (age and sex) balance was disturbed and reproduction of the population decreased. In addition, a high number of wolves in the area during periods of birth of young saigas are highly unfavourable for the population.

Under these conditions, the Government of the Republic of Kazakhstan took urgent measures to stabilize the situation. A special program for the preservation and protection of the saiga population was developed and approved with an annual increase in budget funds allocated.

As a result of the effective work on the conservation of saigas, their numbers had reached 295,000 by 2015; compared with 2001 (when the figure was the lowest at 21,000) the number had increased 14 times.

However, the mass death of the Betpakdala population in 2015 while calving with the figure amounting to 186.7 thousand individuals again sharply reduced the number of saigas (Figure 2.12.1).

It was found out that the main cause of saiga mortality was pasteurellosis, but cause of the disease was not detected.

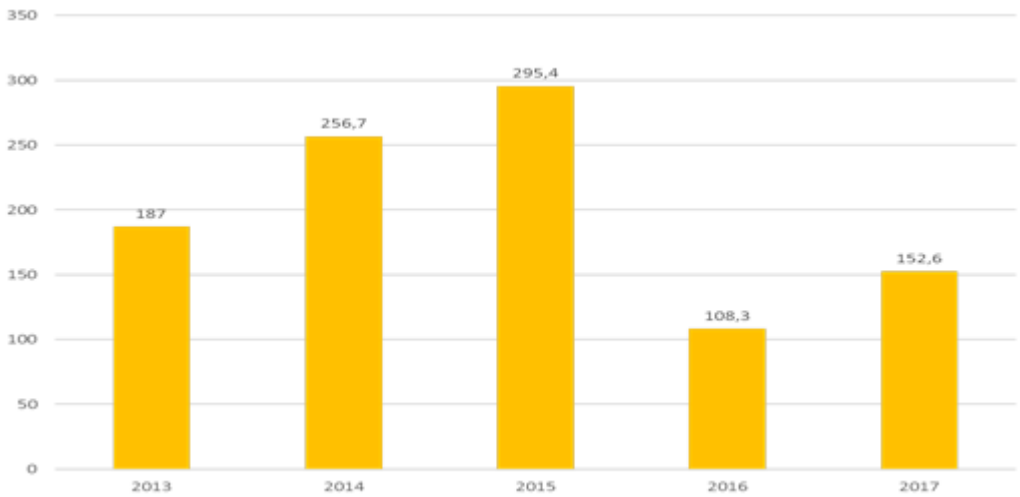

Figure 2.12.1. Population dynamics of saigas in Kazakhstan for 2013-2017

According to the aerial survey conducted in April 2017 by the staff of Ohotzooprom PA RSBSE of the Committee for Forestry and Wildlife of the Ministry of Agriculture of the

Republic of Kazakhstan (Ohotzooprom PA RSBSE), Institute of Zoology RSE, Science Committee of the Ministry of Education and Science of Kazakhstan, Association for the Conservation of Biodiversity of Kazakhstan (hereinafter-ACBK) and inspectors of regional territorial inspection centers, there has been an increase in the number of saigas of all three populations.

Saigas and other rare and endangered species of ungulates are protected by the Ohotzooprom PA RSBSE in 10 oblasts with a total area of 123.0 million hectares; in very difficult off-road conditions and steppe areas the activities are carried out using vehicles.

There are 220 inspectors of wildlife protection, 114 cross-country vehicles, 24 KUNG trucks, 32 snowmobiles, 2 motorcycles involved in protection of saigas and ungulates.

Mobile units and inspectors are equipped with modern means of communication and navigation, night vision devices, weapons and uniforms, as well as photo and video equipment.

In addition, vehicles of mobile groups are equipped with satellite GPS trackers to control their movement. In order to provide more efficient and effective protection of saigas and other rare ungulates due to the size and inaccessibility of many habitats (mountains, deserts), a helicopter and a plane are used.

State inspectors of regional territorial inspection centers for forestry and wildlife, law enforcement and environmental authorities also take part in protection of saigas.

In order to toughen penalties for offenders, by Order of the Deputy Prime Minister of the Republic of Kazakhstan - Minister of Agriculture of the Republic of Kazakhstan No. 197 of May 11, 2017, the amount of compensation for illegal hunting of saigas increased from 200 MCI to 500 MCI for a male, and from 150 to 350 MCI for a female and young saiga.

To increase the effectiveness of saiga protection, the Committee for Forestry and Wildlife of the Ministry of Agriculture of the Republic of Kazakhstan established a special protection regime in their main habitats, mass concentration during calving, wintering and migration by expanding the network of protected areas and establishing wildlife corridors.

Despite the measures taken to combat poaching on saigas, there are still cases.

To illustrate, for the year 2017, 58 cases of poaching were registered, 470 carcasses and 1174 horns were seized. This indicates the possibility of smuggling saiga products outside the country. The presence of a market for saiga horns within the country and an established route for smuggling them abroad, impunity of lawbreakers, pose a risk for saiga conservation, reducing the effectiveness of preservation measures taken by the state.

Also, for the year 2017, the following cases of poaching were recorded:

- goitered gazelle - 2 times, 6 carcasses seized, damage amounting to 5.47 million KZT;
- argali - 2 times, 2 carcasses seized, damage amounting to 6.8 million KZT;
- houbara bustard - 1 time, 1 carcass seized, damage amounting to 1.6 million KZT;
- black-bellied sandgrouse - 2 times, 3 individuals seized;
- little bustard - 2 times, 3 individuals seized.

A new technology is being introduced to monitor wildlife using radio beacons (tracking collars) and through installation of camera traps in protected areas. Tracking collars are installed mainly on saigas, goitered gazelles, kulans and wolves.

Weekly, over the period of saigas gathering in huge numbers during the rut, calving and migration, maps of the distribution of tagged saigas are prepared for the effective planning of security raids (Annex 10a).

As a result of monitoring the operation of tracking collars, unique data were obtained on migration routes and biology of the species (Annex 10b). The results were also used to determine the boundaries of saiga habitats when creating Irgiz-Turgay state natural reservat (Aktobe oblast), Altyn Dala state natural reservat (Kostanay oblast), wildlife corridors for migration and the expansion of Korgalzhyn state nature reserve (Akmola oblast).

To monitor migration, from 2015 to 2016, 11 goitered gazelles were tagged with tracking collars in Altyn Emel state national natural park. The work was carried out jointly by ACBK, Altyn Emel SNNP and Ohotzooprom RSBSE PA with the support of CFW.

In 2017, ACBK together with CFW carried out a pilot project on transportation of kulans using a helicopter from Altyn Emel SNNP to Zhangeldy district of Kostanay Oblast to exercise actions for their relocation and on-site adaptation. During the work, 6 kulans were tagged with radio beacons.

From 2012 to 2017, ACBK and Ohotzooprom RSBSE PA, together with the Kostanay regional territorial inspection center of the Committee for Forestry and Wildlife conducted studies on wolves migration using radio beacons in the saiga range in Kostanay oblast. During these years, 4 wolves were caught and attached tracking collars in Zhangeldy district, Kostanay oblast.

Hunting is a popular form of recreation for citizens. Currently, there are 152,852 hunters registered in the country, of which 179,739 hunters went hunting in the year 2017, including 404 foreign hunters.

In 2017, the state budget received 148,852.6 thousand KZT for using wildlife, including from foreign hunters – 358,288 thousand KZT, and financing amounting to 2,345.7 million KZT was directed to the development of hunting. Private hunters finance the development of hunting farms, including the cost of keeping rangers and biotechnical measures.

Work on fixing the most promising areas of the reserve fund of hunting lands and ensuring the protection of the wildlife in them by ranger services continues.

Table 2.12.3. Attracting private investments to develop hunting in the Republic of Kazakhstan as of December 31, 2017

Name	**2013**	**2014**	**2015**	**2016**	**2017**
Percentage of hunting lands fixed	53	52.2	49.5	50.9	55.1
Number of hunting farms	698	713	690	687	701
Number of rangers/hunting service	2,482	2,492	2,627	2,605	2,538
Number of patrolling vehicles	2,286	2,358	2,204	2,240	2,401
Total funding allocated to develop hunting farms, million KZT,	1,801.6	2,185.0	1,868.5	2,372.0	2,345.7
including allowances for rangers in hunting farms, million KZT;	522.7	692.0	986.5	876.4	975.8
financing of biotechnical measures, million KZT	278.5	204.7	287.9	260.1	261,2

As can be seen from Table 2.12.3, there is a positive trend in the number of hunting lands, the percentage of fixed ones, number of rangers, technical equipment and investments in the development of hunting farms.

As a sign of the development of hunting farms, there are now new economic forms of hunting activity in the country - game breeding, hunting dog breeding, and farm enterprises.

A total of 18 (2.3% of total) of hunting farms with open-air game breeding enclosures are registered. At the same time, due to complicated procedure of registration, only 3 enclosures are fully designed in accordance with the current legislation.

In this regard, to coordinate this work, within the framework of the development of public-private partnership in Kazakhstan, since 2013 the Kansonar Republican Association of hunting entities has been operating in the country.

Habitats of hunted species are presented on the map in Annex 11.

The work on wildlife resources conservation can be seen as effective because it resulted in the stable number of rare and endangered species, as well as hunted species, and for a number of species there is an increase in population. (Table 2.12.4).

Table 2.12.4 Population dynamics of animal species

Species	2013			2014			2015			2016			2017		
	Number	Withdrawn	%	Number	Withdrawn	%	Number	Withdrawn	%	Number	Withdrawn	%	Number	Withdrawn	%
Red deer (maral)	11,347	439	3.72	10,860	373	3.32	11,179	335	2.91	12,496	334	2.6	8,599	323	3.62
Moose	3,731	53	1.4	4,354	72	1.63	4,646	79	1.67	4,637	76	1.61	4,969	89	1.76
Siberian ibex	16,984	425	2.44	16,773	386	2.25	20,861	306	1.45	20,323	352	1.7	12,733	308	2.63
Siberian roe deer	69,022	3,924	5.38	74,025	3,632	4.68	78,051	3,622	4.43	88,364	3,450	3.76	76,986	3,597	4.46
Wild boar	25,725	1,892	6.85	29,061	2,075	6.66	35,052	1,802	4.89	32,740	1,798	5.21	34,113	1,860	5.17
Brown bear	1,988	55	2.69	2,199	43	1.92	2,230	46	2.02	2,017	45	2.18	2,206	48	2.13
Lynx	748	10	1.32	834	13	1.53	947	7	0.73	727	7	0.95	970	11	1.12
Beaver	2,459	18	0.73	2,853	90	3.06	4,507	27	0.6	3,324	19	0.57	3,952	36	0.9
Sable	6,650	445	6.27	7,351	334	4.35	7,740	272	3.39	7,386	287	3.74	8,684	365	4.03
Badger	65,210	2,109	3.13	65,863	2,653	3.87	70,118	2,542	3.5	71,657	2,199	2.98	66,902	2,293	3.31
Marmot	1,806,039	36996	2.01	1,582,401	27,369	1.7	1,707,632	30,176	1.74	1,567,330	21,924	1.38	1,748,558	24,183	1.36
American mink	5,532	40	0.72	6,131	58	0.94	7,638	25	0.33	7,117	44	0.61	8,128	21	0.26
Polecat	91,083	490	0.54	131,367	190	0.14	140,594	367	0.26	97,899	121	0.12	109,990	162	0.15
Stoat	24,493	113	0.46	34,642	12	0.03	37,076	10	0.03	36,038	14	0.04	32,269	13	0.04
Squirrel	16,473	200	1.2	14,974	55	0.37	26,808	59	0.22	32,952	55	0.17	26,854	45	0.17
Siberian weasel	1,524	0		1,934	0		3,355	9	0.27	4,162	0		4,703	4	0.08
Muskrat (ondatra)	278,392	34,007	10.89	324,278	35,252	9.81	319,507	15,304	4.57	186,841	19,799	9.58	163,312	14,037	7.91
Hare	772,102	91,858	10.63	861,147	10,2503	10.64	896,849	104.102	10.4	1,250,016	87,842	6.57	791,643	83,499	9.54
Fox	132,481	7,563	5.4	155,328	8,586	5.24	154,622	7,790	4.8	120,078	6,188	4.9	110,505	6,649	5.68
Racoon dog	1,608	0			0			0		801	0		1,348	0	
Corsac	51,518	884	1.69	58,389	1,276	2.14	58,218	1,287	2.16	45,522	1,021	2.19	47,535	1,368	2.8
Pheasant	303,238	38,364	11.23	293,059	37,683	11,39	298,657	26,846	8.25	327,181	32,350	9	286,025	33,648	10.53
Chukar	402,886	15,912	3.8	369,548	11,395	2.99	365,406	11,118	2.95	356,915	10,794	2.94	209,499	11,860	5.36
Quail	361,121	10,013	2.7	400,892	9,140	2.23	411,247	9,505	2.26	318,651	9,413	2.87	253,459	10,719	4.06
Pigeon	561,690	22,238	3.81	483,098	17,620	3.52	531,999	19,887	3.6	434,774	21,533	4.72	500,322	22,723	4.34
Goose	8,071,139	158,783	1.93	6,531,973	108,900	1.64	7,670,970	119,024	1.53	6,606,456	84,082	1.26	5,536,636	85,750	1.53
Duck	12,478,652	621,834	4.75	12,842,474	515,921	3.86	13,770,013	524,316	3.67	12,959,704.00	408,918	3.06	10,028,401.00	383,558	3.68
Bald coot	2,408,298	81,708	3.28	2,449,609	88,400	3.48	2,275,663	93,292	3.94	2,521,482	74,757	2.88	2,113,891	78,220	3.57
Partridge	579,966	12,579	2.12	700,095	33,374	4.55	741,513	35,707	4.59	635,393	30,277	4.55	640,637	32,321	4.8
Wood grouse	2,645	29	1.08	4,248	32	0.75	3,557	30	0.84	3,761	22	0.58	3,973	14	0.35
Black grouse	157,739	12,579	7.39	178,084	9,844	5.24	183,411	9,996	5.17	166,215	7,621	4.38	184,641	8,207	4.26
Hazel grouse	12,378	425	3.32	15,837	265	1.65	18,770	238	1.25	17,132	171	0.99	22,264	262	1.16
Snowcock	6,788	100	1.45	3,428	15	0.44	3,050	7	0.23	4,467	11	0.25	5,096	15	0.29
Sandpiper	1,017,291	7,959	0.78	986,513	6,356	0.64	751,810	5,934	0.78	547,074	3,811	0.69	666,525	4,140	0.62

Musk deer	485			494			445			441			450		

With respect to fish and other aquatic animals, 18 species of fish and fish-like animals were included in the Red Book of the Republic of Kazakhstan. [69] However, their status is not defined and not recorded in accordance with IUCN internationally recognized categories and criteria. Criminal and administrative liability is incurred for catching fish species listed in the Red Book; however, conservation measures are limited only to this. It is necessary to allocate protected areas for the conservation of rare and endangered fish species, as well as take measures to promote artificial reproduction, preserve the gene pool by establishing broodstock in fish hatcheries, as well as measures to increase the number of rare species by their reintroduction into native water bodies. The first step was made in 2012, when, under the state program, Siberian sturgeon underyearlings were released into the Black Irtysh River and Lake Zaisan.

Kutum - Rutilus frisii kutum (Kamensky, 1901) – by the conservation measures taken, it was possible to stabilize the population, and in May 2018 by decision of the zoological commission, it was transferred from category III (rare) to category V (restored) of the Red Book. It should be noted that Azerbaijan, Iran and Russia annually release more than 100 million of young kutum.

Organization of Wildlife Conservation

Among environmental crimes, poaching is still a threat to biological diversity.

Regional territorial inspection centers of the Committee for Forestry and Wildlife (RTIC) are carrying out activities to ensure state control over conservation, reproduction, use of forests, fish conservation measures, fire prevention activities in forests, control over fauna and flora and are taking measures to combat poaching in fixed hunting lands (Figure 2.12.2).

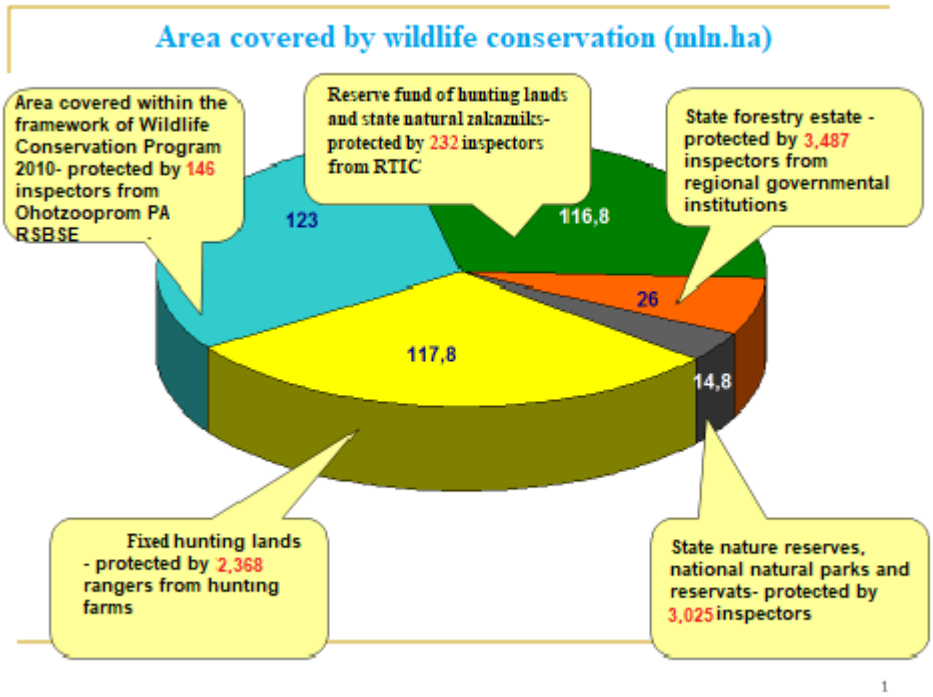

Figure 2.12.2. System of wildlife conservation in Kazakhstan.

In addition, wildlife conservation in forestry estate is carried out by state forestry institutions, in fixed hunting lands- by ranger services of hunting farms and in protected areas- by PA inspectors.

[69] Red Book of the Republic of Kazakhstan. - Vol.I, Part.1. -4th edition - Almaty, Nur-Print, 2008. - 316 p.

As of January 1, 2018, the main RTIC figures for wildlife conservation are as follows:

Raids held– 10,548, checks – 1,245.

Total number of environmental crimes – 7,761, including: related to hunting – 702, forest – 1,112, fishing– 5,947.

Total number of records completed– 7,268, including: related to hunting– 672, forest – 670, fishing –5,926.

Total number of people brought to justice – 56, including: related to hunting– 17, forest– 25, fishing – 14.

Total number of people subject to administrative proceedings – 7,007, including: related to hunting – 681, forest – 691, fishing – 5,635.

Administrative fines amounting to 105 million 268.965 thousand KZT were imposed, including: related to hunting – 7 million 564.85 thousand KZT, forest –11 million 918.465 thousand KZT, fishing –85 million 785,65 thousand KZT.

Administrative fines amounting to 89 million 308.985 thousand KZT were withdrawn, including: related to hunting– 7 million 039.1 thousand KZT, forest– 10 million 488.035 thousand KZT, fishing– 71 million 781.85 thousand KZT.

The number of poaching tools seized (units): 123 firearms, 6,583 fishing gear (nets, etc.).

One of the most effective ways to reduce the incidence of poaching is raising people's awareness.

Such activities are carried out in the framework of the Media Plan developed by CFW and approved by the Deputy Minister of Agriculture of the Republic of Kazakhstan.

Online conferences, briefings, press tours on biodiversity conservation are held annually.

In accordance with the Media Plan, 1,098 articles, talks on radio and television on nature conservation were published and presented in media locally and nationally.

The improvement and optimization of hunting permits has a positive effect on wildlife users.

Currently, the Committee for Forestry and Wildlife is rendering 15 types of state services online via E-licensing state database and e-Government portal. Of these, the following are related to wildlife.

1) issuance by an administrative authority of permits to import and export species of animals that are subject to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) into and from the Republic of Kazakhstan (electronic);

2) issuance of permits for the introduction, reintroduction and hybridization of animals (electronic);

3) issuance of permits for animal species withdrawal, the number of which is subject to regulation (electronic);

4) issuance of permits for the use of fauna (electronic);

5) distribution of quotas for wildlife withdrawal within the approved limits (paper, transferred to a state corporation, currently not automated).

The work on optimization and automation of public services to improve their quality and accessibility to the population still continues.

One of the widely used ways to restore extinct or endangered species or individual populations is reintroduction. Reintroduction of animals is the intentional relocation of individual animals to their former habitats, that is, to those areas where the species already lived before.

1) Houbara bustard breeding centre

Within the framework of the Cooperation Agreement between the Committee for Forestry and Hunting of the Ministry of Agriculture of the Republic of Kazakhstan and the Environment Agency – Abu Dhabi (UAE) on conservation and reproduction of houbara bustards (March 31, 2008, Astana), a special nursery will be built in South Kazakhstan oblast to breed houbara bustards, which will be released to their natural habitat in Kazakhstan.

Within the framework of implementation of this Agreement, in 2008 in Shymkent the UAE

built an experimental nursery for houbara bustard reproduction and establishment of breeding stock for the main nursery and then relocated it to Baydibek district of South Kazakhstan oblast.

The houbara bustard breeding centre with a potential annual release into the nature of Kazakhstan of up to 5000 individuals grown in captivity is being constructed on an allocated land plot of 895 hectares in Baidibek district (Figure 2.12.3)

Figure 2.12.3. Houbara bustard breeding centre

The International Fund for Houbara Conservation (Abu Dhabi, United Arab Emirates) is entrusted to manage the program; the Fund was created specifically to coordinate the scientific and research work on houbara breeding and release in different countries of its natural habitat.

In 2014, in order to implement this project, a cooperation Agreement was signed between the Committee for Forestry and Hunting and the International Fund for Houbara Conservation Abu Dhabi (UAE).

Over the period from 2015 to 2017, the houbara bustard breeding centre produced 2,021 birds. More than 300 local residents are involved in ensuring the functioning of the centre.

Also, between 2009 and 2017, the United Arab Emirates and the State of Qatar imported 8,941 houbara bustards and released into the nature of Kazakhstan (Table 2.12.5).

Table 2.12.5. Houbara bustard breeding dynamics

Year of release	Name of country	Place of release (oblast)	Number of released birds
2009	United Arab Emirates	Mangystau	7
2010	State of Qatar	Almaty	60
2011	United Arab Emirates	South Kazakhstan	50
2012	United Arab Emirates	South Kazakhstan	100
2012	United Arab Emirates	South Kazakhstan	218
2013	United Arab Emirates	South Kazakhstan	576
2013	United Arab Emirates	Mangystau	150
2014	United Arab Emirates	South Kazakhstan and Mangystau	2,200
2014	United Arab Emirates	South Kazakhstan and Mangystau	750

2015	United Arab Emirates	South Kazakhstan and Mangystau	2,437
2016	United Arab Emirates	South Kazakhstan	1,007
2017	United Arab Emirates	South Kazakhstan и Mangystau	1,386
Total			**8,941**

2) Falcon reintroduction

Within the framework of international cooperation, activities are being carried out on the reintroduction of falcons, included in the list of rare and endangered species of animals of Kazakhstan by import of these birds from Arab countries and release into the nature of the country (Table 2.12.6).

Table 2.12.6. Release of falcons into nature of Kazakhstan

Year of release	Name of country	Place of release (oblast)	Number of released birds
2003	Saudi Arabia	Almaty	37
2004	Saudi Arabia	Almaty	41
2009	United Arab Emirates	East Kazakhstan	68
2010	United Arab Emirates	East Kazakhstan	58
2011	United Arab Emirates	East Kazakhstan	51
2012	United Arab Emirates	East Kazakhstan	66
2013	United Arab Emirates	East Kazakhstan	100
2014	United Arab Emirates	East Kazakhstan and Mangystau	124
2015	United Arab Emirates	Mangystau	55
2017	United Arab Emirates	Karagandy	39
Total			635

In Kazakhstan, private nurseries are also engaged in captive falcon breeding. For example, from 2007 to 2014, Sunkar LLP falcon nursery released 162 individuals of the saker falcon grown in this nursery into the nature of Almaty oblast.

3) Bukhara deer (tugai deer) reintroduction

The reintroduction of Bukhara deer was carried out in Kazakhstan in two stages. At first, in 1981, Bukhara deer (21 individuals) were transported from Tajikistan to the Ili River floodplain to Karachingil state-owned hunting farm of the Council of Ministers of the Kazakh SSR (Almaty oblast). Currently, as a result of the positive acclimatization of Bukhara deer, their number in the hunting farm has reached more than 700 individuals.

At the second stage, in cooperation with the World Wildlife Fund (WWF), reintroduction of Bukhara deer in the floodplain of the Syrdarya River in Turkestan district of South Kazakhstan oblast was begun, where now there are groups living in wild and in enclosures with a total of about 150 individuals.

Pursuing the Memorandum of Understanding concerning Conservation and Restoration of the Bukhara deer (Cervus elaphus bactrianus) in Kazakhstan in recent years, the following researches have been conducted.

In the framework of the State Program for Conservation and Restoration of Rare and Endangered Species of Hoofed Animals and Saigas in Kazakhstan, Bukhara deer were recorded and monitored in the floodplain of the Syrdarya and Ili Rivers.

In 2016, in the Ili River floodplain in Karachingil hunting farm of Almaly LLP and the adjacent lands there were 590 deers living while in 2017 this number accounted for 715 deers*.

Males make up 27.27%, females – 43.64%, youngsters – 29.09%. The annual increase in the population of Bukhara deer in the Ili River floodplain is 29.09%. In Karachingil hunting farm, wolves were the cause of the death of 1.7% of Bukhara deer and stray dogs – of 1.1%. It is noted that due to the increase in the number and limited area of farm, a part of the deer population has to move annually to the lands adjacent to the hunting farm, where some animals are killed by poachers. However, in recent years, individual animals and groups of deer have reached the mouth of the Charyn River, the Charyn ash grove and the Ili River floodplain to the Panfilov Bridge, i.e. 200-300 km east of Karachingil hunting farm.

In 2016, the Syrdarya River floodplain in the lands of Syrdarya-Turkestan state regional natural park was inhabited by 126 Bukhara deers, of which 63 deers were kept in enclosures of Turkestan nursery for the conservation and reproduction of Bukhara deer, and 63 deers lived in the wild in the Syrdarya River floodplain. In 2017, 146 deers lived in the park's lands, of which 78 deers were kept in enclosures, and 68 lived in the Syrdarya River floodplain. Among Bukhara deers living in Syrdarya-Turkestan SNNP, males make up 30.15%, females – 31.74%, and youngsters– 22.2%. The annual population growth of Bukhara deer in recent years has been 22.2%. It should be particularly noted that individual animals or groups of deer inhabit the area from the SNNP down the river to Tartogai forest, located in Kyzylorda oblast, 110 km off the park; and up to the river the deer settled down to the mouth of the Arys River.

As part of the implementation of the Memorandum of Understanding concerning Conservation and Restoration of the Bukhara deer (Cervus elaphus bactrianus) in 2017, the second enclosure for the conservation and reproduction of Bukhara deer was built in Bairkum area in the Syrdarya River floodplain at the expense of South Kazakhstan oblast administration.

The relocation will continue more intensively in the future, including with the tiger restoration program in Balkhash Lake area.

Population dynamics of Bukhara deer in Kazakhstan for the period from 2013 to 2017 is presented in Table 2.12.7.

Table 2.12.7 Population dynamics of Bukhara deer

Hunting farm, nursery, river foodplain		Number of individuals, by year					Population growth in 2017 in comparison with 2013; %%
		2013	2014	2015	2016	2017	
Almaty oblast							
Karachingil hunting farm		350	350	350	500	690	+97,14%
Lands adjacent to Karachingil hunting farm		50	50	50	90	25	-50,00%
TOTAL NUMBER		400	400	400	590	715	+78,75%
South Kazakhstan oblast							
Syrdarya RSNP	Syrdarya River foodplain (population living in the wild)	29*	39*	49*	63*	68	+168,97%
	Bukhara deer reproduction Turkestan nursery	36	42	54	63	78	+88,89%
TOTAL NUMBER		65	81	103	126	146	124,62%
IN TOTAL		**465**	**481**	**503**	**716**	**861**	85,16%

* - a part of animals moved outside RSNP in summer and autumn of 2013-2017

To reintroduce Bukhara deer in tugai ecosystems of the region, methodical approaches and considerable experience of reintroduction of the species in the 1970s can be used, thanks to which in Kazakhstan deer population of Karachingil hunting farm was created.

It is necessary to build several adaptation enclosures in the areas of future release, which will make it possible to form groups of release that are balanced in terms of age and sex. In addition, keeping a group in an open-air enclosure for up to 6 months will ensure that social connections are formed and animals are adapted to a specific territory, which will exclude migration immediately after release. The current number allows to withdraw up to several dozens of individuals per year without damage to the farm. Moreover, withdrawal of animals of certain age and sex groups will stimulate reproduction.

4) Tiger reintroduction

The Turanian, or Caspian tiger (*Panthera tigris virgata Nliger*, 1815) is one of the 8 subspecies of the tiger - in the recent past it inhabited the southern coast of the Caspian Sea, the Transcaucasus, the northern regions of Iran and Afghanistan, Central Asia, and the southern areas of Kazakhstan. The Ili River valley - South Balkhash was one of the most northern, i.e. peripheral part of the range.

The loss of the Turanian tiger in the recent past prompted scientists from several countries to raise the question of its restoration.

Cytogenetic studies of the survived derivatives (hides and bones) of the Turanian tiger from different regions of its habitat have indicated that the Amur tiger (P.t.altaica Temm.) that has survived to the present is virtually indistinguishable from the Turanian tiger killed by humans (Driscoll et al., 2009). This makes it possible to use Amur tigers to restore natural tiger populations in suitable habitats within the range of the extinct Turanian subspecies.

On September 8, 2017, the Ministry of Agriculture of the Republic of Kazakhstan and WWF (World Wildlife Fund) signed the Memorandum of Cooperation on the implementation of a joint tiger reintroduction program in Kazakhstan, as part of the Astana EXPO 2017 International Exhibition.

The program was presented to the public and representatives of key ministries on May 27, 2015 at the Nazarbayev University. During the presentation, opinions of international experts, representatives of the World Wildlife Fund (WWF-Russia), the Committee for Forestry and Hunting of the Ministry of Agriculture of the Republic of Kazakhstan, the Institute of Zoology of the Ministry of Education and Science of the Republic of Kazakhstan and the Association for the Conservation of Biodiversity (ACBK) were heard.

The southern shore of Lake Balkhash in the area of the Ili River delta and to the east of it (Annex 12) was selected as the possible restoration area for the tiger.

In the planned area there are tugai and reed thickets, and the wild boar lives and the tugai deer can be restored. The total area of tiger habitat is more than 1 million hectares. According to indirect historical data, the density of the Turanian tiger was significant and the program provided for the possibility of creating at least 100, and a maximum of 200 tigers of Balkhash population.

The tiger restoration program in Balkhash will include the following main steps:

1. Habitat preparation
2. Release of tigers into nature
3. Program success monitoring

5) Kulan reintroduction

To date, Association for the Conservation of Biodiversity of Kazakhstan (ACBK), in cooperation with the Committee for Forestry and Wildlife, is carrying out work on kulan relocation (reintroduction).

In October 2017, 9 kulans were relocated from Altyn Emel SNNP to Altyn Dala SNR (reservat) in Kostanay oblast.

Altyn Dala SNR has created all the appropriate conditions. Torgai steppe is currently the largest steppe region with the potential for restoring extinct wild odd-toed ungulates - the kulan and the Przhevalsky horse (Equus przewalskii) – in the place that probably once was their main habitat.

Based on the above assumptions, kulan reintroduction in Kazakhstan is scheduled for

2017-2020 (Annex 13a, 13b).

As a result of this work in 2017-2020, three new kulan populations in Kazakhstan are expected to be created and existing Barsakelmes population is expected to be maintained; this way the total number of populations in Kazakhstan will increase to six. This will not only increase the number of kulans in the country, but also significantly increase the sustainability of their existence.

In Kazakhstan, the kulan disappeared in the 1930s as a result of overhunting (Geptner et al., 1988). Reintroduction of ungulates in our country began to take place several decades ago, and it has gained good experience. Reintroduction of the kulan in Kazakhstan was carried out in several stages.

During the period from 1953 to 1961, 14 kulans were relocated from Badkhyz reserve (Turkmenistan) to Barsakelmes island in the Aral Sea (Kyzylorda oblast) (Sludsky, Afanasyev, 1964)

Over the period from 1982 to 1983, kulans from Barsakelmes island were relocated and released into the area of the Kapchagai state hunting farm (currently, Altyn-Emel SNNP, Almaty oblast). Subsequently, kulans were released into Andasai (Zhambyl oblast) and Aktau-Buzach SNZs (Mangystau oblast).

Altyn-Emel SNNP, where their population reached more than 3,500 individuals in 2017, is the world's most successful reintroduction of wild odd-toed ungulates, and currently represents the largest population of kulans in the wild.

6) Przhevalski horse reintroduction

The reintroduction of the Przhevalsky horse in Kazakhstan began in 2003, when 14 animals were introduced to Altyn-Emel SNNR from Germany (Munich Zoo).

Since 2012, a new project on the reintroduction of the Przhevalsky horse has been implemented to restore the completeness of natural ecosystems in central Kazakhstan. The past range of the Przhevalsky horse is shown on the map in Annex 12.

The project is implemented by the Association for the Conservation of Biodiversity of Kazakhstan RPO in cooperation with the Committee for Forestry and Wildlife of the Ministry of Agriculture of the Republic of Kazakhstan and the Kazakhstan National Geographic Society RPO (KNGS; joined the project in 2014).

To date, center for Przhevalsky horse reintroduction has been built in Altyn Dala state natural reservat (Kostanay oblast) and in its protected zone (Alibi area), which consists of two paddocks for horses of 50 and 20 hectares, as well as houses with outbuildings.

Relocation of horses from Europe is planned in several stages of 6-8 animals annually, bringing their number to 100 horses.

The aim of the project is to create a sustainable population of Przhevalsky horses with about 500 individuals in Central Kazakhstan. A prospective work program for the Przhevalsky horse in Kazakhstan as a whole was prepared (with the support of KNGS), describing the proposed activity not only in Altyn Dala, but also considering its potential in other parts of the country.

In parallel with the work in Altyn-Dala, in 2016, KNGS and ACBK assessed feeding and other capacities of Altyn-Emel SNNP for Przhevalsky horses.

According to international standards, a compulsory precondition for the reintroduction of the Przhevalsky horse is to include it in the list of protected species. At present, they are not included in the list of fauna of the country and such procedure was not provided for by national legislation.

As a result of the joint work carried out by CFW MoA RK, ACBK, Science Committee of MES RK on this issue in the autumn of 2016, today the legislation allows to include species that disappeared in the wild (tiger, Przhevalsky horse, hunting leopard) in the list of rare and endangered species of Kazakhstan.

7) Measures on study and conservation of snow leopard

The snow leopard (Uncia Schreber, 1775) is one of the rarest animals in Kazakhstan, which

is included in the Red List of the International Union for Conservation of Nature (IUCN), in Annex I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora, as a threatened species. The assignment of such status indicates that there is a need to take emergency measures by all states where it lives to protect it, study and restore the population.

The growing intensity of the development of mountain ecosystems and the consumption of biological resources, the reduction of the range and number of the snow leopard threaten its existence as a species and dictate the need to take effective measures for its conservation.

In Kazakhstan over the past 12 years, within the boundaries of the snow leopard range, 6 national parks have been created in all mountain systems, and the areas of three previously established reserves have been expanded. This made it possible to increase the area of the protected part of the snow leopard range (Annex 14).

The Association for the Conservation of Biodiversity of Kazakhstan (ACBK), in cooperation with the Committee for Forestry and Wildlife of the Ministry of Agriculture of the Republic of Kazakhstan, has been working on preservation and study of the snow leopard since 2013. Previously, assessments of the number of snow leopards in the country, their age and sex composition, food supply, habitat condition, a detailed study of the biology of the species were not carried out. Therefore, the assessment of the number of snow leopards is one of the main results of this work - 110-130 individuals of snow leopards live in Kazakhstan.

One of the new methods for recording and monitoring of the snow leopard is the use of camera traps, which are installed at migration points, possible laying place of the snow leopard. As a result of this work, snow leopard habitats have been recorded - Altai, Saur, Dzungarian Alatau, and Tien Shan, which are of international importance, as regions of high biodiversity. At the same time, cross-border cooperation with neighboring countries is of the greatest geographical importance for snow leopard conservation.

Work on the study of the snow leopard continues. Additional information on the food supply has been received.

The main reasons for the decline in the number of snow leopards are poaching, including on ungulates (food supply), habitat destruction due to the increase in the number of domestic animals in the mountains, as well as construction of roads, sports, entertainment complexes and other facilities that increase anxiety factor.

Over the period from 2014 to 2016, the Committee for Forestry and Wildlife of the Ministry of Agriculture of the Republic of Kazakhstan together with ACBK implemented the project entitled “Biodiversity protection in the transboundary region of Northern Tien Shan”.

Currently, the Irbis Project is being implemented jointly with ACBK.

The project was launched in 2015 and is being carried out jointly with Zhongar-Alatau SNNP on the area of both the national park and Tokty zakaznik. The project has achieved the following results:

- examination of potential habitats of the snow leopard in Zhetysu (Dzungarian) Alatau, including Zhongar-Alatau SNNP and Tokty zakaznik;
- clarification of habitats, distribution features, approximate number and gender and age composition of the snow leopard in Zhongar-Alatau SNNP and Tokty zakaznik;
- identification of conflicts of the snow leopard with the population (attack on livestock);
- clarification of factors resulting in the decline in the number of snow leopards in Zhetysu Alatau;
- preparation of recommendations for improving the effectiveness of PAs system in the region.

Wildlife and hunting legislation

On June 15, 2017, the Law of the Republic of Kazakhstan No. 73-VI “On Amendments and Additions to Some Legislative Acts of the Republic of Kazakhstan on Flora and Fauna” was adopted, under which, in order to develop a hunting industry:

- new terms of “game breeding” and “hunting farm” have been introduced;
- hunting in the zone of limited economic activity of state national natural parks and the

buffer zone of state natural reserves has been prohibited;

- use of animals bred and kept in captivity and (or) semi-free conditions in hunting farms has been permitted;

- right has been granted to hunting farms to determine the dates for the commencement and end of hunting season in the fixed lands within the time limits established by the Rules for hunting;

- right has been granted to territorial subdivisions of the authorized body to make a decision on postponing the hunting season to an earlier or later period (up to fifteen calendar days) within the time limit for hunting, depending on natural and climatic conditions of the region;

- use of aircraft, auto- and motor-vehicles, and snowmobiles in amateur (sport) wolf hunting on fixed hunting lands has been prohibited;

- to ensure protection, reproduction and sustainable use of fauna, local executive bodies should establish specialized organizations.

Wildlife and hunting legislation is still improving; in particular, amendments were made to the draft Law of the Republic of Kazakhstan "On Amendments and Additions to Some Legislative Acts of the Republic of Kazakhstan on Regulating the Agro-industrial Complex" in terms of providing servitude for game breeding and creating hunting farms.

Challenges and scientific and technical needs to meet national targets

Practically in all inspection centers there is a shortage of inspectors (443 inspectors) and outdated material and technical resources, which leads to a weakening of control and inspection activities in the areas under their control.

As the review shows, material and technical resources (MTR) in the regional territorial inspection centers of the Committee for Forestry and Wildlife of the Ministry of Agriculture of the Republic of Kazakhstan have not been upgraded since 2013; most fixed assets were purchased 10 years ago and technically outdated, and vehicle depreciation is 90-100%.

The most significant obstacles arising while implementing national targets on wildlife and the development of hunting include:

• lack of knowledge about game breeding, keeping of animals in captivity and semi-free conditions in hunting farms, in order to reproduce and use fauna for hunting purposes and the development of hunting by foreigners;

• lack of knowledge about recording of the number and optimal number of predators in the country, to take preventive measures to minimize harm they cause to population, agriculture and wild fauna;

• need for subsidies for hunting farms and equating it to livestock breeding;

• it is necessary to subsidize hunting users who protect and breed rare and endangered species of wild animals on fixed lands, and those engaged in breeding in enclosures;

- absence of legal norms providing for compensation for damage caused by poaching to a hunting farm (a claim paid by the violator for illegal withdrawal of an animal or a bird is sent to the state budget without taking into account the costs of the hunting farm for protection, biotechnical measures, detection and suppression of poaching, as a result of which the hunting farm bears losses);
- absence of norms in the Land Code on targeted fixation of lands for the construction of enclosures necessary for the creation of hunting farms and game breeding;
- lack of relevant requirements (GOST) for game breeding products.

The most important needs are the following:

- determine areas where to strengthen effectiveness of governance and need to expand and strengthen the network of game breeding farms, nurseries, centers of various forms of ownership for animal breeding, including for the rescue of detained and confiscated animals, as well as their inclusion in programs for reintroduction and relocation of certain species (Annex 15);
- need to create a center for wild animals relocation to ensure reproduction and rational use

of fauna, to develop technologies for the conservation of rare and endangered species of animals in artificial conditions and natural habitats;

- need to take measures to identify, monitor and prevent the emergence and spread of diseases of wild animals that threaten the health of citizens, causing damage to agriculture and species diversity, including rare and endangered animals.
- during production processes, use of highways, pipelines and communication lines and electricity transmission, there is the need to introduce technologies that include measures to prevent death of wild species and violation of their migration routes;
- need for staff training and retraining.

2.13. Measures taken for meeting the national target of conserving genetic resources, assessment of their efficiency, challenges, scientific and technical needs.

The main way to conserve the gene pool of flora and fauna is the creation of forest gene reserves, as well as the creation of protected areas (PAs) with various protection regimes. Forests in Kazakhstan are represented by 10 species in the plain and mountain ecosystems and occupy an area of 12.5 million hectares, which makes the country the third biggest forest zone in Eastern Europe and Central Asia. In general, the flora is represented by 5,754 species of higher plants. There is a high level of endemism with 14%. The list of rare and endangered species includes 387 plant species.

The special group includes wild-growing plant species related to agrobiodiversity and is valuable for the development of agriculture and the country's export potential. The special group includes more than 210 species of wild-growing plants that determine the genetic potential of 24 crops. Some of them are progenitors of apples, apricots and have a high potential for growing fruits, berries, nuts, and cereals.

Genetic seed banks, living plant collections are used in agriculture. Idioplasma is preserved by deep cooling. To date, more than 70 varieties of cereals, 68 varieties of fruits, more than 60 varieties of vegetables, melons and gourds and 23 varieties of potatoes have been cultivated and zoned.

Fauna of Kazakhstan is represented by 835 species of vertebrates and 100 thousand species of invertebrates, among them there are at least 50-60 thousand of insects. Over the past 10 years, zoologists have described more than 500 species of invertebrates, which are new to science, and more than 1,000 species of invertebrates, which are new to Kazakhstan. The list of rare and endangered species includes 224 animal species.

Stud farms, breeding farms and distribution centers are engaged in preserving the gene pool of livestock, represented by different species, breeds, varieties, lines of highly productive animals adapted to different climatic zones and regions of the country (cattle, sheep, goats, horses, camels, pigs, deer, bees and fish, cross breeding of birds).

The potential of scientific organizations engaged in research and conservation of the gene pool is quite high. Work in this field is carried out with the support of the state budget and private investment.

Organization of genetic resource conservation and capacity assessment

a) natural resources

In Kazakhstan, natural genetic resources conservation is carried out using *in situ and ex situ* methods. The first method is used mainly in the state forestry estate and protected areas. In particular, in forest areas of relict and endemic species that are unique not only in terms of their species composition, but also of their productive and genetic qualities, as well as those forests areas which perform important protective functions in difficult conditions and have a special status of valuable forest land having a status of a reserve, where all forms of forest use are

prohibited. Such lands are singled out when planning a forest inventory, which is held every 10-15 years.

The main way to conserve the forest gene pool is the creation of forest gene reserves. With their help, virgin forest communities are preserved in the natural environment, and a set of specific genotypes of this population is preserved. Such reserves were created for 14 forest plant species within the total area of more than 78 thousand hectares. The number of these sites increases annually as a result of the work of specialists of institutes of tree seed production using special methods, as well as two forest tree breeding centers, research departments in protected areas managed by the Committee for Forestry and Wildlife of the Ministry of Agriculture of the Republic of Kazakhstan.

Ex situ conservation methods are used by research institutes, botanical gardens, which are a part of the Ministry of Education and Science of the Republic of Kazakhstan and KazAgroInnovation JSC research holding of the Ministry of Agriculture, zoological parks and nurseries of the Republic of Kazakhstan.

Botanical gardens play an important role in plant gene pool conservation. They have a documented collection of living plants and use it for scientific research, plant biodiversity conservation, demonstration and educational purposes, as well as for international exchange in the framework of the International Association of Botanic Gardens. There are 5 botanical gardens in Kazakhstan: Main, Altai, Ili, Zhezkazgan, Mangyshlak, with a total area of 424 hectares. They are created in different natural zones and have their own specialization.

The most representative collection of flora can be seen in state-owned enterprise 'Institute of Botany and Phytointroduction RSE on PVC' which has over 7,000 species, varieties and forms of plants, as well as a collection of woody plants - 895 taxa from 49 families and 129 genera. The Alpinaria exhibition has about 200 species of native plants and more than 100 species and varieties widely used in the culture of herbaceous perennials and miniature shrubs. Altai botanical garden includes 3,600 species, forms, plant varieties, Mangyshlak experimental botanical garden – 936 plant taxa, including a collection of woody plants - 321 species belonging to 64 genera and 29 families, etc.

The Institute of Botany and Phytointroduction RSE on PVC has 250,000 species of herbaria of bryophytes, ferns, gymnosperms and angiosperms. There are more than 500 collections of fossil plants collected in various regions of the country. This is the largest collection of remnants of Jurassic, Cretaceous, Paleogene and Neogene periods, not only in Kazakhstan, but throughout Central Asia.

The herbarium (collection) of mushrooms and lichens accounts for 150,000 samples belonging to more than 3,500 species. This is one of the richest collections in Central Asia. It is part of the World's Herbaria and has an international AA index. On the basis of herbarium materials, a fundamental work entitled "Flora of Sporophytes of the Republic of Kazakhstan" was published in 13 volumes and 20 books (1956-1988). It was awarded the State Award of Kazakhstan.

The Institute also created a unique collection of wild apple (more than 200 varieties of clones) and apricot (120) selected from natural populations of mountain forests of the country. Theoretical and methodological approaches to the analysis of the variety of forms of these plants have been developed.

The Institute of Zoology RSE on PVC conducts fundamental and applied research in the field of zoology of vertebrates and invertebrates, paleozoology and parasitology. The Institute has a high potential scientific personnel participating in a number of national and international programs in the field of conservation and restoration of rare species. A lot of work is being done to identify the size of populations and preserve especially rare species of wild animals: snow leopard, Kazakh mountain sheep, argali, goitered gazelle and other mammals and birds.

The Kazakh Research Institute of Fishery (KazNIIRH) of KazAgroInnovation JSC MoA RK is developing a scientific basis for conservation and sustainable use of biological resources of fishery ponds and gene pool of rare and valuable fish species. It constantly monitors

ecosystems of water bodies and biological resources. Biological bases of rational use and reproduction of fish stocks are being developed, and work on acclimatization of introduced fish fauna and fish forage invertebrates, breeding and conducting breeding researches, as well as improvement of pond fish species and lines is in progress. Annually, on the basis of the scientific data provided by KazNIIRH, the Government of the Republic of Kazakhstan approves annual fishing limits in water bodies of the country. The master plan on fish farms, biotechnological measures, breeding and regulatory framework for certain regions of Kazakhstan has been developed.

Zoological parks of the country are large environmental and scientific centers; they are located in Almaty, Karaganda and Shymkent. Their main goal is conservation of endangered and rare species of animals, research and environmental education.

Almaty zoo is one of the oldest in Kazakhstan. Its collection has more than 500 species, more than 4,000 individuals. Seventy-seven species of the zoo are listed in the Red Book of IUCN, CIS and Kazakhstan. One of the most important parts of the zoo's activities is its participation in various international programs for endangered species conservation and restoration. Breeding birds of prey has become a priority for the zoo under this program.

Karaganda zoo is also one of the oldest in Kazakhstan. The zoo specializes in maintenance and breeding of rare and endangered animals in Kazakhstan and Central Asia. The collection includes 250 species of animals - fish, amphibians, reptiles, birds, mammals.

Shymkent zoo has more than 1,300 animal samples of 160 biological species, including fish - 32 species, amphibians – 3 species, reptiles – 15 species, birds – 60 species, mammals – 50 species. About 30 species are included in the Red Book of IUCN and Kazakhstan.

In 1989, Sunkar private nursery was opened in Kazakhstan, which breeds and preserves endangered species of birds of prey (hawks, falcons, eagles, etc.). Today it is the only one of its kind in Kazakhstan. According to experts of international CITES Convention, it is recognized as one of the best nurseries in the world. During the existence of the nursery, 700 birds have been bred and released into the wild. Among them are 500 falcons and 8 eagles.

b) agriculture

Currently, plant breeding is carried out in Kazakhstan by more than 20 scientific organizations and covers 50 crops. Local material is used as a source of idioplasm. In the past decade, they were received from regional and international networks. Most attention is paid to two main crops – wheat and barley. The use of PGR is limited by the varying degrees of improvement in breeding of different crops. Loss of locally adapted genotypes was not identified. There is a lack of PGR of some economically important features and characteristics. In connection with diversification of crop production, considerable attention is paid to the creation of collections of legumes, oilseeds and commercial crops, which are non-traditional and not sufficiently studied in terms of the use.

Currently, the Institute of Plant Biology and Biotechnology RSE on the PVC:

- has a collection of *laboratory plants* of 139 varieties, hybrids and wild forms, including apple – 15, pear – 5, griot – 32, cherry – 9, plum – 22, cherry plum – 5, and strawberry – 9, raspberry –30, black currant – 12; cold stored (+4 ºC);

- created a collection of species bred under *laboratory conditions and in natural conditions*, commercially valuable varieties of roses in medium-term storage conditions (4 ° C);

- has a cryogenic collection of 120 varieties, hybrids and wild-growing types of apple, currant and raspberry kept at a very low temperature (-196 ° C) in liquid nitrogen;

- created a collection of 150 wheat samples, which are recommended as sources and donors of resistance to abiotic and biotic environmental factors;

- created a genetic collection of soft spring wheat, carrying certain adaptive characteristics so that in breeding more productive and drought-resistant varieties are used. A collection of donors of morphological features, namely a stiff tomentous leaf blade, was formed. Continuous lines carrying this phenotypic trait, which can explain performance and total tolerance to abiotic and biotic stressors, were maintained and used for experimental hybridization;

- created a collection of sorghum sugar seeds, obtained experimental data, reflecting biological productivity, resistance to adverse environmental factors, such as drought, salinization and contamination by heavy metals of foreign sorghum varieties. The most promising samples were selected for cultivation in the south and south-east of the Republic of Kazakhstan;

- created a collection of varieties of barley and wheat from the countries of the former USSR, USA, Europe and Asia, as well as wild species of barley and aegilops of Kazakhstan, Israel, Turkmenistan, ICARDA.

The Museum of the Kazakh Research Institute of Agriculture of the NK NCB MES RK has 16,000 samples of wheat.

Information on *ex-situ* plant collections in the agricultural sector of Kazakhstan is presented in Table 2.13.2.

Table 2.13.2. *Ex-situ* plant collections in agricultural sector of Kazakhstan

Collection holders	Number of kept samples	Notes
Kazakh Research Institute of Agriculture and Plant Growing, Almaty oblast	15,689	
Kazakh Research Institute of Livestock and Fodder Production, Almaty	842	
South-Western Scientific Research Institute for Livestock and Crop Production, Shymkent	13,248	
Scientific-production center for grain farming named after A. Barayev, Akmola oblast	11,815	Wheat, barley, oats of different ecological and geographical origins– 59 countries (USA, Canada, Argentina, Australia – leading countries exporting grain) – 3,185 samples. Fodder gene pool herbs – 1,500 Oilseeds and beans – 1,100, etc.
Kazakh Scientific Research Institute of Horticulture and Viticulture, Almaty	4,276	Collections (samples): - fruit crops – 3,147; - berries – 469; - grape – 364; - microorganisms – 126; - cryoconservation – 45. Gene pool of pome fruit and stone fruit was collected (125 samples).

Karaganda Research Institute of Plant Growing and Breeding, Karaganda oblast	1,013	
Kazakh Research Institute of Potato and Vegetable Growing, Almaty oblast	10,400	119 crop samples belonging to 156 botanical species from 97 countries
Pavlodar Research Institute of Agriculture, Pavlodar oblast	21,100	
Kyzylorda Knowledge Dissemination Center, Kyzylorda	1,950	1,500 samples of rice and 450 samples of melon. No special storage conditions.
Karabalyk Agricultural Experimental Station, Kostanay oblast	1,500	
Krasnovodopad Agricultural Experimental Station, South Kazakhstan oblast	779	
Aral Sea Experimental Station for Plant Genetic Resources named after N.I.Vavilov, Aktobe Oblast	9,369	
Kazakh Research Institute of Forestry, Schuchinsk	846	

In general, as part of a study covering the period from 1996 to present, a gene pool of crops has been collected, which includes about 75 thousand samples. The PGR structure in the context of the study is presented in Figure 2.13.1.

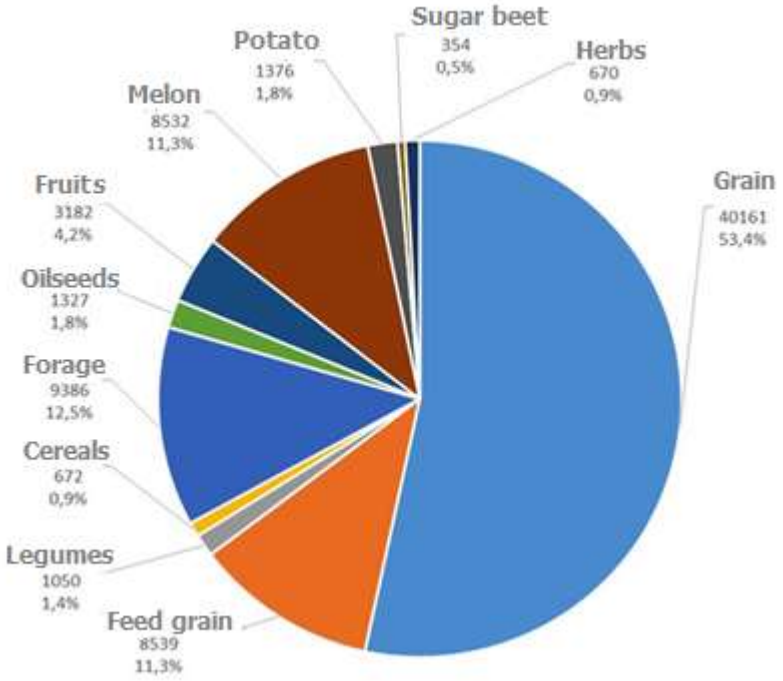

Figure 2.13.1. Structure of PGRFA *ex-situ* collections of Kazakhstan

In selected groups, the dominance of certain crops is observed. To illustrate, more than 80% of the wheat collection is represented by wheat. In collections of forage plants there is a predominance of grain and leguminous crops. Two crops – melons (2,246 samples) and tomato (1,500 samples) make up 51.3% of the gene pool of vegetables, melons and gourds. The gene pool of fruit and vegetable is most widely represented by apple tree gene pool (48.1%), which is the main fruit crop in a mild climate; 8 species have been preserved. Collections of various groups of plants were formed for individual categories of materials. The following crops have the status of cultivated / improved varieties: 67% – grain, 46% – feed grain, 75% – legumes, 57% – potato, 58% – fruits. Twenty-one percent of the collection of feed grain, fodder, oilseeds were formed on the basis of the breeding material.

Wild-growing forms are a part of the collection of four crops: feed (30%), potato (26%), fruit and berries (4.2%) and medical (89%). Fifty-six percent of melon collections and potato collection contain mutable / genetic material (Fig. 2.13.2)

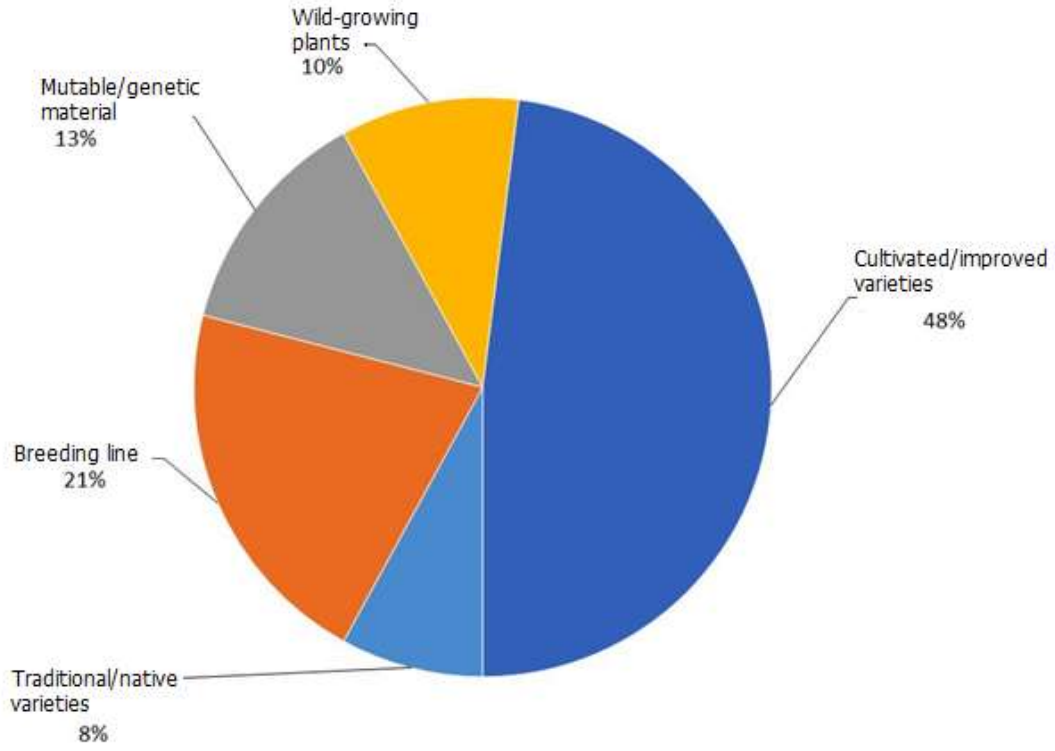

Figure 2.13.2. Status of PGRFA *ex-situ* collections of Kazakhstan

However, incomplete taxon representation, incomplete geographical coverage, loss of known native and old varieties, loss of historic varieties is the main problem of the collections being kept.

The collected gene pool requires special attention from researchers to maintain and preserve it effectively - systematic reproduction, regular monitoring of viability and genetic integrity. Idioplasm collection of Kazakhstani plants is preserved with varying degrees of loss risk. In this regard, optimization of PGR keeping is the primary task of research works on PGRFA.

The agricultural crops gene bank being created will be intended for short-term, medium-term and long-term storage of 300 thousand samples of valuable plant material.

Institutions working on creating gene pool of crops in Kazakhstan

- Kazakh Research Institute of Agriculture and Plant Growing;
- Scientific-production center for grain farming named after A. Barayev;
- Kazakh Research Institute of Potato and Vegetable Growing
- National Breeding Centre of the CFW of MoA
- South-Western Scientific Research Institute for Livestock and Crop Production;
- Aral Sea Experimental Station name after N.I.Vavilov;
- Kazakh Scientific Research Institute of Rice Growing named after I. Zhakhayev;
- Kazakh Research Institute of Cotton Growing;
- East Kazakhstan Research Institute of Agriculture;
- Experimental Farm of Oilseeds LLP;
- Krasnovodopad Agricultural Experimental Station LLP;
- Aktobe Agricultural Experimental Station LLP;
- Karabalyk Agricultural Experimental Station LLP.

Size of the gene pool, by crop – 72,595 samples, including:

Cereals – 29,096; feed grain – 3,259; pulse crops – 1,835; oilseeds – 3,778;
feed – 11,205; groats – 1,636; vegetables, melons and gourds, as well as potatoes – 15,453; industrial crops- 2,280; fruit and berry crops – 3,682.

***Replenishment of the gene pool over the period from 2012 to 2017, by crop* – 16,260 samples, including:**

Cereals – 6,607; feed grain – 1,093; pulse crops – 1,253; oilseeds – 535;
feed – 2,246; groats – 486; vegetables, melons and gourds, as well as potatoes – 2,299; industrial crops – 1,230; fruit and berry crops – 511.

Research work on creating the gene pool of agricultural crops over the period from 2012 to 2017:

- Collection and study of biodiversity of non-traditional crops and wild relatives of cultivated flora of Kazakhstan in order to develop genetic resources of agricultural crops, preserve, restore and use in breeding, 2015-2017, program-based budgeting, MoA RK, NASEC non-commercial JSC (National Agrarian Science and Educational Centre).

- Mobilization, study, preservation and restoration of the gene pool of agricultural crops (cultivated and wild-growing flora) to increase productivity and stability of the agro-industrial complex of the Republic of Kazakhstan in the context of global and local climate change, 2015-2017, MoA, NASEC non-commercial JSC;

- Phenotypic and genetic diversity of collections of wild relatives of wheat (genus Aegilops l.) – identification of potential sources of useful traits for their balanced use and ex-situ preservation, 2015-2017, MES RK.

c) microorganisms

Republican collection of microorganisms is the main repository of microorganisms in Kazakhstan. This professional scientific organization, which provides qualitative research and services in the field of microbiology and biotechnology, is the leading scientific and methodological center among specialized collections of industrial microorganisms of the Republic of Kazakhstan. Collections of the organization are a constant source of crop strains for scientific and industrial needs of the country.

Republican collection of microorganisms is included in the list of strategic objects of the Republic of Kazakhstan and, along with physical protection, it ensures development of modern technologies to maintain viability and biological activity, organizes centralized recording and control of the movement of collections of industrial microorganisms.

The organization has the central museum of microorganisms, which carries out certification, storage, and safekeeping of valuable species of industrial microorganisms, including those obtained from other organizations, as well as checking them for purity and viability. Material and technical resources of the museum allow to store collection species properly. Storage of collection strains there meets the requirements of economic activity and international standards, and must be done in at least three ways. This storage requirement is

strictly enforced for all cultures in storage at the museum. Currently, the museum holds 418 strains of microorganisms by cryopreservation at a temperature of 80 ° C, freeze-drying, as well as subcultures with regular subculturing in ISOLAB tubes with screw caps.

In 2006, this organization became a member of the World Federation for Culture Collections (WFCC) under the acronym RCM and number 907.

A collection of industrial microorganisms producing biologically active substances was created at the enterprises of the National Center for Biotechnology (NCB):

- collection of the Institute of Pharmaceutical Biotechnology of NCB has 119 cultures of microorganisms;

- museum of the Research Institute of Agriculture of the NCB has 190 strains of microorganisms and viruses, 21 cell lines of industrial and control strains, 120 insulators of various fungi.

The Institute of Pharmaceutical Biotechnology of NCB together with the Institute of Microbiology has prepared a catalog of industrial microorganism cultures containing information on 169 strains of industrial cultures and various test cultures.

Museum of strains of the Kazakh Scientific Research Veterinary Institute has more than 300 cultures of microorganisms.

The Kazakh Research Institute of Food Industry has 40 cultures of lactic acid bacteria, 30 yeast cultures and 22 strains of filamentous fungi.

The collection of SPC of Microbiology and Virology LLP contains 312 strains of microorganisms, including bacteria - 123, actinomycetes- 105, yeast- 35, filamentous fungi- 49.

d) development of new technologies for the conservation and use of genetic resources

The Institute of General Genetics and Cytology RSE on PVC conducts fundamental research in the field of genetics and cell biology. Researches are aimed at solving actual problems of ecology, medicine and agriculture. Species developed at the Institute of Technology of Accelerated Growth of Standard Conifers and Deciduous Trees are of interest to forestry. Research related to the study and creation of a data bank on rare and endangered sheep breeds of Kazakhstan, molecular genetic and cytogenetic certification of important agricultural species are of direct interest.

Over the past 20 years, the Institute of Horticulture and Viticulture of KazAgroInnovation JSC of the Ministry of Agriculture of the Republic of Kazakhstan has created about 144 new varieties and put them to state tests. More than 20 varieties of KRIHA RK breeding were zoned in the south and south-east of Kazakhstan. About 30 varieties of KRIHA RK breeding were included in the State register of appropriate selection achievements recommended for use in the Republic of Kazakhstan.

The following has been developed and improved: biotechnology for obtaining a virus-free planting material for fruit and berry crops; technology of propagating rootstocks by hardwood cuttings of world novelty; optimal structures of apple orchards, stone fruits, berries and grapes; a system for preserving soil fertility and protecting plants from pests, diseases, and weeds; recommendations for growing aport apples; KRIHA RK-1 system of forming vines and labor-saving technologies; method of long-term storage of fruits in a modified gas atmosphere using natural and synthetic adsorbents.

In order to increase productivity of individual tree species and restore population of endangered wild fruit trees, forest biotechnological laboratories have been established on the basis of Almaty and Kokshetau forest breeding centers. Work on clonal micro-reproduction of the Sievers apple and aspen (poplar) trees is being carried out.

With the help of modern genetic methods (chemical and radiation mutagenesis and gynogenesis) KazNIIRH has created highly productive breed groups of carp and silver carp. Resource-saving technology has been developed for fish polyculture farming using inexpensive feed. Following the results of fishing research, new, more effective methods and devices for fishing, equipment and accessories for mechanization of labor-intensive processes in fish farming have been proposed. A number of technologies and methods for the manufacture of

canned fish, sausages, smoked fish products, a wide range of low-value fish, glue from fish scales, etc., have been suggested.

e) development of international relations and cooperation

A number of research organizations in the country participate in cooperation programs at the regional and international levels. For instance:

Since the beginning of 2006, the Kazakh Research Institute of Potato and Vegetable Growing, through international cooperation with the World Vegetable Center (AVRDC-WVC), has received more than 400 variety samples from 10 species of vegetables that are used for breeding. Among them are tomatoes, sweet peppers, hot peppers, vegetable soybeans, vegetable beans, Oregon beans, cucumbers, etc.

The scientific-production center for grain farming named after A. Barayev pays great attention to the study of the gene pool of spring barley and oats, represented by varieties and hybrid forms from the collections of the International Center for Agricultural Research in the dry areas (ICARDA).

The National Center for Biotechnology provides for scientific and business cooperation in the field of new technologies with a number of research centers in the USA (University of California), France (National Center for Scientific Research), Japan (Nagasaki University), Korea (Korean Research Institute of Biosciences and Biotechnology), Belarus (Institute of Genetics and Cytology, Institute of Microbiology), Russia (Vector, Center of Virology and Biotechnology, Institute of Physicochemical Medicine, Institute of Cytology and Genetics, Siberian Branch of the Russian Academy of Sciences, National Research Center for Epidemiology and Microbiology named after the honorary academician N.F.Gamaleya, Altaivitaminy CJSC).

The center is the contact point of the Cartagena Protocol on Biosafety to the Convention on Biological Diversity, ratified by the Republic of Kazakhstan in 2008.

At present, the Institute's gene pool has 10,400 samples of 119 cultures from 97 countries.

KazNIIRH LLP carries out international cooperation with leading scientific institutions of foreign countries on environmental problems of water protection, conservation of biodiversity of rare and endangered species, population genetic studies of ichthyocenosis, aquaculture, etc. (Russia, Azerbaijan, Great Britain, China, Iran, Israel and etc.). Activities are carried out under international programs of CITES, FAO.

International activity of the Republican collection of microorganisms is aimed at forming scientific cooperation with collections of cultures of microorganisms and other scientific organizations of other countries through the implementation of joint research in the field of microbiology and biotechnology. In the framework of the interstate scientific and technical program on biotechnology, cooperation with the national collection of the Institute of Microbiology of the National Academy of Sciences of Belarus is being developed.

Some international projects were implemented with the participation of a number of research groups in the south and south-east of the country:

- UNDP-GEF pilot project entitled "*In-situ* conservation of Kazakhstan's mountain agro-biodiversity" is aimed at preserving the gene pool of globally significant wild fruit (apple, apricot) reserves at local level;

- GEF-UNEP regional project entitled "*In Situ/On Farm* Conservation and Use of Agricultural Biodiversity (Horticultural Crops and Wild Fruit Species) in Central Asia".

Challenges and needs.

At the same time, the use of genetic resources in the country is fragmented and uncoordinated. There are no uniform storage requirements for collections of genetic resources and, as a result, more than 70% of available samples are stored in uncontrolled conditions of temperature and humidity for a short period of time. In the collections, there is an incomplete representation of taxa, an incomplete geographical coverage. Known native and old, historic varieties are missing (lost).

Organization of flora and fauna conservation does not guarantee the conservation of their

genetic resources. They are not protected from their unauthorized transfer from the country, which contributes to an uncontrolled use of these resources and loss of the country's sovereign rights to the results of such use.

Suggestions to improve agro-biodiversity in Kazakhstan

For sustainable development of PGRFA in the country, it is necessary:

- to improve the legal framework for PGRFA – state registration of collections - recognition by the state. Based on the established priorities, to elaborate and strengthen the national program, to develop a national strategy for the conservation and sustainable use of PGRFA;

- to provide long-term targeted funding for research on PGRFA;

-to increase coordination – to establish a committee on PGRFA in the Republic of Kazakhstan and interdepartmental working groups on PGRFA with supervisors on certain cultures, functioning as the governing body and responsible for coordinating activities on PGRFA, which would include representatives of governmental, private, public and non-governmental organizations;

- to create national PGRFA repository, responsible for the creation, organization of storage and rational use of plant genetic resources, which will allow:

1) to implement national policy on conservation of genetic resources: to store valuable plant samples, sperm and animal embryos in standard conditions;

2) to guarantee long-term germplasm conservation in living;

3) to defend national interests on genetic resources within the framework of existing international law - determine the access by other researchers;

4) to guarantee registration of a creator or a collector of germplasm;

5) to guarantee its availability during arbitration (UPOV);

6) to have general information about genetic resources of Kazakhstan and conduct research programs for the development of crop production on their basis.

In the country, 362 certified seed producers produce and sell seeds of crops, while the vast majority (74%) produce seeds of grain crops, 66 are certified in oilseeds, 55 –in fodder grasses, 2. - in sugar beet. In this regard, the amount of seeds of these crops produced in the country does not cover the demand, and there is a significant proportion of seed imports. (Figure 2.13.3).

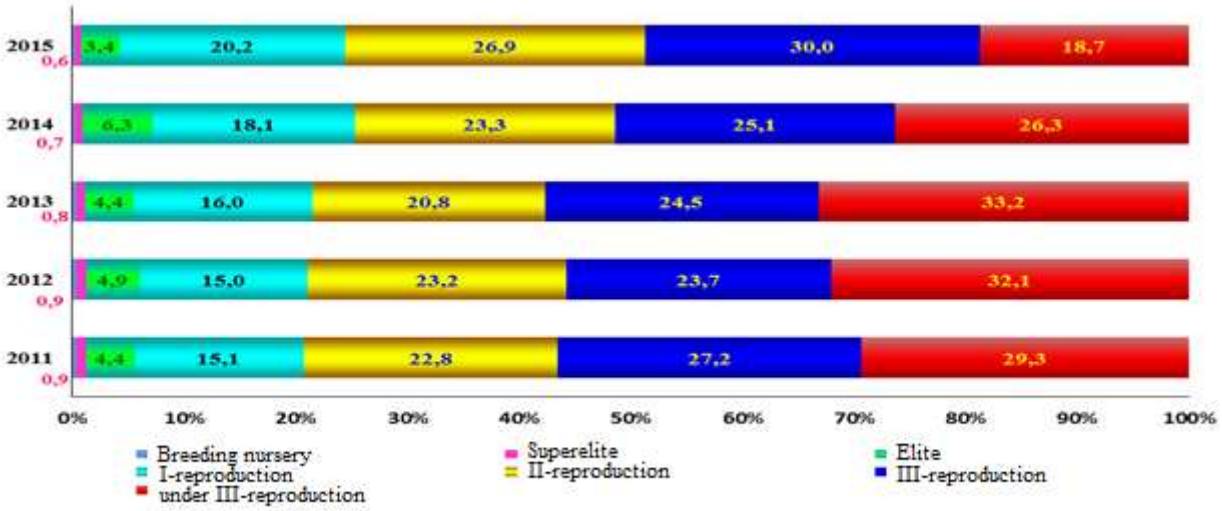

Figure 2.13.3. Proportion of sowings with seeds of various reproductions, %

Improving efficiency of state variety testing of agricultural crops

The main task of the State Commission for Crop-Varieties Testing (State Commission) is

the organization and carrying out of state tests for economic utility and examination of the patentability of new varieties of domestic and foreign breeding, identifying the best varieties of crops in terms of economically valuable traits and properties.

At present, as part of the State Commission there are 12 regional, 3 regional inspection centers and 73 variety testing sites in the country.

Provision of state-owned variety testing sites with laboratory, agricultural (including specialized) equipment and machinery, (currently equipped for 46%) still remains to be the problem.

It should be noted that the improvement of material and technical equipment of state variety testing sites and laboratory equipment will provide an opportunity to carry out a qualitative assessment of the tested varieties for economic utility and patentability, to obtain reliable data on the conducted analyzes. Technical equipment of the variety testing process is a major factor in its effective development, and it improves the quality of the variety testing through the timely complete implementation of all the agrotechnical works recommended by the zonal farming system. This makes it possible to identify high-yielding varieties for introduction into production, which will increase production levels.

Strategic Goal D. Enhance the benefits to all from biodiversity and ecosystem services.

2.14. Measures taken for meeting the national targets of improving well-being of population, quality of environment and enhancing water security, assessment of their effectiveness, obstacles arising, as well as scientific and technical needs to be met.

According to many experts, the issue of water scarcity is one of the most important in Kazakhstan.

In the country, there are about 39 thousand rivers and temporary streams, of which more than 7 thousand are over 10 km long. There are also more than 48 thousand lakes with a total water surface area of 4,500 km² and a volume of about 190 km3. Most lakes are located in the forest-steppe zone and the northern part of the steppe zone. Regarding the type of water exchange, closed lakes are prevalent.

Also in Kazakhstan there are 1,665 hydraulic structures, of which 319 are reservoirs with a volume of more than one million cubic meters, 276 ponds, 443 dams, 125 levees, 112 hydro-systems, 385 main canals. Three hundred forty-seven hydraulic structures are in unsatisfactory condition.

Table 2.14.1. Renewable freshwater resources (millions m3)

	2012	2013	2014	2015	2016
Precipitation	705,879	940,263	746,623	907,392	1,081,786
Surface flow	49,200	75,009	63,500	67,700	990,086
Flow from neighboring countries	43,500	46,100	46,300	39,700	
Total renewable freshwater resources	92,700	121,100	109,800	107,400	

Source: http://stat.gov.kz

According to statistics in 2015, the amount of renewable freshwater resources in the country amounted to 107,400 million m3 (Table 2.14.1., Fig. 2.14.1), the main part of which was accounted for by the internal flow - 63%. At the same time, surface and groundwater flowing from neighboring countries (inflow) over the period from 2000 to 2015 decreased by 24.4% and

amounted to 39,700 million m3, from transboundary rivers of China, Uzbekistan, Russia and Kyrgyzstan.

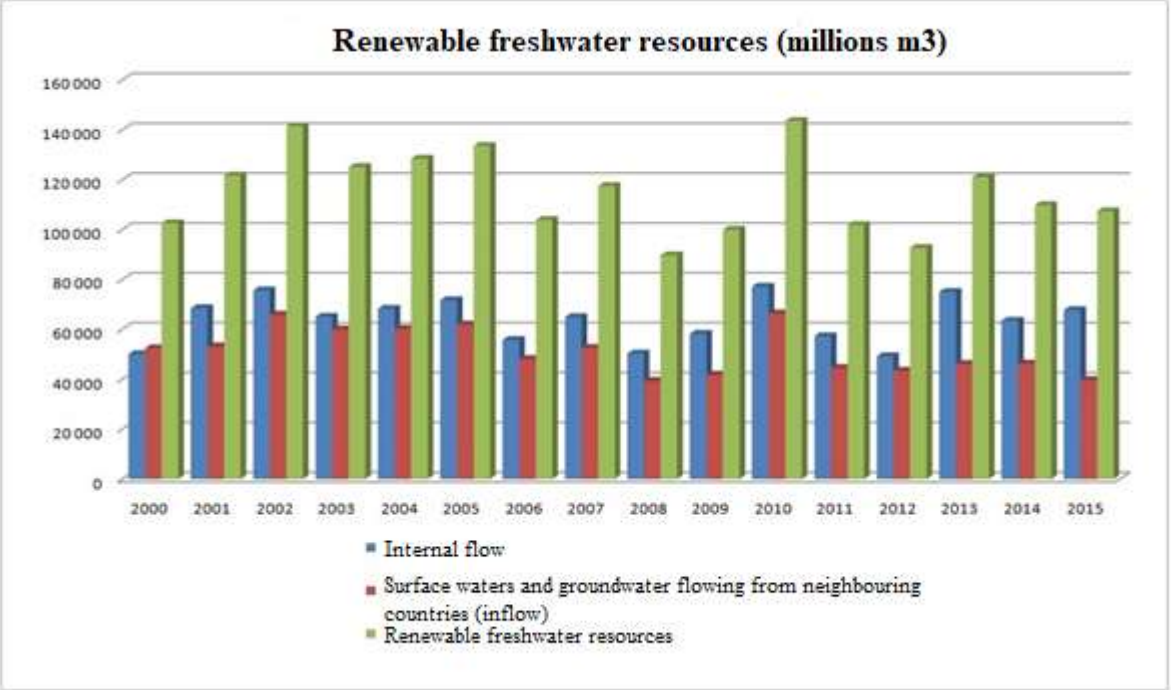

Fig.2.14.1. Dynamics of renewable freshwater resources.
Source: http://stat.gov.kz

Additional freshwater sources are groundwater, approved reserves of which are 15.4 km3 (of which 1.2 km3 are currently extracted), desalinated sea waters and other sources.

According to the Committee on Water Resources of the Ministry of Agriculture of the Republic of Kazakhstan, the total amount of water resources guaranteed for use is 23.2 km3 per year, without taking into account the water required for environmental use and ensuring mandatory water flow to neighboring states.

The lack of water resources, with an average dryness, reaches 6.6 km3 and is observed in all basins. In dry years, the level of water supply is 60%, and in some regions (Central Kazakhstan) – only 5-10%, while the lack is mainly observed in irrigated agriculture. Especially critical is the situation in the basins of the transboundary Syrdarya River (1.2-3.5 km3 of deficit), Ural River (up to 1.7 km3), Ili River, Shu River and Talas River. With adverse climatic and transboundary hydrological conditions, by 2040, surface runoff in Kazakhstan is predicted to decrease by 11.4 km3 per year.

According to the Concept, among the main problems of sustainable use of water resources are high levels of evaporation from surface water bodies, high dependence on transboundary flow and high exposure to the risk of climate change. Among the socio-economic reasons for water shortages, the Concept identifies low water prices, high subsidies, insufficient water intake control and poor infrastructure, which reduces the efficiency and cost recovery of the initiatives being implemented.

According to statistical data, in 2012 the total water intake for municipal, industrial and agricultural needs amounted to 21,389 million m3, and in 2015 it accounted for 21,661 million m3, which is about 20% of all water resources.

Losses during transportation on average make up about 60% of the volume of water consumption for agricultural consumers; about 40% – for industrial consumers and 50% - for municipal services. The main part of water intake goes to the needs of agriculture and amounts to 13.4 km3 per year, of which 3.8 km3 per year is used for the needs of regular irrigation, 0.8 km3 is distributed between flood irrigation, hayfield flooding and pastures water supply, and 8.8 km3 – is made up by loss during transportation.

Water saving in municipal and industrial sectors is provided by the tariff policy. In

accordance with the Law of the Republic of Kazakhstan of July 9, 1998 “On Natural Monopolies and Regulated Markets”, water supply and / or sanitation services are related to natural monopolies.

Over the period from 2013 to 2016, the following documents on tariff policy regulation were issued:

- Program for the Tariff Policy for Natural Monopolies in the Republic of Kazakhstan until 2020. Executive Order of the Republic of Kazakhstan No. 1360 of December 19, 2014;

- Comprehensive Plan to Implement New Mechanisms of Water Tariffs in the Republic of Kazakhstan for 2013-2015. Executive Order of the Republic of Kazakhstan No. 1779 of December 29, 2012;

- Special Procedure for Costing Applied at Approval of Tariff Rates (prices, fee rates) for Regulated Services (goods, works) of Natural Monopoly Holders. Order of the Acting Minister of National Economy of the Republic of Kazakhstan No. 566 of July 24, 2015;

- Regulations to Approve the Maximum Level of Tariff Rates (prices, rates, charges) and Tariff Estimates for Regulated Services (goods, works) of Natural Monopoly Holders. Order of the Acting Minister of National Economy of the Republic of Kazakhstan No. 274 of March 27, 2015;

- Instructions to Calculate Profit Rate (net income) on Regulated Base of Operating Assets for the Natural Monopoly Holders Providing Water Supply and / or Water Sanitation Services and the Natural Monopoly Holders of the Energy Sector. Order of the Chairman of the Republic of Kazakhstan Agency for Regulation of Natural Monopolies No. 69-OD of February 27, 2013;

-Regulations to Approve Temporary Reduction Factors to Tariffs (prices, fee rates) for Regulated Services in Water Supply and/or Water Sanitation. Order of the Chairman of the Republic of Kazakhstan Agency for Regulation of Natural Monopolies No. 115-OD of April 16, 2013.

According to many experts, introduction of differentiated tariffs in urban water supply and water sanitation systems played the most significant role in increasing the efficiency of water use by state-owned and commercial enterprises, for which the tariff is several times higher than the tariff for population.

Water saving measures in agriculture are presented in Section 2.7 of this report.

Guaranteed water supply of population is one of the most important goals of sustainable development not only in Kazakhstan, but throughout the world.

In Kazakhstan, by 2020 it is planned to provide the population with access to centralized water supply in cities – 100%, in rural areas – 80%, and by 2030 – 100%, and give priority to sustainable water supply of municipal services.

Achievement of these goals is presented in Table 2.14.2.

Table 2.14.2. Achievement of targets for water supply and sanitation

Target indicator	**2013**	**2014**	**2015**	**2016**	**2020 (target)**
Percentage of water users with a constant access to centralized drinking water supply system in cities:	55	86	87	88	100
in rural areas	11	50.3	51.5	52.3	80
Percentage of water users with access to sanitation systems	Less than 50	81	90.8		100
in rural areas		11			20

Source: MID RK

To ensure water quality in the course of state control and supervision, the sanitary service carries out sanitary-chemical, microbiological, virological, parasitological and radiological

studies in cities with a population of more than 100 thousand people. The percentage of samples that do not meet the established standards does not exceed 1-2%.

In order to stimulate agricultural producers to introduce water-saving technologies, state provides investment subsidies. Order of the Minister of Agriculture of the Republic of Kazakhstan No. 48 of February 1, 2017 approved "Rules of Subsidy to Reimburse Part of the Costs Incurred by the Subject of the Agro-industrial Complex with Investments".

To ensure stable operation of state-owned hydraulic structures, 178 domestic and 11 cross-border facilities annually carry out operational activities, maintenance, flood control and water protection measures. In particular, in 2016, reconstruction of 15 hydraulic structures and 8 group water pipelines was carried out. At the same time, the area of irrigated land with improved water supply increased by 64.9 thousand hectares, 256.7 km of water pipeline was constructed and reconstructed, and the water supply was improved in 6 rural areas with a population of more than 11 thousand people.

At the same time, water resources and water facilities systems with pre-project and project documentation are being automated. The purpose of these projects is to create an automated complex of technical means for operational control and management of the process of water distribution and water accounting.

In order to prevent seasonal shortages of water resources, over the period from 2013 to 2016, 22 new reservoirs were constructed to accumulate melt and flood waters with the volume amounting to 1.9 billion m3:

- Almaty oblast– 4;
- East Kazakhstan oblast– 6;
- Zhambyl oblast– 4;
- West Kazakhstan oblast–2;
- Kyzylorda oblast– 3;
- Aktobe oblast– 1;
- South Kazakhstan oblast– 2.

To solve the problem of the building up of water protection zones and lines and the corresponding pollution of water bodies, the Land Code introduced the provision that the allocation of land plots located within five hundred meters from the shoreline of a water body is carried out after determining the boundaries of water protection zones and lines, and establishing the mode of their economic use, with the exception of protected areas and the state forestry estate. The procedure for determining coastline is determined by the rules for establishing water protection zones and lines approved by the authorized body in the field of use and protection of water resources, water supply, and sanitation.

Also, the Water Code stipulates that the authorized body in the field of protection and use of water resources, in coordination with the authorized bodies in the field of environmental protection, shall set water quality standards and at least once every five years the aggregate water consumption and sanitation norms for certain economic sectors. Against these standards, users of natural resources will justify specific norms of water consumption or discharge per unit of production (for a certain amount of work done) when using water for individuals and legal entities.

In accordance with new legislation:

- work is being carried out to develop numerical values of the standards for maximum permissible harmful impacts (MPHI) for the Yertis, Tobol, Ili, Yesil and Zhaiyk Rivers;

- Order of the Minister of Agriculture of the Republic of Kazakhstan No. 151 of November 9, 2016 approved the Unified System for Water Quality Classification in Water Bodies;

- Joint Order of the Minister of Agriculture of the Republic of Kazakhstan and the Minister of Energy of the Republic of Kazakhstan No. 422 of October 6, 2016 approved the Methodology for the development of target indicators of water quality in surface water bodies and measures to achieve them;

- Order of the Minister of Agriculture of the Republic of Kazakhstan No. 431 of October

11, 2016 approved aggregate water consumption and sanitation norms for certain economic sectors.

Obstacles and needs.

One of the important problems for Kazakhstan is an increase in water intake by neighboring states, which creates crisis situations in transboundary rivers basins. Particularly difficult relations in terms of water use of the transboundary Ili and Irtysh Rivers have been developed with the PRC. Lakes Balkhash and Zaisan are being under threat.

Currently, in China projects on the transfer of the Ili and Irtysh Rivers for agricultural needs of Western China are being implemented.

The estimated water intake from the Black Irtysh River by the Republic of China amounts to about 2 km3, which is 20% of the average annual river runoff; it can have an extremely negative effect on environmental conditions in the Irtysh basin, which is already now assessed as very unfavorable.

To solve transboundary problems, Kazakhstan needs to conclude agreements on the joint use of transboundary water bodies with neighboring states.

Also, insufficient work is being done on water supply to distant pastures.

It is necessary to fully restore pasture ecosystems by ensuring water supply, restoring existing wells, operating them with the use of solar and wind energy to supply electricity and water to distant pastures and shepherds' families.

Noting the adoption of the most important documents on socio-economic development in Kazakhstan, it is necessary to state that their text is gender-neutral. The documents provide for actions aimed at improving lives of general population, while the implementation of Aichi Target 14 provides for taking into account the needs of women, indigenous and local communities, as well as poor and vulnerable groups of population. Therefore, there is the need for programs and data on their implementation, disaggregated by sex.

2.15. Measures taken for meeting the national target of preventing and restoring degraded ecosystems, adapting to climate change and combating desertification, assessment of their effectiveness, obstacles arising, as well as scientific and technical needs to be met

In addition to reducing pollution in order to preserve **biodiversity of aquatic and riparian ecosystems**, it is highly important to supply the sufficient amount of water to natural water bodies. To solve the tasks of **providing natural water bodies with water** set by the Strategy Kazakhstan-2050, water drawdowns, shore protection and dredging works are carried out annually.

The provision of natural water bodies with water accounted for: in 2013 – no data; in 2014 – 42 km3; in 2015 – 32.84 km3; in 2016 – 37.88 km3; in 2017 – no data.

Lake Balkhash is currently considered to be one of the most problematic water bodies. The water level in the lake is directly dependent on the annual water content. As of January 1, 2017, the water level in Lake Balkash was 342.30 m (Baltic System). The minimum allowable level of Lake Balkhash is 341 m BS, so at present the level of the lake does not cause any particular concerns.

With the support of the World Bank, the Third Aral Sea Basin Program (ASBP-3) was implemented **on the issue of Aral Sea**, environmental and sanitary water drawdowns in the Aral-Syrdarya basin were normalized, the Lesser Aral dam was increased to bring its absolute level to 48 m; management of irrigated ecosystems, phytomelioration works were carried out to prevent degradation and ensure restoration of land in the Aral Sea Basin; an information system on the Aral Sea was created. At the same time, the mirror area of the Lesser Aral was expanded almost to the city of Aralsk, ecosystems of the Syrdarya River delta were restored, salt and dust transfer

from the Kazakhstani part of the Greater Aral was reduced.

Regarding the issue of the **Caspian Sea,** currently four international protocols to the Framework Convention for the Protection of the Marine Environment of the Caspian Sea (Tehran Convention) are signed:

- Protocol on Regional Readiness, Response and Cooperation in Combating Oil Pollution Incidents (Aktau Protocol);
- Protocol for the Protection of the Caspian Sea against Pollution from Land-Based Sources (Moscow Protocol);
- Protocol on Conservation of Biological Diversity of the Caspian Sea (Ashgabat Protocol);
- Protocol on Environmental Impact Assessment (Moscow Protocol).

However, the Law of the Republic of Kazakhstan No. 474-V of March 18, 2016 only ratified the Protocol on Regional Readiness, Response and Cooperation in Combating Oil Pollution Incidents. Ratification of the remaining protocols is required.

One of the important problems for Kazakhstan is an **increase in water intake by neighboring states**, which creates crisis situations in transboundary rivers basins. Particularly difficult relations in terms of water use of the transboundary Ili and Irtysh Rivers have been developed with the PRC. Lakes Balkhash and Zaisan are being under threat.

Currently, in China projects on the transfer of the Ili and Irtysh Rivers for agricultural needs of Western China are being implemented.

The estimated water intake from the Black Irtysh River by the Republic of China amounts to about 2 km3, which is 20% of the average annual river runoff; it can have an extremely negative effect on environmental conditions in the Irtysh basin, which is already now assessed as very unfavorable.

Review of data on the quality and quantity of water resources shows that despite the fact that the Republic of Kazakhstan has sufficient water resources, at present, their quality does not allow for sustainable water use and water consumption by the population and does not always meet the requirements of biodiversity conservation in Kazakhstan's ecosystems. The reason is a high degree of depreciation or lack of water supply and sewage systems in human settlements, irrational water use and poor-quality treatment at sewage treatment plants of industrial enterprises, low level of operation and ineffective management of water management organizations.

Effective water management is the main condition for ensuring water security in conditions of limited and vulnerable water resources, and, therefore, one of the main components of national security.

Modeling has shown that the most cost-effective adaptation measures for Central Asia are improving agricultural practices, using deficit irrigation, increasing water reuse in agriculture, and reducing irrigation areas. In general, measures applied to agriculture are much more effective than those related to domestic water use.

As part of the implementation of international projects, the UN Development Program will carry out pilot activities to create ponds of melt and flood waters to ensure irrigation and develop mechanisms for economic incentives for the use of water-saving technologies in the southern regions of Kazakhstan.

Sewage treatment in Kazakhstan can also not only significantly improve the condition of water bodies in all regions of the country, but also become a source of energy and other resources. A good example is the construction of new sewage treatment plants in Astana, where water is purified to a standard quality and may no longer be dumped into Taldykol reservoir, but into the Esil River.

Land degradation.

According to the land balance data, as of November 1, 2012, there were 245.6 thousand hectares of disturbed land in the country, which housed overburden and rocks, tailings, ash dumps, mining quarries, oil fields and barns. Of these, only 53.2 thousand hectares are exhausted and are subject to rehabilitation.

At the end of 2017, there were 248.3 thousand hectares of land disturbed during the construction of industrial facilities, linear structures and other enterprises, the development of mineral deposits, their processing and geological exploration, of which 51 thousand hectares were exhausted and are subject to rehabilitation.

That is, from 2013 to 2017 the situation practically did not change in terms of disturbed lands, but the number of rehabilitated lands decreased significantly (Table 2.15.1).

Table 2.15.1. Dynamics of land disturbance and rehabilitation

	2013	**2014**	**2015**	**2016**	**2017**
Lands disturbed	247,136.0	247,136.0	250,199.0	247,834	248,297
Disturbed lands exhausted	52,989.0	52,989.0	53,427.0	53,702	51,988
Rehabilitated	2,147.0	870.0	338.0	3,673	1,152.8

Most of disturbed lands belong to the category of land of industry, transport, communication, the needs of space activities, defense, national security and other non-agricultural purposes (Annex 16). In regional terms, the largest amount of disturbed land is located in three regions: in Mangystau oblast — 78.6 thousand hectares and exhausted in 3.6 thousand hectares; in Karaganda oblast— 45.3 thousand hectares and 10.6 thousand hectares, respectively, and in Kostanay oblast — 37.8 thousand hectares and 13.7 thousand hectares, respectively. In total, in the country there are 3,346 enterprises and organizations having disturbed lands. In 2017, 1.8 thousand hectares were disturbed in the country, 0.6 thousand hectares of disturbed land were exhausted and 1.2 thousand hectares of disturbed lands were rehabilitated. The largest area of disturbed land was rehabilitated in Aktobe oblast with 1.0 thousand hectares.

Pollution of natural environment with oil and oil products is still a relevant environmental issue in the country. Soil contamination with oil and oil products causes almost complete depression of the functional activity of the soil microflora. Physical and chemical properties of soil change, water-air regime deteriorates, and structure of biocenosis changes. All of this generally leads to an imbalance in ecosystems and negatively affects all links of the ecological chain: soil layer, surface and groundwater, and geological environment. According to the Ministry of Energy of the Republic of Kazakhstan, there is pollution by oil and oil products of an area of more than 1.5 million hectares. A large percentage of soil and environment pollution belongs to Atyrau oblast with 59%, Aktobe oblast with 19%, West Kazakhstan oblast with 13% and Mangystau oblast with 9%. For example, the total area of oil polluted soils in Western Kazakhstan is 194 thousand hectares, and the amount of spilled oil is more than 5 million tons.

At present, problems associated with water and wind soil erosion and degradation of pastures are still urgent problems in the field of land resource use **in agriculture;** these problems cause deterioration of population's living conditions, changes in the soil ecological state, reduced quality of agricultural products. [70] In total, in 2017, the country had 180,440.4 thousand hectares of pastures. About 125 million hectares of pastures were not provided with water and not used. According to statistics, as of the end of 2012, there were 27.1 million hectares of pastures, degraded to the middle and high degree. In 2017, the total area of pastures degraded to the middle and high degree in the country made up 27.1 million hectares. The largest areas of degraded pastures are in Atyrau oblast (4.1 million hectares), Aktobe oblast (3.9 million hectares), Almaty oblast (3.0 million hectares), West Kazakhstan oblast (2.5 million hectares), Kyzylorda oblast (2.0 million hectares), Akmola oblast (1.9 million hectares). Degradation is characterized by the loss of valuable forage species of plants from the grass stand and their

[70] General scheme of the organization of the territory of the Republic of Kazakhstan, approved by Order of the Minister of Regional Development of the Republic of Kazakhstan No. 403 / OD of December 31, 2013

replacement by weedy, non-edible annuals.

In terms of zones, degradation of pasture ecosystems is mostly seen in lowlands, where more than 95% of all degraded pastures are found, including in desert and semi-desert zones - 16.1 million hectares, or 60% of their area. Degradation is the main result of changing environmental conditions and unsustainable human activities. It is manifested in the loss of valuable forage plant species from the grass stand and their replacement by weedy, non-edible annuals. The replacement of perennial plant species with annuals not only leads to a decrease in the average yield of pastures, but also to a marked seasonality of their use. Modified plant communities are unstable, they undergo a process of species substitution, and yield is highly dependent on meteorological conditions and varies over years and seasons within wider limits.

The main causes of agricultural land degradation are soil erosion and deflation. Erosion arises from improper land use, excessive grazing of livestock, improper agricultural practices, destruction of grass and forest vegetation.

There are 24.2 million hectares, or 11.3% of agricultural land exposed to wind erosion (deflated) in the country. The percentage of lands exposed to water erosion accounts for 4.9 million hectares, or 2.3% of agricultural land of the total area. (Table 2.15.2).

Table 2.15.2. Dynamics of eroded lands

	2010	2015	2017
Area of land exposed to water erosion (thousands, ha)	4,988.9	4,950.0	4,900
Proportion of soils exposed to water erosion to total area of agricultural lands	2.2	2.2	2.3
Area of land exposed to wind erosion (thousands, ha)	25,493.1	24,168.1	24,200
Proportion of soils exposed to wind erosion to total area of agricultural lands	11.5	10.9	11.3

The processes of **desertification** and degradation affect in varying degrees the land of 70% of the country's area (Annex 17), which is largely due to the country's landscape features. Causes of desertification in Kazakhstan are both natural and anthropogenic. The main natural factor contributing to the development of desertification in Kazakhstan is the inland situation of the country, which determines climate's continentality and aridity, scarcity and uneven distribution of water resources causing widespread sand (up to 30 million hectares) and saline lands (35.3 million hectares). Conditions for the development of land degradation are also created by disruption of seasonal features of soil formation under the influence of droughts. Poor land cover and its dynamism are also the preconditions for desertification. The long-term dynamics of climatic conditions and its influence on fauna showed that in the south of Kazakhstan over the past 44 years, meteorological conditions during winter grazing have softened, and there has been a shift in the timing of sheep shearing in spring to earlier periods and the conditions of summer grazing of sheep have toughened due to rising temperatures and lower precipitation. 71.

These features cause a weak resistance of the natural environment to anthropogenic impacts (according to available estimates, about 75% of the country's territory is under an increased risk of environmental destabilization). Anthropogenic factors leading to the emergence and development of desertification in Kazakhstan are mainly associated with such types of economic activities as livestock grazing, agriculture, mining, construction and operation of industrial, military and civil facilities, irrigation and linear structures. Desertification is also the result of illegal logging, uprooting of shrubs and subshrubs for cattle feeding and fuel, forest and steppe fires, unsystematic recreational activities, landfills around human settlements, pollution of

71 Seventh National Communication and the Third Biennial Report of the Republic of Kazakhstan to the UN Framework Convention on Climate Change. 2017

soil and groundwater with toxic substances, transport effects.

When the climate warms, the most dangerous consequences are floods and freshets. To drastically improve the fight against catastrophic floods, it is necessary to move from the current strategy for dealing with consequences, as an unpredictable and uncontrollable natural phenomenon, to a strategy for preventing floods and managing their risk.

The pilot study conducted in the framework of the joint UNDP/EU/UNECE project entitled "Supporting Kazakhstan's transition to a Green Economy model" in accordance with international experience recommended the following economic instruments for implementation:[72]

- differentiated tariffs should be introduced only for water volumes within norms and excess water volumes, regardless of the consumer;
- industrial water users must pay for the volume and quality of wastewater;
- among small groups of water users it is possible to use wholesale water trading;
- current policy of providing free irrigation water encourages farmers to use too much water, which leads to the depletion of water resources and the salinization of soil or waterlogging. Such results can be avoided with the help of basic methods of accounting and charging for the use of surface or groundwater;
- most obvious way to use subsidies is to restore and expand infrastructure, which has been damaged for decades. Such subsidies should depend on the population at risk and production factors. Subsidies can also be provided through a "revolving fund" mechanism;
- accounting using the system of proportional value of assets stimulates the swelling of assets. These systems should be compared with the full cost model, which does not lead to asset swelling and, possibly, a system for evaluating managers' performance based on the achieved result.

These recommendations can be used to further improve legislation of the Republic of Kazakhstan.

In 2018, the UNDP / GEF / Government RK project entitled "Improving Sustainability of the Protected Areas System in Desert Ecosystems through Promotion of Biodiversity-Compatible Livelihoods in and around PAs" was completed. As part of this project to **ensure the resistance of desert ecosystems to anthropogenic influences, climate change and environmental risks**:

- area of Altyn-Emel national natural park increased to 146,500 hectares (Resolution of the Government of the Republic of Kazakhstan No. 1047 of December 24, 2015);
- Ili-Balkhash state natural reservat was created in Almaty oblast within the area of 415,164 hectares (Resolution of the Government of the Republic of Kazakhstan No. 381 of June 27, 2018);
- Arganat complex natural zakaznik of local significance was created within the area of 186,960 hectares (Resolution of the Akimat of Almaty oblast No. 188 of April 24, 2018);
-technical documents (ENO and feasibility study) to expand the area of Ustyurt reserve by 78,000 hectares were prepared;
- Zhabaushkan local zakaznik was created within the area of 316,141 hectares (Resolution of the Akimat of Mangystau oblast No. 53 of February 27, 2015);
- area of 2,300 hectares was reserved by the Akimat of Kyzylorda oblast to expand Barsakelmes reserve (Resolution of the Akimat of Kyzylorda oblast No. 897 of October 10, 2017);
- Kapchagay-Balkash wildlife corridor was created within the area of 973,765 hectares (Resolution of the Akimat of Almaty oblast No. 51 of February 21, 2018).

Total area for the expansion of protected areas network in desert zones amounted to 2,388,000 hectares.

To ensure sustainable development of areas:

[72]Analysis of economic instruments of water supply and sanitation in the Republic of Kazakhstan / Ed. B.K Yessekina, Doctor of economics., prof.. - Astana, 2016. – 88 p.

- in accordance with Article 8 of the Land Code of the Republic of Kazakhstan functional zoning schemes for Aral-Syrdarya and Ili-Balkhash project areas were developed and approved. As a result, more than 13.0 million hectares of land was covered by territorial planning. Functional zoning maps are published on the geoportals of Almaty and Kyzylorda oblasts http://geoportal.kz/7sumap/login and http://map.geoportal.kz/map/ru;

- strategies and action plans for sustainable land use for Ili-Balkhash and Aral-Syrdarya project areas were developed and approved;

- functional zoning atlas of Aral, Kazalinsk districts of Kyzylorda oblast and Balkhash district of Almaty oblast were issued in Russian and Kazakh languages (1,500 copies); they contain complete cartographic information on the state of ecosystems, land resources and the socio-economic potential of the districts. Atlases are sent out to target partners and are used for business planning;

- three coordination councils were established at Barsakelmes, Ustyurt reserves and Altyn-Emel national park, allowing local people, local authorities, NGOs, private sector to participate in PA management processes;

- mechanisms for implementing the objectives of landscape planning through the creation of new partnerships between various stakeholders were demonstrated. As a result, Eco-Damu microcredit program with the lowest rate in the country (4%) was introduced. A total of 83 business projects were financed with a total of 275.3 million KZT. Also, in the framework of new partnerships, 3 pilot PES schemes (payments for ecosystem services) were implemented.

To implement sustainable agricultural practices in arid areas, 40 pilot projects in three project areas demonstrating improved agricultural practices and alternative activities in rural areas were implemented with the following results:

- 180 hectares of highly productive forage lands were created in pilot plots in 3 desert regions of the country; they demonstrate methods that allow to increase forage productivity by 2 times while reducing water consumption by 60%;

-seasonal pasture rotation practice was introduced within the area of over 40.0 thousand hectares; 6 pasture management councils were created, 8 watering places were restored at 6 distant pastures to provide more than 3,000 cattle with water, alternative energy sources were implemented (solar panels and wind turbines), living conditions of 60 farmers and their families in distant pastures were improved. 250 farmers improved knowledge on sustainable pasture management;

- together with the Akimat of Mangystau oblast in Ustyurt region, water was supplied to 8 pasture plots within the area of 10,000 hectares and 2,000 heads of livestock;

-in Kyzylorda oblast, drip irrigation practices for irrigation of rice, as well as vegetables, melons and gourds was used within the area of 2 hectares. 23,000 m3 / ha of water was saved during the irrigation of rice while during the irrigation of vegetables, melons and gourds 2,500 m3 / ha of water was saved;

- information on the implemented pilot projects was systematized and published on the open information resource http://pilots.biodiversity.kz/

Obstacles and needs

Despite the measures taken in Kazakhstan, the area of degraded pastures is growing. Also, the traditional farming system, based on multiple mechanical treatments of soil and the use of crop rotations with leas, leads to degradation and depletion of soil fertility.

Along with the restoration of transhumance in Kazakhstan, it is necessary to regulate the use of pastures, rehabilitate degraded pasture land into highly productive cultivated pastures and develop seed farming of pasture crops.

It is also necessary to introduce more efficient farming methods that minimize tillage, preserve organic matter and moisture in the soil, prevent soil erosion by wind and water, for example, by using equipment that provides zero tillage, and alternating crops. The elimination of leas and the use of crop diversification will increase the effectiveness of conservation agriculture. A variety of crops and root systems, flora and fauna control soil erosion, increase

biological activity and sequestration of soil carbon.

2.16. Measures taken for meeting the national target of creating and operating a national clearing-house mechanism under the Nagoya Protocol, assessment of their efficiency, challenges, scientific and technical needs.

In order to ensure **implementation of the Nagoya Protocol**, Kazakhstan became a member of the UNDP-GEF Global Project entitled "Strengthening Human Resources, Legal Frameworks and Institutional Capacities to Implement the Nagoya Protocol" (2017–2019). The project in Kazakhstan is implemented by the UNDP Country Office, as well as the Institute of Ecology and Sustainable Development (Almaty), which became the winner of the competition held by UNDP.

Copyright in the Republic of Kazakhstan is regulated by the Constitution of the Republic of Kazakhstan, the Civil Code of the Republic of Kazakhstan (Articles 971 - 984), the Law of the Republic of Kazakhstan No. 6-1 "On Copyright and Related Rights" of June 10, 1996, provisions of the Geneva Agreements of the World Intellectual Property Organization, the Agreement on Copyright and the Performances and Phonograms Treaty of December 20, 1996, to which Kazakhstan is a party (laws No. 545 and No. 546 of April 16, 2004 on accession to these treaties) and other regulatory and legal acts of the Republic of Kazakhstan.

Breeding achievements are protected by the Law of the Republic of Kazakhstan "On the Protection of Selection Achievements". The right to breeding achievement is protected by the legislation of the Republic of Kazakhstan and is confirmed by a patent. The patent certifies the exclusive right of the patent owner to use the breeding achievement, its priority and authorship of the breeder. Any person who is not a patent owner is entitled to use a breeding achievement only with the permission of the patent owner on the basis of a license agreement. Forest genetic resources can be recognized as breeding achievements if they are registered as a new variety (clone, line, hybrid of the first generation of the population) for which a patent was granted.

The author (patent holder) of a breeding achievement has all rights to it in accordance with the legislation of the Republic of Kazakhstan. The mechanism of distribution of benefits of using forest genetic resources, which were not officially recognized as breeding achievements, has not been developed in the country.

a) natural resources

Access (exchange, purchase and sale) to flora and fauna and their use within the country is carried out on the basis of permits issued by a specialized unit of the authorized body on a reimbursable basis. Income from their use goes to the state budget. At the same time, only a small part of the flora (mainly in the forestry estate) and game animals are under direct control.

Access (exchange, purchase and sale) to rare and endangered species of flora and fauna, their parts and derivatives is carried out on the basis of special decisions of the Government of the Republic of Kazakhstan.

International exchange (purchase and sale) of rare and endangered species of flora and fauna, their parts and derivatives is carried out in accordance with CITES obligations. Permission on their transfer (import-export) and control over it are carried out through the country by the Convention's national administrative and scientific authorities.

International scientific exchange (trade) of flora and fauna species, their parts and derivatives is possible on the basis of international agreements (contracts) to which Kazakhstan is a party.

The main transfer of genetic material of natural flora and fauna species facilitates the exchange between scientific botanical gardens and zoos. In particular, according to available information, within the framework of the International Association of Botanical Gardens,

national botanical gardens exchange planting materials and seeds to replenish collections of 108 botanical gardens from 48 countries.

b) agriculture

Consumer access to seed crops in Kazakhstan is carried out through individuals and legal entities that have the status of original seed producers, elite seed producing farms, seed farms, seed distributors. To support producers of original seeds, elite seed producing farms, seed farms, seed distributors and consumers, budget subsidies can be provided.

It is allowed to import into Kazakhstan and export from Kazakhstan batches of seeds of agricultural crops, varieties of which are included in the state register of breeding achievements recommended for use in the Republic of Kazakhstan.

It is allowed to import into the Republic of Kazakhstan batches of seed varieties that are not included in the state register of breeding achievements recommended for use in the Republic of Kazakhstan, and / or which are intended for scientific research and state tests of patentability and economic feasibility.

The import into the Republic of Kazakhstan of seed varieties obtained from genetically modified materials is allowed in agreement with the competent authority of the country.

Seed batches imported into the Republic of Kazakhstan are subject to control in the field of plant quarantine, phytosanitary examination and seed examination.

Kazakhstan is a party to:

1. Agreement of the CIS countries on Cooperation in the field of Conservation and Use of Plant Genetic Resources (entered into force on October 16, 2000). Along with the issues of mutually beneficial cooperation in this area, the Agreement provides for:

- implementation of mutually beneficial exchange of genetic resources of cultivated plants and their wild relatives;
- mutually beneficial access to samples of the plants gene pool gathered together in the gene pools of the former Soviet republics;
- assistance in the creation of national banks of plant genetic resources based on the exchange of the gene pool, methods and work techniques;
- creation of joint automated databases of the national gene pool for the accelerated use of plant genetic resources in breeding programs;
- support of free and duty-free transfer of gene pool samples across borders, taking into account phytosanitary control requirements.

2. Agreement of the CIS Council of Heads of Government on the legal protection of plant varieties (entered into force on November 29, 2004), for cooperation in order to create the most favorable conditions for the protection, use, transfer and distribution of plant varieties for the mutual benefit of producers and consumers .

Consumer access to livestock breeding material is carried out through animal husbandry units: stud farms, breeding farms, breeding centers, distribution centers, breeding reproducers, national chambers for cattle breeds.

Provision is made to subsidize the activities of livestock enterprises, aimed at:

- preservation and restoration of the gene pool of pedigree animals, including breeds with a limited gene pool;
- ensuring the availability of breeding material for domestic agricultural producers;
- carrying out breeding and finalization by domestic agricultural producers.

Export of livestock products (material) is carried out in the presence of a pedigree and veterinary certificate issued by the authorized body.

Import of livestock products (material) is carried out in the presence of a veterinary certificate and a recognized pedigree certificate or equivalent document issued by the competent authorities of the exporting country.

Import of seeds for further sale is carried out through breeding and distribution centers.

To ensure collection, storage and processing of data on pedigree animals in the livestock breeding units and data on animals involved in breeding process, a breeding database (IAS) has

been created. The main tasks of IAS are:

- monitoring and obtaining information on livestock, areas of productivity, breed, level of productivity and breeding value, data on state breeding;
- automatic creation of reports throughout the country by oblast, district, city, rural district;
- coordination of breeding activities and management of herd reproduction;
- centralized storage of data on productivity of pedigree and commercial livestock for subsequent research purposes.

IAS is kept electronically under conditions ensuring the prevention of unauthorized access to the database. Information on the number of livestock and user's personal data is entered into IAS by the user after registration and access to the database through the IAS operator.

c) microorganisms

Study of genomes of animals, plants and microorganisms is important for solving fundamental and applied problems of biology and medicine, as well as practical problems in public health, agriculture, environment and biological industry.

Kazakhstan acceded to the Budapest Treaty on the International Recognition of the Deposit of Microorganisms for the Purposes of Patent Procedure. It was signed in Budapest on April 28, 1977 (Law of the Republic of Kazakhstan No. 259 of November 16, 2001).

Challenges and needs.

The use of genetic resources in the country is fragmented and uncoordinated. The issues of conservation, research and development in the field of genetic resources are under the auspices of two ministries: in the field of conservation and sustainable use of natural (including genetic) resources and in the field of agriculture - the Ministry of Agriculture (KazAgroInnovation JSC); in the field of research and conservation of collections (gene banks) of native species of flora and fauna, development of biotechnologies – the Ministry of Education and Science (Science Committee).

Due to the lack of uniform standards for the storage of collections of genetic resources, more than 70% of available samples are stored in conditions of unregulated temperatures and humidity. In the collections there is an incomplete representation of taxa, an incomplete geographical coverage. Some known local, old, traditional varieties are missing (lost).

Managing flora and fauna conservation does not guarantee the conservation of their genetic resources. They are not protected from their unauthorized transfer from the country, which contributes to an uncontrolled use of these resources and loss of the country's sovereign rights to the results of such use

Accession the Nagoya Protocol and its subsequent implementation envisages the creation of special structures:

- National Focal Point on Access and Benefit Sharing (the task is to provide information to applicants);
- Competent national authorities (their task is to provide direct access to genetic resources and consultations).

To ensure implementation of the protocol, the following will be required:

- decision on the appointment of an authorized body of the Government of the Republic of Kazakhstan in the field of conservation and use of genetic resources;
- appropriate legislative, administrative or policy measures governing access to genetic resources, traditional knowledge and benefit-sharing;
- appropriate measures to organize control and increase transparency of genetic resources use (creation of control points, clerical work);
- measures aimed at raising awareness of the importance of genetic resources and traditional knowledge associated with genetic resources, as well as access and benefit-sharing issues.

It is necessary to provide funding for the following activities:

- creation (construction and equipment) and maintenance of modern gene banks for genetic material conservation, continuation of work on creating a network of national genetic centers;

- conducting a large-scale inventory of natural biological (genetic) resources and collecting genetic material for long-term storage (*in situ*, *ex situ*) and scientific research;

- inventory and accounting of biological (genetic) collections in the country, formation of methods for their storage and monitoring;

- development of biotechnologies, including innovative, based on national genetic collections;

- development and implementation of educational programs, training of specialists in the field of genetic resources.

Strategic Goal E. Enhance implementation through participatory planning, knowledge management and capacity building

2.17. Measures taken for meeting the national target of adopting the National Strategy and the Action Plan on biodiversity conservation in Kazakhstan, assessment of their efficiency, challenges, scientific and technical needs.

Kazakhstan signed the Convention on Biological Diversity in 1992 and ratified it in 1994. In accordance with this, in 1999, the Ministry of Natural Resources and Environmental Protection of the Republic of Kazakhstan developed and approved the National Strategy and the Action Plan for the Conservation and Sustainable Use of Biodiversity in Kazakhstan (NSAPBD). This NSAPBD contained a number of measures aimed at increasing efficiency of the state's activities in identifying ways to preserve and manage biodiversity of flora and fauna, implementation of which would significantly improve the situation. Unfortunately, the Strategy was not approved by the Government of the Republic of Kazakhstan as a strategic document, supported by government funding and binding.

As part of the fifth objective of the fifth replenishment of the Global Environment Facility (GEF), CBD Parties were provided with support for updating and revising NSAPBD in accordance with the Strategic Plan for Biodiversity 2011-2020. Thus, in 2014, the GEF-UNDP-Ministry of Environment and Water Resources of the Republic of Kazakhstan project entitled "National Biodiversity Planning to Support the implementation of the CBD 2011-2020 Strategic Plan in Republic of Kazakhstan" was launched in Kazakhstan. The project prepared an updated version of the NSAPBD, referred to as the Concept for Conservation and Sustainable Use of the Biological Diversity of the Republic of Kazakhstan until 2030 (the Concept on Biodiversity). In accordance with the recommendations of the "Guidance for National Biodiversity Indicator Development and Use" developed by UNEP-WCMC in 2014, the Concept on Biodiversity has been finalized and includes 20 Aichi Targets. The draft Concept was approved by the Ministry of Environment and Water Resources of the Republic of Kazakhstan and was evaluated by 6 international experts on the www.nbsapforum.net platform. The Concept is the only document providing for an integrated sectoral approach to biodiversity planning, while complying with international global commitments. The Concept defines 10 key goals and 32 tasks within two priority areas: (1) biodiversity conservation; (2) sustainable use of forest resources, wildlife and fish resources, pastures and development of organic farming. This document is a good guideline for professional developers of other national plans and programs, and government bodies. UNDP biodiversity project experts are constantly updating the goals and objectives of the Concept on Biodiversity and the actions of the Plan to implement the Concept.

CFW MoA RK, with the support of UNDP biodiversity projects, is taking steps to adopt the Concept on Biodiversity at the national level. Over the years, this document was presented at a hearing in the Senate of the Parliament of Kazakhstan on the conservation of biodiversity. The Government of Kazakhstan has been notified of the need to adopt the Concept on Biodiversity.

At present, CFW MoA RK is developing state sectoral programs for the development of forestry and protected areas, wildlife, fisheries. The goals and objectives of the Concept on Biodiversity will be integrated into these sectoral development programs. However, measures to adopt the Concept on Biodiversity as a single long-term strategic document in order to achieve Aichi target 17 will continue to be taken.

2.18. Measures taken for meeting the national target of preserving and reviving intangible cultural heritage, assessment of their efficiency, challenges, scientific and technical needs.

The Constitution of the Republic of Kazakhstan states that the land and underground resources, waters, flora and fauna, other natural resources shall be owned by the state. Plots can also be privately owned on terms, conditions and limits established by the Law. According to Article 23 of the Land Code of the Republic of Kazakhstan, in the private property of citizens of the Republic of Kazakhstan may be land plots for farm or farm, private farming, afforestation, horticulture, individual housing and cottage construction, as well as granted under construction or built-up production and nonproduction, including residential, buildings (structures) and their complexes, including land intended for the maintenance of buildings (structures, installations), in accordance with its intended use. For the purposes listed above, with the exception of commercial agricultural production and afforestation, land can be privately owned by foreign citizens, stateless persons and foreign non-state legal entities.

Of the total area of privately owned land, agricultural land accounts for 50.4%, land for human settlements - 46.5%, industrial, transport, communications and other non-agricultural land - 3.1%.[73]

According to the Committee for Forestry and Wildlife of the Ministry of Agriculture of the Republic of Kazakhstan, private forestry estate is located in two economic entities of Akmola oblast within the area amounting to 695 hectares.

Agricultural land owned by citizens and non-state legal entities accounts for 1,476.7 thousand hectares (in 2015 it was 1,369.9 thousand hectares, in 2016 – 1,479.4 thousand hectares), which is only 1.4% of the land in this category, 101.1 million hectares (97.1%) are in temporary land use by farms and non-state land users, 1.5 million hectares (1.4%) - in permanent land use by state legal entities. The number of women among landowners is constantly increasing.

As of November 1, 2017, the agriculture sector in the country included 222.0 thousand farm enterprises, which had 61.6 million hectares (59.3%) of agricultural land, 1,659 agricultural cooperatives within the area of 2.6 million hectares (2.5%), 7,709 business partnerships of all forms and joint-stock companies within the area of 37.1 million hectares (35.7%). State agricultural enterprises occupy 1.5 million hectares, or 1.4% of agricultural land. The proportion of women heads of farm enterprises is also constantly increasing (Table 2.18.1).

2.18.1. Share of the adult population that owns land (number of owners and land users), people

	2013	2014	2015	2016
Total, people	3,627,950	3,446,072	3,812,716	3,786,672
Including, men	2,633,489	2,333,740	2,678,797	2,748,637
Women	994,661	1,112,332	1,063,053	1,069,288
Proportion of women heads of farm enterprises	18.3	18.7	20.3	20.7

[73] Consolidated analytical report on the state and use of the lands of the Republic of Kazakhstan for 2017. Astana, 2018.

The experience of the development of protected areas in Kazakhstan convincingly shows how the local population is quickly adapting to the requirements of nature protection in the protected areas and the surrounding area. Since the Law of the Republic of Kazakhstan "On Specially Protected Natural Areas" clearly defines requirements for the interaction of PAs with the local population, including in terms of use of bio-resources (allowing haymaking, harvesting forest resources in designated areas, according to special forest land usage permits, etc.) local residents see real support and, over time, become active agents of the state's environmental policy. The effectiveness of the participation of local communities and indigenous peoples in this process is particularly well seen near PAs that have the status of legal entities (reserves, national and regional parks, nature reservats), where protection regime is the most stringent and there is staff specialized in environmental protection and biodiversity conservation constantly engaged in environmental education.

To date, several regulatory legal acts aimed at improving the status of women have been adopted, such as the Law "On State Guarantees of Equal Rights and Equal Opportunities of Men and Women" (2009, with subsequent amendments and additions), the Law "On Prevention of Domestic Violence" (2009, with subsequent amendments and additions). In 2016, the **Concept of Family and Gender Policy in the Republic of Kazakhstan until 2030** was approved.

The Republic of Kazakhstan has acceded to a number of international legal acts on human rights, including on women's rights. According to the commitments made upon the accession to the Convention on the Elimination of All Forms of Discrimination Against Women, Kazakhstan undertakes to pursue a policy to eliminate discrimination against women. The Republic of Kazakhstan has made a lot of efforts to create conditions for the practical realization of women's rights and opportunities, implemented international human rights standards into national legislation, legislation aimed at ensuring gender equality.

Implementation of various projects, including holding numerous seminars, conferences and forums, with the support of international organizations, contributed to the gradual change in the attitudes of men and women and in the system of concepts of the managerial and intellectual elite, legal institutions and the public to the biodiversity-related issues.

At the same time, within the framework of UNDP projects in the field of biodiversity conservation: "Technical Support to Eligible Parties to produce the Sixth National Report to the CBD" (hereinafter - 6ND), "Building Transformative Policy and Financing Frameworks to Increase Investments in Biodiversity Management" (hereinafter - BIOFIN) and "Improving Sustainability of PA System in Desert Ecosystems through Promotion of Biodiversity-compatible Livelihoods in and around PAs" (hereinafter- Desert Project), in 2018 an analytical report "Gender analysis within biodiversity projects and recommendations" was developed. A special role in the system of sustainable management, conservation and sustainable use of biodiversity belongs to environmental non-governmental organizations. In the Republic of Kazakhstan, over 30 non-governmental organizations are actively engaged in the issues of reproduction and biodiversity restoration, environmental education and the development of ecotourism basics. A network of environmental information users through the Internet was created to exchange information on environmental and biodiversity issues.

To develop **transhumance,** one of the traditional types in Kazakhstan, pastures are being supplied with water. During the period from 2012 to 2014, pasture inventory was being conducted. Of the examined 20.3 million hectares of pastures (without areas for radical improvement), 14.2 million hectares, or 70% were supplied. 1.8 million hectares of pastures, or only 12.7% are supplied with water thanks to effective water supply facilities. The remaining areas of pastures - 12.4 million hectares are supplied by water supply facilities that require renovation. Distant pastures will continue to be supplied with water, but this should take into account Kazakh's traditional knowledge on seasonal use of natural pastures and the creation of

infrastructure and basic living conditions for shepherds and their families.

Kazakhstan also needs to revive traditional hunting with golden eagles, greyhounds Tazy, and Tobet dogs, which will contribute to the development of eco-tourism.

Obstacles, scientific and technical needs.

Despite the fact that Kazakhstan has a management system in the field of conservation of natural resources, it does not sufficiently take into account local features of changes in natural processes, cultural traditions of interaction with nature, attitude of men and women to these resources and traditions, their use or preservation.

Current situation is characterized by a large variety of social, religious, national features of different population groups; predominance of exploitative treatment of nature, focus on the use of natural resources, low level of environmental awareness and a lack of understanding of the importance of biodiversity conservation; rapid changes in public opinion in the context of social and economic reforms.

Since biodiversity conservation brings far-reaching consequences to all residents of the Republic of Kazakhstan, it is important to raise public awareness in order to facilitate active voluntary participation of the public in this process. The level of public awareness of biodiversity in Kazakhstan is insufficient, there are still cases of poaching, illegal collection of flora and fauna.

Steps need to be taken to increase the level of involvement of various stakeholders, including local communities, in PAs management process. One of the mechanisms for the development of mutually beneficial cooperation between PAs and the local population is the creation of public councils, which makes it possible to effectively resolve or prevent conflicts arising from the use of nature and at the same time protecting nature in the same area.

The purpose of public councils is to create conditions for population's direct involvement in making important decisions on environmental management and nature conservation. On the one hand, public councils allow local population to fulfill their right to actively participate in solving issues that directly affect their lives; on the other hand, protected areas significantly increase their chances of getting support in PA management and development from residents. Public councils provide substantial assistance in reducing the risk of making mistakes in resolving environmental issues, contribute to the development of local self-government and the formation of an active civil society.

Types of activities that require PA interaction with local residents are the development of sustainable (ecological) tourism; promotion of socio-economic development of the area; social planning, contribution to the creation of democratic foundations of local self-government; preservation of cultural heritage; revival of traditional culture; environmental management and environmental safety of the area.

To fulfill all the above mentioned measures and fully achieve Aichi target 18, there is also a need for adequate funding.

Also under rapidly changing economic and social conditions characteristic of today's Kazakhstan, a number of existing legal regulations currently require clarification, specification or revision, in particular *on gender relations and rational use of natural resources.*

A number of legal norms, including on the issues of private forestry estate and forest certification, protection of genetic resources, issues of private fish farming, etc. do not reflect the ***development and more detailed legal work on the citizens' rights (men and women) on the use of these resources,*** as well as decision-making in the field of long-term planning of biodiversity conservation measures, adaptation of flora and fauna to climate change factors, regulation of access to genetic resources and fair and equitable sharing of benefits arising from their use for men and women.

Analysis of the situation in the field of conservation and rational use of natural resources of Kazakhstan shows poor gender mainstreaming in the activities of state authorities at different levels, on environmental issues, climate change, rational use of natural resources and biodiversity conservation, which impedes timely and full consideration of gender aspects when

making environmentally significant decisions.

There is a lack of interaction between the structures engaged in biodiversity conservation, especially with respect to the issues of accounting, cadastre and monitoring of natural resources, and with the structures and scientific institutions dealing with gender relations issues. There are no special scientific programs *on the introduction of gender approaches in rational use of natural resources.*

Also, a poor interaction has been revealed between government agencies and economic agents, local populations, NGOs, and other organizations that are responsible to a certain extent or are involved in conservation issues.

Gender analysis of the projects showed that despite the inclusion of some gender aspects, the involvement of women as participants in projects during the implementation of projects, gender mainstreaming was not sufficiently ensured. The statements of most reports and publications are gender neutral, which makes it difficult to identify the real impact of project results on women and men, not only on their access to biological resources, but also on the benefit from using them.

In the Republic of Kazakhstan, at the legislative level, equal rights to access biological resources are guaranteed for men and women. At the same time, data on the access of men and women to biological resources confirm the prevalence of men among landowners and land users, among those who head farm enterprises, etc. According to the women of the focus group (September 24, 2018) few women agricultural enterprises, since the existing stereotypes hinder the advancement of women to these positions.

Despite the fact that Kazakhstan has a management system in the field of conservation of natural resources, it does not sufficiently take into account local features of changes in natural processes, cultural traditions of interaction with nature, attitude of men and women to these resources and traditions, their use or preservation.

A number of legislative acts, including on the issues of private forestry estate and forest certification, genetic resources conservation, private fish farming, etc. are **at the development stage and do not reflect more detailed legal provisions on the citizens' rights on the use of these resources, their ecosystem services**, as well as decision-making in the field of long-term planning of activities on economic assessment of biodiversity conservation data, on the regulation of access to genetic resources and fair and equitable sharing of benefits arising from their use for men and women and the local community as a whole.

In order to deal with these issues, it is necessary to improve legislation and impose relevant obligations on state bodies and local self-government bodies, in which responsible persons and departments should be appointed. These issues are relevant and important for Kazakhstan, as activities in the field of human resources development and gender mainstreaming to ensure natural resources conservation can be directed not only to training technical and scientific specialists dealing with environmental protection and environmental management, but also to the formation of an ecological worldview, conscientiousness and ecological culture among men and women

2.19. Measures taken for meeting the national target of carrying out applied scientific research in the field of forestry, wildlife and protected areas using scientific developments, assessment of their efficiency, challenges, scientific and technical needs.

According to the National Report on Science in the Republic of Kazakhstan in 2013, 345 organizations were engaged in scientific research in Kazakhstan, and in 2016 the number

accounted for 383.[74]

Scientific potential of Kazakhstan in the field of biodiversity is represented by both state and non-state sectors. Scientific research is funded by both the state, and by grants, including foreign ones. Applied research is funded in accordance with the Strategic Plan of the Ministry of Agriculture of the Republic of Kazakhstan.

In Kazakhstan, the leading research institute engaged in basic and applied research on forestry and protective afforestation is the Kazakh Research Institute of Forestry and Agroforestry. It was founded in 1957 and has 3 branches to conduct scientific research in various natural zones of Kazakhstan.

The relevance of the research is determined by the low forest cover of the country and, as a result, the need to preserve existing forests and their biological diversity, and the rational use of forest resources, as well as an increase in forest cover.

Major scientific developments are being introduced into forestry production. About 50 acts on the introduction of scientific advances in production were received. The effect of the introduction is not only economic, associated with a reduction in the cost of individual operations, an increase in the survival rate of artificial plantations and accuracy of accounting, but also environmental, aimed at preserving the gene pool and increasing the sustainability of forest ecosystems. In addition, research developments are used in curriculums of forestry universities, project organizations, farm enterprises.

Organizations, or groups of scientists that won a grant under a project, or a target programme, create a team including individual specialists from other organizations. This makes it possible, when working, to use modern approaches, equipment and technology of the participants. Such experience is already available, for example, the project entitled “Genetic diversity and preservation of genetic resources of endemic, rare and industrially important plants in the Republic of Kazakhstan (2015-2017)” carried out by the Institute of Plant Biology and Biotechnology of SC MES RK, in cooperation with Altai Botanical Garden and Terra, the Center for Remote Sensing and GIS.

The staff of Altai Botanical Garden (PA) together with the Institute of Plant Biology and Biotechnology carried out thorough field studies, as they know the territory and local flora well. GPS tagged photographs of species were taken, herbaria plant samples were identified, monitoring sites were described, a list of flora was made, and so on. Natural ecosystems were thoroughly described and mapped, as well as an electronic database was created by Terra LLP, using new technologies, based on satellite images. This made it possible to accurately identify areas of interest and plot them on ecosystem maps for long-term monitoring of biodiversity. Such an integrated approach allowed one to get a comprehensive assessment of biodiversity and ecosystems of a large area, covering a half of East Kazakhstan oblast, in a short time. This work resulted in a joint monograph “Endemic, rare, endangered and economically valuable wild plants of Kazakhstan”, issue 1. East Kazakhstan.

Under this approach, the effectiveness of the implementation of projects by MES RK and the availability of research materials significantly improves. Since there are requirements for the publication of research results (scientific articles, monographs, etc.), reporting materials are stored in the Institutes and the Library of the National Center of Scientific and Technical Information, therefore are available to users. This is important for obtaining reliable data on biodiversity at specific sites, certain areas, etc. In this regard, research data are widely used in the development ENO and feasibility studies for the creation or expansion of protected areas, the Nature Records, monitoring of biodiversity, etc.

Also significant scientific studies were carried out on biodiversity monitoring. They are covered in section 2.11 of this report. It also presents the main difficulties and the needs in the implementation of scientific research in Kazakhstan.

[74] http://sc.edu.gov.kz/ru/page/natsionalnii-doklad-po-nauke/natsionalnii-doklad-2017-godhttp://sc.edu.gov.kz/ru/page/natsionalnii-doklad-po-nauke/natsionalnii-doklad-2017-god

In accordance with the Law of the Republic of Kazakhstan No. 43-IV of June 17, 2008 "On Ratification of **the Cartagena Protocol on Biosafety** to the Convention on Biological Diversity**",** the Republic of Kazakhstan has undertaken to promote the provision of an adequate level of protection in the field of safe transfer, processing and use of living modified organisms (LMOs) resulting from the use of modern biotechnology and possibly having an adverse effect on conservation and sustainable use of biological diversity, taking into account risks to human health and paying special attention to transboundary movements.

In accordance with the request of the Secretariat of the Convention on Biological Diversity, the National Center for Biotechnology (NCB) prepared the 2nd (2011) and 3rd (2015) National Reports of the Republic of Kazakhstan on the implementation of the Cartagena Protocol.

In the framework of the "Industrial Biotechnology" STP (scientific and technical program) for 2014-2016, NCB developed the technology of microclonal propagation of Rhodiola rosea. The technology aims to preserve biodiversity of natural populations of valuable medicinal plants. Experimental plantation of Rhodiola Rosea was established on the basis of Altai Botanical Garden. As part of the grant project entitled "Study of genetic and geographical diversity of natural populations of Rhodiola rosea in Kazakhstan using sequenation of non-coding region of the genome (non-transcribed spacers and introns of genes)" for 2015-2017 in order to identify the links of DNA polymorphism with the polymorphism of isoenzymes and other phenotypic traits, the genetic diversity of the Kazakhstani populations of Rhodiola Rosea was studied. As a result, a DNA collection of geographically distant populations of rhodiola was formed.

In the framework of the project "Molecular genotyping of flora of Bayanaul and Burabay state national natural parks" for 2015-2017, genotyping of endemic, rare, endangered, and economically valuable plant species using universal DNA markers was carried out.

In order to facilitate the exchange of scientific, technical, environmental and legal information and experience regarding living modified organisms and genetically modified organisms, NCB corporate website (www.biocenter.kz) has a page containing the necessary information on the Cartagena Biosafety Protocol to Convention on Biological Diversity: normative documents, strategic plans, guidelines on risk assessment of LMOs, informative brochures, information database on GMOs in the world, as well as national contact points of the CBD.

In 2016, joint order approved the roadmap on the interaction of state bodies (Ministry of Agriculture, Ministry of National Economy, Ministry of Education and Science, Ministry of Investment and Development, Ministry of Energy) on the regulation of GMO circulation, involving the study of international experience in conducting GMO surveillance, carrying out scientifically based assessment, and risk management relevant to Kazakhstan in the field of GMOs.

Challenges and needs.

National legislation and administrative and legal system in the field of biosafety in Kazakhstan are not fully developed, the effectiveness of existing regulatory acts is not high enough, which makes the country vulnerable in terms of control of genetic engineering activities, monitoring of LMOs movement, their use in agriculture and food production. In this regard, there is a need to strengthen the existing capacity for the implementation of the Cartagena Protocol by improving legislative and regulatory acts in the field of genetic engineering regulation and their harmonization in accordance with international obligations of the Republic of Kazakhstan, including risk assessment, ethical and environmental aspects when using GMOs.

Despite the progress achieved in the biological diversity conservation and sustainable use, there is still a negative impact on natural ecological systems, including populations of wild endemic and rare plant species. To improve work on conservation and sustainable use of plant diversity in Kazakhstan, preserve and restore the diversity of flora, it is necessary to develop and implement on an ongoing basis programs to support and develop the collections of state botanical gardens, dendrological parks and implement scientific and technical programs and projects to develop long-term cryopreservation and creating *in vitro* collections of rare and

endangered plant species.

The results of scientific research are poorly used in practice. Therefore, it is necessary to strengthen funding for research on the efficient use of natural resources in agriculture, demonstration and introduction of green technologies, especially in irrigated agriculture.

2.20. Measures taken for meeting the national target of ensuring biodiversity conservation with the help of sufficient funding from all sources, assessment of their efficiency, challenges, scientific and technical needs.

Kazakhstan is among the countries implementing the Global Biodiversity Finance Initiative (BIOFIN), whose goal is to support countries in identifying directions of biodiversity funding and developing financial solutions that can mobilize financial resources for biodiversity conservation. BIOFIN is seen as an important aid to the ambitious CBD Strategic Plan for Biodiversity 2011-2020. It meets directly Aichi Target 20 on resource mobilization, which contributes to other 19 targets, for the NSAPBD implementation.

BIOFIN methodology provides an innovative, phased and adaptable approach that allows countries to conduct a review of political and institutional context for financing biodiversity; assess current biodiversity expenditures; assess future financial needs; identify and mobilize resources and policies needed to successfully implement the most appropriate financial solutions to perform national biodiversity plans and meet biodiversity targets.

With the help of a political and institutional review, the main public and private institutions involved in the coordination, management and financing of biodiversity conservation and sustainable use were identified.

Public and private biodiversity expenditures review showed that the state budget is the only guaranteed source of biodiversity financing. To illustrate, over the period from 200 to 2014 the proportion of biodiversity financing from the state budget made up 86%. However, this is only 0.4-0.8% of the total government expenditure for the period. Of the 14% private sector funding, the proportion of international grants and NGO funding is 7%, own funds of environmental institutions - 5%, and industrial companies - 2%. Over the past seven years, biodiversity expenditures amounted to about 1.2 billion US dollars. Comparing biodiversity financing with the country's macroeconomic indicators for the same period, biodiversity expenditures amount to about 0.1% of Kazakhstan's GDP and tend to decrease. For instance, in 2008 this figure accounted for 0.18%, and by 2014 it had decreased to 0.08% (Fig. 2.20.1).

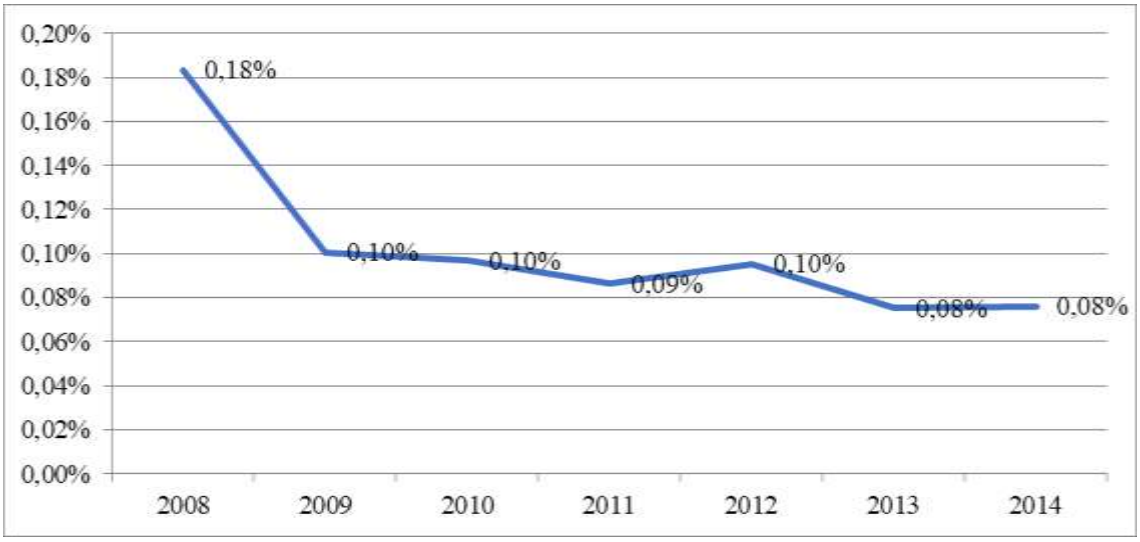

Fig. 2.20.1. Changes in the proportion of biodiversity expenditures (% of GDP)

The review addressed public and private expenditures on biodiversity conservation, which have an indirect and direct impact. Programs and subprograms implemented with the help of national and local budgets were attributed to public expenditure. These budgets financed activities to preserve biodiversity in the following sectors: forestry, PAs, protection and restoration of fauna, conservation and reproduction of fish resources, water and agriculture. Funds of environmental institutions through the provision of paid services, funds allocated by international and other organizations, and the expenses of industrial companies (oil and gas, mining, metallurgy and energy companies) on environmental activities were attributed to private expenditure.

Indirect and direct impacts of biodiversity expenditure were identified for each activity. To determine the percentage spent on biodiversity conservation, experts used three main objectives of CBD: biodiversity conservation, sustainable use of biodiversity, and fair and equitable sharing of benefits associated with the use of genetic resources. Thus, a fundamental factor in the distribution of the percentage of expenditures directly and indirectly affecting biodiversity was compliance and non-compliance with these goals.

As part of private expenditures on biodiversity conservation, the costs of environmental activities carried out by industrial companies in Kazakhstan were also analyzed. The main activities in the oil industry are: landscaping, monitoring and research of fauna and flora, ensuring the operation of devices for fauna protection. Indirect measures include such measures as biological treatment and reuse of wastewater, rehabilitation of disturbed lands (not for economic activity). In mining, metallurgy and energy, the only activity with a direct impact is the landscaping. Most activities have an indirect effect on biodiversity. At the same time, the review identified a few companies that develop strategies for biodiversity conservation in the developed areas, carry out a number of activities to attract public attention to biodiversity issues. Among these companies is North Caspian Operating Company which developed a strategy, and also conducts annual monitoring of the population of birds and seals.

As part of the biodiversity finance review, a study on biodiversity tax collection was also conducted. Tax collection for the use of natural resources is carried out in accordance with the Tax Code of the Republic of Kazakhstan. It should be noted that the collected taxes are basic (non-targeted). The biodiversity budget receives the following types of taxes:

- payment for wildlife use;
- payment for forest use;
- payment for the use of protected area;
- payment for the use of navigable waterways;
- payment for the use of surface water resources;
- payment for environmental pollution.

According to the review of changes in biodiversity tax collection, the largest amount is accounted for by payment for environmental pollution with more than 90% (Fig. 2.20.2).

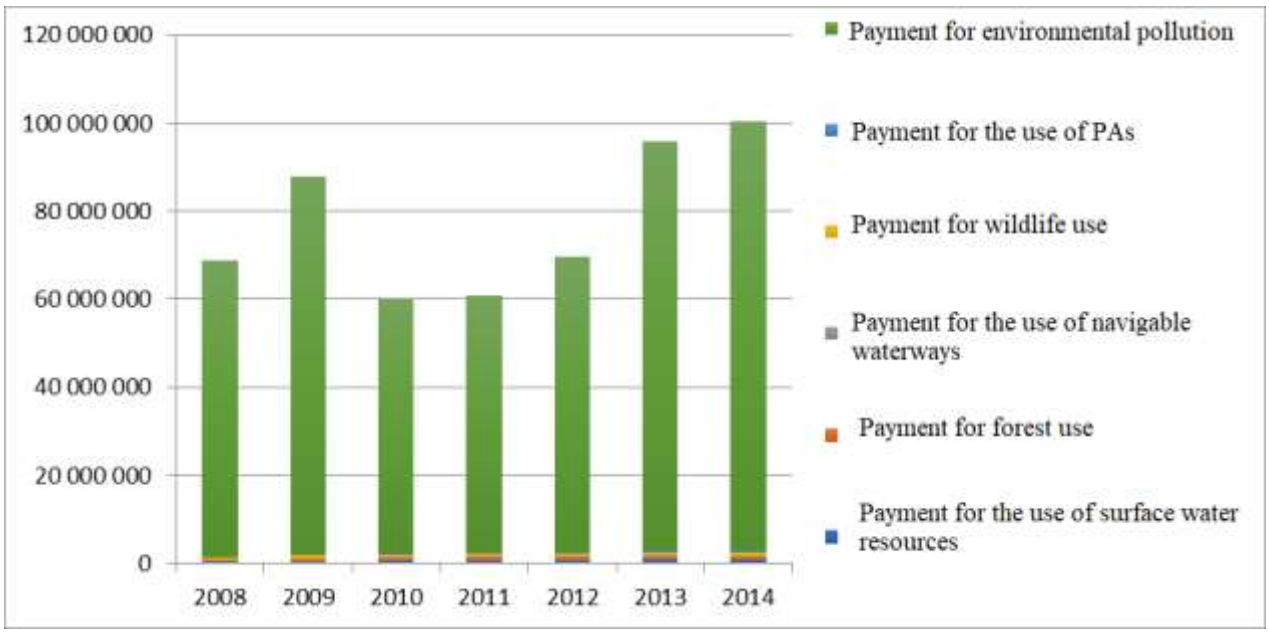

Fig. 2.20.2. Dynamics of state budget tax collection, by biodiversity payments (in thousands KZT)

Payment for environmental emissions by nature users within the limits specified in the environmental permit is charged according to pollutants and types of waste. The minimum environmental pollution payment is 0.01 MCI for methane, the maximum -13402 MCI for copper. Emissions are made according to the established limits; in case of excessive emissions, the payment is 10 times of this amount.

Compared to pollution payment, payments for the use of wildlife and forest resources is radically different. To illustrate, payments for any type of hunting range from 0.01 MCI to 16 MCI; for forest resources - from 0.1 MCI to 3.24 MCI.

A comparison of payments for the use of natural resources and payments for emissions shows how undervalued biodiversity of the country is.

At the stage of NSAPBD development in Kazakhstan, there was no financial assessment of the implementation of activities envisaged in the document. However, this information is very important when making decisions at the level of government agencies that approve funding. The BIOFIN methodology provides for a systematic and flexible approach to estimating the costs of implementing national goals, calculating the gap between the existing basic funding and the costs of implementing NSAPBD. Thus, biodiversity financial needs assessment for the conservation and sustainable use of biodiversity in Kazakhstan is a complete review of total costs, both one-time costs and current costs for the implementation of the Concept on Biodiversity.

According to estimates, the budget for the implementation of the Concept on Biodiversity for the period 2016–2020 accounts for 851 million USD: to implement the first direction of biodiversity conservation, including the task of creating an ecological network and protecting the country's genetic resources - 402.8 million USD; for the second one, including sustainable use of forest, wildlife, fish resources and agro-biodiversity (implementation period until 2020) 382.8 million USD is required, of which, 70% goes on conservation and restoration of forest ecosystems. According to the Concept, the mechanisms for implementation are information provision and staffing, applied research, and the improvement of economic mechanisms for biodiversity conservation. The budget for the implementation of the Concept on Biodiversity is 65 million USD.

To implement the Concept on Biodiversity and achieve its goals, it will take on average 170 million USD annually up to 2020. Comparing data with macroeconomic indicators, the annual expenditure on biodiversity conservation is 0.2% of the country's annual GDP.

From a global point of view, of the CBD High Level Group, according to a global assessment of resources needed for the implementation of the Strategic Plan for the Conservation and Sustainable Use of Biodiversity, the required funding until 2020 is 150–450 billion USD annually. Until 2020, the implementation of the Concept on Biodiversity requires 170 million USD annually, or 0.1% of the estimated total annual global budget.

Also, as part of the assessment of financial needs, the biodiversity financing gap was calculated. According to the BIOFIN methodology, the financing gap is calculated as the difference between the basic financing under business-as-usual scenario and the budget necessary for the implementation of the Concept on Biodiversity. Basic financing under business-as-usual scenario does not imply additional efforts to mobilize the country's financial resources, and takes into account only existing funding. Thus, the budget under business-as-usual scenario, which includes an estimate of public and private costs for the period 2016–2020, amounted to 382 million USD. Meanwhile, the budget for the implementation of the Concept on Biodiversity is 851 million USD (Fig. 2.20.3).

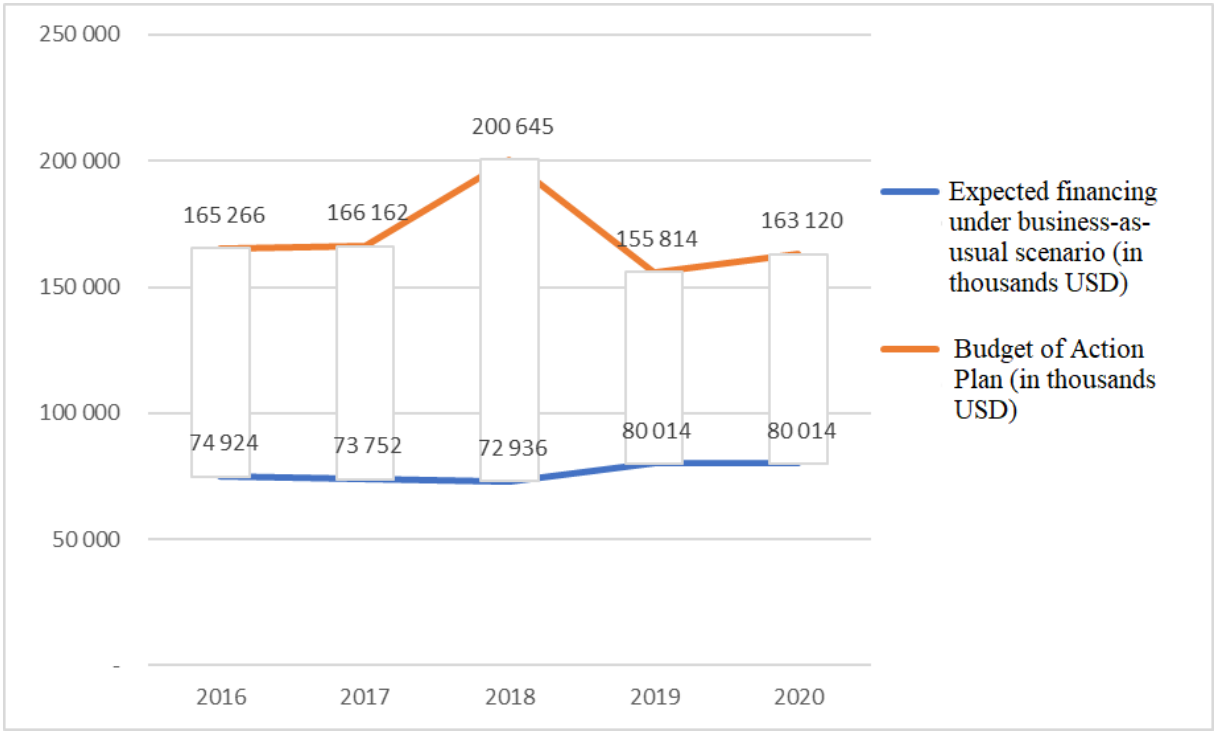

Fig. 2.20.3 Biodiversity financing gap, (in thousands, USD)

According to the review carried out as part of this work, the financing gap of biodiversity conservation goals up to 2020 amounts to 469 million USD, or 55% of the current biodiversity financing in the country. The greatest financing gap is observed in the following areas: combating the main causes of biodiversity loss by integrating biodiversity into state and social activities; enhancing implementation through community planning, knowledge management and capacity building. One of the priority issues on the way to preserve and restore the country's biodiversity and ecosystems is awareness of their value by decision makers and the public.

To cover the existing financing gap, experts of the BIOFIN project in Kazakhstan developed a financial resource mobilization plan for biodiversity conservation, including the most promising financial solutions. Under the resource mobilization plan, experts recommend to implement the following financial solutions: enhancing the protected area potential to improve their financing, introducing carbon offsetting, improving financing of hunting farms, subsidizing game breeding, supporting organic farming, tax incentives for developing ecotourism,

introducing compensation for biodiversity loss, attracting external investments for conservation and sustainable management of forest resources.

To advance further implementation of financial decisions, improvement of environmental legislation is required. The BIOFIN project team over the period from 2015 to 2017 developed new regulations and actively participated in the improvement of current legislation on flora and fauna. As a result of these efforts, the term “forest ecosystem services” and voluntary contributions for forest ecosystem services are included in the Forest Code of Kazakhstan as a financing mechanism for the forest sector. Voluntary contributions for unavoidable harm in the conduct of economic activities are included in the Law “On Specially Protected Natural Areas” as one of the new sources of funding for PAs. Also, the budget financing of PAs after the adopted amendments will be allocated in accordance with the PA Management Plan. This situation will significantly increase funding from the budget in accordance with the actual need of PAs. In general, these legislative amendments will allow PAs and forestry institutions to attract additional funding for the conservation, restoration of ecosystems and biodiversity from the private sector. At present, the BIOFIN project team continues to work on developing recommendations for improving the environmental legislation of Kazakhstan.

Existing difficulties and required capacity

Practically in all development programs of the industrially developed regions of Kazakhstan until 2020, the following threats (difficulties) to further development are noted:

- reliance on export of raw materials (mining and metallurgical complex);
- uneven distribution of generating capacity possibly resulting in a shortage of electricity in some regions with an excess in others;
- high volumes of imports of machinery, equipment, mechanisms, which hinders the development of mechanical engineering and instrument engineering, the main consumer of metals and metal products;
- competitiveness of mechanical engineering in Russia and China;
- depletion of mineral resources;
- fall in raw material prices;
- relatively small size of domestic market.

The main problems of industrial development are:

1) high degree of depreciation of fixed assets;
2) unstable nature of investment;
3) technological lag and lack of local manufacturers of machinery, equipment, mechanisms; high import prices;
4) high energy-, labor- and material intensity of products;
5) low competitiveness of products;
6) limited range and low domestic consumption of mechanical engineering and light industry products;
7) high degree of environmental pollution.

At the same time, it should be noted that due to the novelty of new development approaches, not only in Kazakhstan, but throughout the world, there may be mistakes in the choice of local indicators and areas of application of efforts of both government agencies and businesses. Completely new approaches and technologies are also possible, which can significantly simplify and accelerate achievement of the final goal - sustainable development.

Therefore, a constant review of the current situation, results achieved and chosen ways to achieve target indicators is necessary. At the same time, target indicators themselves also constantly need to be critically reconsidered. Such review should take into account constantly changing world experience, which is covered in detail by such international organizations as UNEP, UNDP, OECD, WB, EBRD, ADB and others, keeping in mind decisions made at international conferences and meetings of heads of states and governments around the world.

In particular, currently an agreement has been reached with the OECD on the implementation of the European "polluter pays" principle in Kazakhstan.

Section III. Assessment of the performance in meeting national targets

National targets delivery assessment in 6NR's Section 3 is based on indicators recommended in decision XIII/28 of the 13th meeting of the Conference of the Parties to the Convention on Biological Diversity.

The recommendation sets out both generic and specific indicators.

Generic indicators are applied to those aspects that can be monitored, whereas specific indicators are of dynamic nature and can be used in monitoring of changing trends within those aspects. The table includes only those indicators that are currently available or under active development.

National targets delivery assessment presented in the table is based on the national indicators developed in compliance with the above recommendations and tracked by the national monitoring systems in Kazakhstan.

The first table identifies a set of national indicators for each Aichi Target, in line with generic and specific indicators recommended by decision XIII / 28 of the Thirteenth Meeting of the Conference of the Parties to the Convention on Biological Diversity.

The second table, for each Aichi Target, presents data on the implementation of national indicators and assessment of performance in meeting each national target (positive dynamics, negative dynamics, insufficient dynamics).

3.1. Assessment of the performance in meeting national targets under Aichi Target 1.

Table 3.1.1. Alignment of national indicators with recommended indicators of performance in meeting the national target on training and building environmental consciousness across businesses and among population equivalent to Aichi Target 1.

Recommended indicators		**National targets**
Generic indicators	**Specific indicators**	
Trends in awareness and attitudes to biodiversity	Biodiversity barometer	Training materials and curricula, professional standards, research and monitoring results
	Interest in biodiversity on the web (Google Trends)	Creation of information sites
	Global Visitor Survey by the World Association of Zoos and Aquariums (WAZA)	No
Trends in public engagement with biodiversity	No specific indicators identified.	Conducting awareness-raising seminars, round tables and forums, appearances in the media, creating nature museums and organizing different activities, number of NGOs in the field of biodiversity protection, increase in the number of visitors at PAs.

The analysis of this table shows that national indicators are only indirectly aligned with the recommended indicators for assessing the performance of national targets. Most national indicators lack quantitative indicators.

Table 3.1.2. Assessment of performance in meeting national targets on training and building environmental consciousness across businesses and among population, equivalent to Aichi Target 1.

National assessment indicators	Program documents which include indicators	Indicator's value	Indicator's dynamics in 2013-2017	Assessment of indicator trends (performance assessment)		
				Positive	negative	insufficient
Training materials and curricula, professional standards, research and monitoring results	State programme on water resources management	To develop 14 professional standards (performance standards)	In 2014-2016, 10 professional standards were developed for 20 specialties related to the protection and use of water and land resources. In 2017, 4 professional standards were developed in the areas of "Water Management", "Fisheries" and "Forestry". In the model curricula for all specialties in the cycle of general education disciplines, there is an obligatory component - the discipline "Ecology and sustainable development" for 90 hours. Since 2013, the following topics have been introduced into the model curriculum of this discipline: "Economic aspects of sustainable development. Green economy and sustainable development. Water Resources Management", "Ecoenergy. The strategy of global energy-ecological sustainable development in the XXI century. Renewable energy sources."	Yes		

Creation of information sites	No	No	Distribution, placement on the official Internet resource of the Committee for Forestry and Wildlife of official press releases, statements and other information materials on biodiversity conservation, development of PA system. Creation of information sites for all international projects in the field of biodiversity conservation.	Yes		
Conducting awareness-raising seminars, round tables and forums, presence in the mass media, creation of nature museums and organizing different activities, the number of NGOs in the field of biodiversity protection, an increase in PA visitors.	No	No	Information on the values of biodiversity is communicated to the public through the media, organization of round tables and forums, distributing leaflets, setting billboards, panels, signs. Most of the PAs have created nature museums, in state forestry institutions and nature conservation institutions there are forestry schools, which organize and conduct annual environmental events: “March for Parks”, “Zhassyl Zhapyrak”, “Kazakhstan Day of Tree planting”, “Earth Day”, “Plant Your Own Tree", "Green Kazakhstan" and others. On the issues of biodiversity conservation, dozens of films have been filmed and they are shown on television. Scientific conferences and meetings are held at the local and international levels.	Yes		

The analysis of the table illustrates that plans and programs in Kazakhstan usually contain

only generic directions for the development of various curricula and programs. Such curricula also envisage programmes to inform the population about biodiversity conservation problems, as well as conducting various activities with involvement of population without quantitative indicators. At the same time, the total number of such events is quite significant and can receive positive evaluations of their effectiveness.

3.2. Assessment of performance in meeting national targets under Aichi Target 2.

Table 3.2.1. Alignment of national indicators with recommended indicators of performance in meeting the national target for the transition to “green economy” equivalent to Aichi Target 2.

Recommended indicators		**National indicators**
Generic indicators	**Specific indicators**	
Trends in the inclusion of reserves and natural resource flows to the national accounts	Number of countries implementing natural resource accounts, other than energy resources, in the System for Environmental and Economic Accounting (SEEA)	No
Trends in the number of countries that have assessed biodiversity values in accordance with the provisions of the Convention	Results of the implementation of the national targets set in accordance with the target 2 on the conservation and sustainable use of biodiversity, adopted in Aichi, the Strategic Plan for the Conservation and Sustainable Use of Biodiversity for 2011-2020 (indicator for SDG target 15.9)	Implementation of pilot projects
Trends in incorporating biodiversity and ecosystem services values into sectoral and development policies.	Number of countries that have incorporated biodiversity into national development plans, poverty reduction strategies, or other major development plans	Change of legislation

The task to integrating economic assessment of ecosystem services into the country's national sustainable development policy is only declared in the Concept for Conservation and Sustainable Use of Biodiversity of the Republic of Kazakhstan until 2030, which does not have full-fledged legitimacy. The assessment of ecosystem services is carried out on a pilot nasis only in the framework of international projects.

Table 3.2.2. Assessment of performance in meeting national targets on training and building environmental consciousness across businesses and among population equivalent to Aichi Target 2.

National assessment indicators	**Program documents which include indicators**	**Indicator’s value**	**Target dynamics in 2013-2017**	**Assessment of target trends (performance assessment)**		
				Positive	**negative**	**insufficient**

Implementation of pilot projects	No	No	An example of assessing the value of ecosystem services is a pilot study conducted in the Karkaraly National Park		Yes	
Changes in legislation	No	No	The term “forest ecosystem services” is included in the Forest Code of the Republic of Kazakhstan		Yes	

Today, in Kazakhstan’s practice and policy of ecosystem management in the context of "green economy", the weak point is quantification of the ecosystem services’ value, inadequate accounting of natural capital in the country's GDP. This is accompanied by a number of barriers, such as lack of qualified specialists, lack of funding, etc. It means, that for the time being, the performance in meeting national targets under Aichi Target 2 can only be assessed as negative.

3.3. Assessment of performance in meeting national targets under Aichi Target 3.

Table 3.3.1. Alignment of national indicators with recommended indicators of performance in meeting the national target for the transition to “green economy” equivalent to Aichi Target 3.

Recommended indicators		**National indicators**
Generic indicators	**Specific indicators**	
Trends in the number and scope of incentives, including developmentally harmful subsidies, that have been eliminated, reformed or phased out.	Trends in potentially harmful elements of state agricultural support (producer support estimates)	No
	Trends in potentially harmful elements of state support of fisheries	No
	Agricultural export subsidies (indicator for SDG target 2.b)	No
Trends in the development and application of incentives to promote the conservation and sustainable use of biodiversity.	Number of countries with national biodiversity-related instruments, taxes and fees	Payments for the use of forest, wildlife and protected areas
	Number of countries with national instruments for REDD + programs	Introduction of biodiversity useful subsidies
	Number of countries with national biodiversity-related permitting programs	Payments for the use of bio resources and PAs resources.

As it was already mentioned in Sections 1 and 2 of this report, presently there are no such programmes that would give a task to reduce subsidies for industries that are users of nature resources, including agriculture, equivalent to Aichi Target 3. No activities are planned in this

area.

Table 3.3.2. Assessment of performance in meeting the national target on training and building environmental consciousness across businesses and among population equivalent to Aichi Target 3

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National assessment indicators	Program documents which include indicators	Indicator's value	Dynamics of targets in 2013-2017	Indicator trends assessment (results assessment)		
				positive	negative	insufficient
Payments for the use of biological resources and PAs resources	RK Legislation	No	In 2013 year — 11887432,6 KZT. In 2016 year — 13219419,0 KZT.	Yes		
Introduction of resources that are useful for biodiversity	Strategic plans of the Ministry of Agriculture of RK	Introduction of subsidies for aquaculture, beekeeping, maral breeding	Subsidies are introduced for aquaculture, beekeeping and maral breeding. There are no subsidies to organic farming and game breeding.	Yes		Yes

Subsidies for individual branches of agriculture that are useful for biodiversity conservation, such as aquaculture, maral breeding (reindeer herding), and beekeeping, only slightly improve the overall negative performance in meeting the national target under Aichi Target 3.

3.4. Assessment of performance in meeting national targets under Aichi Target 4

Table 3.4.1. Alignment of national indicators with recommended indicators of performance in meeting the national target for the transition to "green economy" equivalent to Aichi Target 4

Recommended indicators		National indicators
Generic indicators	Specific indicators	
Trends in populations and extinction risk of species in use, including species being traded	Red List Index (impact of use)	Index is not applicable.
	The percentage of countries in category 1 by CITES	Kazakhstan is not included into the 1st category of countries according to CITES classification
	Red List Index of Traded Species	Index is not applicable. To date, 110 species of animals that live in Kazakhstan are included in CITES Applications.
	Share of wildlife traded that is poached or illicitly obtained (indicator for SDG target 15.7)	No data
	Share of national exclusive economic zones	State Reserve Zone of the

	managed by ecosystem approaches (indicator for SDG target 14.2)	Northern Caspian.
Natural resource use trends and / or related concepts	Ecological footprint	Withdrawal of lands from productive turnover Freshwater intake, Greenhouse gas emissions, The share of renewable energy in total energy production
	Footprint of raw material consumption (RMC) and RMC per capita and GDP (indicator for targets 8.4 and 12.2 of the SDGs)	Energy performance GDP energy intensity Total water consumption per unit of GDP
	Domestic consumption of material in material form (DCM) and DCM per capita in GDP (indicator for targets 8.4 and 12.2 of the SDGs)	Total energy consumption Domestic water consumption per capita
	Adoption of national action plans for sustainable consumption and production (SCP) (indicator for SDG target 12.1)	Accepted
Assessment of environmental limits in terms of sustainable production and consumption	Percentage of net primary product withdrawn by humans	Freshwater intake
	Percentage of freshwater withdrawn by humans (water print)	Renewable freshwater resources Freshwater intake
	Change in water use efficiency over time (indicator for SDG target 6.4)	Water resources productivity Water loss Water reuse and recycled
	Water load level: freshwater abstraction as a percentage of available freshwater resources (indicator for SDG target 6.4)	Renewable freshwater resources Freshwater intake
Urban biodiversity trends	Number of cities applying the Urban Biodiversity Index and reporting on it	No
	Ratio of development rates and population growth rates (indicator for SDG target 11.3)	Demographic indicators
Trends in the extent to which the value of biodiversity and ecosystem services are included in organizational accounting and reporting systems	No	No

Analysis of this table illustrates direct or indirect relation of the indicators tracked by the national Statistics in Kazakhstan to performance indicators under Aichi Target 4. Only indicators on urban biodiversity and biodiversity values are completely not presented. There are also no indicators on population trends and the risk of extinction of the used species, including those used as commodities.

Red List Index - calculated based on changes in the categories of the International Union for Conservation of Nature (IUCN) at a time interval, evaluated at the regional (local) level. In Kazakhstan, the state assessment by IUCN categories was not performed, the index is not applicable.

Since 2000, Kazakhstan is a party to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). To date, 110 species of animals that live in Kazakhstan are included in CITES Applications. Import into Kazakhstan and export of CITES objects is subject to permits of the CITES Administrative Authority in the Republic of Kazakhstan.

In 2019 Kazakhstan plans to perform a revision of the List of rare and endangered species of animals and plants and republication of the Red Book of the Republic of Kazakhstan (animals and plants), in order to align it with the categories of the International Union for Conservation of Nature (IUCN) and generally accepted international requirements.

The waters of the eastern part of the Northern Caspian and the Volga River delta (within the Republic of Kazakhstan) and the Urals are included in the state reserve zone in the northern part of the Caspian Sea, designed to conserve fish stocks, ensure optimal living conditions and natural reproduction of sturgeon and other valuable fish species. The state reserve zone in the northern part of the Caspian Sea provides opportunities for the development of fisheries, water transport, state geological study, exploration and production of hydrocarbons with special requirements.

Table 3.4.2. Assessment of performance in meeting the national target of transition to "green economy" equivalent to Aichi Target 4.

National assessment indicators	**Program documents which include indicators**	**Indicator's value**	**Dynamics of the indicator in 2013-2017**	**Assessment of trends in the indicator (performance assessment)**		
				positive	**negative**	**insufficient**
GDP energy intensity	Strategy "Kazakhstan-2050". Concept for transition of the Republic of Kazakhstan to Green Economy	Reduction of energy intensity of GDP: 10% by 2015 and 25% by 2020 compared with the initial level of 2008.	A decrease by 9.6% in 2013 - a decrease by 17.6% in 2016	Yes	-	-
State Nature Reserve Zone of the Northern Caspian	Resolution of the Councils of Ministries of the Kazakh SSR of April 30, 1974 # 252 "Announcement of the protected area in the northern part of the Caspian Sea (with amendments from 13.07.78 # 284; from 15.09.89 #290; from 23.09.93 # 936)	No	No	Yes		

Total water consumption per unit of GDP	State Water Management Program of Kazakhstan (expired)	By 2020, a decrease in water consumption per unit of GDP in real terms by 33% compared to 2012.	Reduction of $ 1,000 per ton in GDP, from 50.3 m ^{3} in 2013, to 46.3 m ^{3} in 2016.	Yes	-	Yes
Share of renewable sources in electricity generation	STRATEGY "Kazakhstan-2050". Concept for transition of the Republic of Kazakhstan to Green Economy	not less than 3% by 2020 and 10% by 2030, generally 50% by 2050	Increase from 0.59% in 2013 to 1% in 2016	Yes	-	Yes
Greenhouse gas emissions	Concept for transition of the Republic of Kazakhstan to Green Economy	-15% of the 2012 level by 2030 -25% by 2050	+ 4.2% in 2013 -9.3% in 2015	Yes	-	-

The analysis of the given table demonstrates aspirations of Kazakhstan to meet international criteria and indicators in the field of fisheries. Indicators for non-target species, various biodiversity indices and adaptive management are completely absent.

3.5. Assessment of performance in meeting national targets under Aichi Target 5.

Table 3.5.1. Alignment of national indicators with recommended indicators of performance in meeting the national target for conservation, rational use and reproduction of forest resources, equivalent to Aichi Target 5.

Recommended indicators		**National indicators**
Generic indicators	**Specific indicators**	
Trends in forest scale	Trends in forest cover	Forested area
	Forest area as a percentage of total land area (indicator for SDG target 15.1)	Forest cover
	Percentage of important objects of biological diversity in terrestrial and freshwater areas covered by protected areas, by ecosystem type (indicator for SDG target 15.1)	Total Protected Area Percentage of the area of PAs of the country Lands of protected areas
	Progress in sustainable forest management (indicator for SDG target 15.2)	No
Trends in the extent of natural habitats other than forests	The change over time of the area of water-related ecosystems (indicator for SDG target 6.6)	Water Fund Lands Pollution of water resources

	Scale of natural habitat (land area minus cities and agricultural land)	Reserve Land Area
	Wetland length	Approved list of wetlands of international and republican importance
Trends in fragmentation of forests and other natural habitats	No	No
Trends in degradation of forests and other natural habitats	Biodiversity Habitat Index	No
	Percentage of degraded land in relation to total land area (indicator for SDG target 15.3)	Area of disturbed lands
Trends in the risk of extinction and population of specialists species in habitats in each of the main types of habitats	Red List index (forest species)	No
	Living Planet Index (forest species)	No
	Species Habitat Index	No

Analysis of the given table demonstrates direct or indirect relation of the indicators tracked by national Statistics in Kazakhstan to indicators to be assessed under Aichi Target 5. Only indicators on various biodiversity indices are completely absent.

Table 3.5.2. Assessment of performance in meeting the national target on conservation, sustainable use and reproduction of forest resources, equivalent to Aichi Target 5.

National assessment indicators	**Program documents which include indicators**	**Indicator's value**	**Dynamics of the indicator in 2013-2017**	**Assessment of trends in the indicator (performance assessment)**		
				positive	**negative**	**insufficient**
Forested area	1.Strategic Plan of the Ministry of Agriculture for 2017-2021; 2. Regional development Programme for	To bring the area of forest-covered lands on specially protected natural territories and territories of specialized enterprises of forestry by the beginning of 2018 up to 1409.0 ths. ha to bring by the beginning of	the actual figure amounted to 1422.9 thousand ha, i.e., the execution is 101% forested area: 2013 - 11.07 million ha; 2017 – 11.36 million ha or 101.2%	Yes Yes		

	2016-2020	2018 the area covered with forest lands on the territory of the State Forest Estate, managed by local executive bodies, up to 11228 thousand. ha				
Forest cover	Strategic Development Plan of the Republic of Kazakhstan until 2025	Increasing the forest land area and bringing it to 4.8%	Forest Fund: 2013 - 29.28 million ha; 2017 - 29.84 million ha	Yes		
Percentage of the area of specially protected natural territories of the country	Zhassyl Damu industry-specific program.	10% by 2020	2013 - 8.76% in 2017 - 8.96%	Yes		
Water body pollution	No	No	The total number of water bodies surveyed in 2017 is as follows: - “high level of pollution” - 23 rivers, 8 lakes, 1 reservoir. - “extremely high level of pollution” - 2 rivers and 1 lake. Compared to 2013, the pollution situation has changed for the worse. Then of the class of "dirty" water bodies were 6 rivers; of the class of "very dirty" water bodies - 6 rivers, 3 lakes.		Yes	
Water supply	Concept for	No	in 2014 - 42 km ^{3};		Yes	

of natural water bodies	transition of the Republic of Kazakhstan to Green Economy		in 2015 - 32.84 km ^{3}; in 2016 - 37.88 km ^{3}			
Approved list of wetlands of international and republican importance	No	No	54 objects with a total area of 3914639 ha. And 10 of them are of international importance.	Yes		
Land of industry, transport and communicatio n	No	No	increased from 2,620.8 thousand hectares in 2012 to 2,875.4 thous. ha in 2016		Yes	
Number of disturbed lands	No	No	2012 - 245.6 thous. ha. 2013 - 247.1 thous. ha. 2014 - 247.1 thous. ha. 2015 - 250.2 thous. ha. 2016 - 247.8 thous. ha.		Yes	

Analysis of this table illustrates positive dynamics of the total area of the State Forest Estate and the area of forest covered lands, as a result, the forest cover of the country increased from 4.6% in 2013 to 4.7% at the beginning of 2018. At the same time, there is also negative dynamics (performance assessment) of the areas of deserted and degraded lands.

The national programs of Kazakhstan do not plan to improve such indicators as water pollution, the number of disturbed lands that are monitored by statistical and departmental observations and have a negative trend.

3.6. Assessment of performance in meeting national targets under Aichi Target 6.

Table 3.6.1. Alignment of national indicators with recommended indicators of performance in meeting the national target for conservation, rational use and reproduction of fish resources, equivalent to Aichi Target 6.

Recommended indicators		**National indicators**
Generic indicators	**Specific indicators**	
Trends in certified sustainable fisheries	Catches of fisheries certified by the Marine Stewardship Council	Total allowable catches of fisheries in the Caspian Sea, approved by the Commission on Aquatic Biological Resources
Trends in the proportion of depleted species, target species and by-catch species for which recovery plans exist	Number of countries with regulations requiring recovery of depleted species	Fish breeding volumes
	Share of depleted reserves for which recovery plans are implemented	Target and boundary guidelines for total allowable fish crop and stock
Trends in population and risk	Red List Index (commercial water species)	Inclusion or exclusion of fish

of extinction of target species and types of by-catch		species in the Red Book of the Republic of Kazakhstan
	Number of countries whose policies include appropriate provisions to minimize the impact of fishing on endangered species	Limits in yield of fisheries on inland waters fishing effort standards
	Proportion of fisheries monitored regularly and reported for exposure to threatened species	Control of execution of limits in yields of fisheries
	Proportion of threatened species whose mortality rate due to fishing is decreasing	Exclusion of fish species from the Red Book of RK
	Number of countries whose policies include taking account of the death of non-target species and ensuring their safe biological limits.	No
	Trends in populations of untargeted species that are adversely affected by fishing	No
	Red List Index (Impact of Fisheries)	No
	Living Planet Index (trends in target and by-catch species)	No
Trends in fishing practices	Global bottom trawling activities	No, due to lack of bottom trawling
	Progress by countries in terms of compliance with international legal instruments to combat illegal, unreported and unregulated fishing (indicator for SDG target 14.6)	Anti-poaching reports
	Volume (spatial scale, type of fishing gear and intensity) of fishing effort in vulnerable habitats	Fishing effort standards
	Number of countries with monitoring and/or ecosystem impact assessment programmes	Monitoring and assessment of impact on fish stocks on reservoirs of international and republican importance
	Number of countries with legislation in place to take action to protect vulnerable habitats (including vulnerable marine ecosystems) and to address threats to ecosystem structures and functions	Laws and international conventions regarding wildlife conservation
	Fisheries management measures to effectively manage bycatch and reduce discards	Number of reservoirs covered by the definition of the total allowable catch of fish (limit)
	The number of fish stocks regulated by adaptive management systems / plans and the scope of their coverage	No
Trends in the proportion of fish stocks outside safe biological limits	Proportion of fish stocks within biologically sustainable limits (indicator for SDG target 14.4)	Maintenance of the fishery resources inventory
Trends in specific yields of fisheries	Approximate yields of fisheries and fishing effort	Mastering the catch limits

	Progress made by countries with regard to the degree of application of the legal/regulatory/policy/institutional framework in which access rights of small-scale fishing enterprises are recognized and protected (indicator for SDG target 14.b)	Criteria for the designation of fishery bodies and (or) their plots to reservoirs and (or) sites for commercial fishing, amateur (sport) fishing, lake and commercial fish farming, and cage fish farming

Analysis of this table shows the aspirations of Kazakhstan to meet international criteria and indicators in the field of fisheries. Indicators for non-target species, various biodiversity indexes and adaptive management are completely absent.

Table 3.6.2. Assessment of performance in meeting the national target for conservation, rational use and reproduction of fish resources, equivalent to Aichi Target 6.

National assessment indicators	**Program documents which include indicators**	**Indicator's value**	**Dynamics of the indicator in 2013-2017**	**Assessment of indicator`s trends (performance assessment)**		
				positive	**negative**	**Insufficient**
Total allowable fish crops in the Caspian Sea, approved by the Commission on Aquatic Biological Resources fish crop limits on inland waters	Agreement of the Caspian bordering countries states on aquatic bioresources	Annual approval o limits	Moratorium on sturgeon fishing	Yes		

Fish breeding volumes	Strategic plans of the Ministry of Agriculture RK	Release of fry of sturgeon and other valuable fish to natural reservoirs	On Sturgeon in 2015: 7.5 million pcs were released, in 2016 – 7.86 million. pcs., in 2017 – 6.8, 2 mln. pcs. In 2015 by the Republican state enterprises were released 267 mln. pcs. of young sazan, ripuza, grass carp and silver carp, in 2016 – 198 mln. pcs., in 2017 – 299, 2 mln. pcs. In addition, as part of the fulfillment of obligations, in 2016, users of fisheries reservoirs stocked fixed reservoirs in a total volume of more than 180 million juveniles of valuable species of fish (2015 - 200 million pieces). The efficiency of stocking ponds with young commercial fish species is low. The catch of stocking fish in 2015 was 5.7% of the total catch, in 2016 - 4.3%, in 2017 - 5.1%.	Yes		Yes
Target and boundary guidelines for total allowable catch and stock	No	Number of boundary landmarks	Developed 3 boundary benchmarks, approved 1	Yes		Yes
Inclusion or exclusion of fish species in the Red Book of the Republic of Kazakhstan	No	No	Restored one of the 18 species included in the RB of RK (Kutum)	Yes		
fish crop limits on inland waters fishing effort	Methods for determining the total allowable fish crop and	No	Fishing limits in 2017-2018 reduced from 55-60 to 44-45 thousand tons per year	Yes		

standards	other aquatic animals, taking into account the need to reduce the fishing load on the super-exploited fish populations.					
Control of execution of fish catch limits	No	No	Mastering the limit increased from 40.5 in 2014 to 44.0 thousand tons in 2016	Yes		
Exclusion of fish species from the Red Book of RK	No	No	Restored one of the 18 species included in the RB RK (Kutum)	Yes		
Anti-poaching reports	Strategic plans of the Ministry of Agriculture RK	No	In the period 2014-2016 - 18,662 violations of environmental legislation were identified. 2659 persons were brought to administrative responsibility, to criminal one - 131 persons. Administrative fines were imposed in the amount of 225.8 million tenge, of which 171.2 million tenge was charged to the state budget. 170.6 tons of fish were seized from violators. Also, 1043 units of swimming equipment and 14081 units of fishing gear were seized. On the reservoirs of the Zhaiyk-Caspian basin during the spawning of sturgeon and other fish species, a large-scale fish-security action "BEKIRE" is held every year from April 1 to May 31.	Yes		Yes
Fishing effort standards	Order of the Ministry of Agriculture of RK	No	Introduced in 2018	Yes		Yes
Monitoring and assessment of impact on	No	No	Monitoring and assessment of the impact on fish stocks is carried out in reservoirs of	Yes		Yes

fish stocks on reservoirs of international and republican importance			international and republican significance.			
Laws and international conventions regarding wildlife conservation	No	No	In 2015, the order of the authorized body on fisheries approved "Restrictions and prohibitions on the use of fish resources and other aquatic animals" The “Agreement on the conservation and rational use of the aquatic biological resources of the Caspian Sea” was signed (Astrakhan, September 29, 2014).	Yes		
The number of reservoirs covered by the definition of the total allowable catch of fish (limit)	The strategic plan of the Ministry of Agriculture RK for 2017-2021.	%	The number of reservoirs increased from 60 to 100%	Yes		
Maintenance of the Fishery resources inventory	No	No	In 2017, the inventory of fish resources was updated with the introduction of cost estimates of biodiversity	Yes		
Mastering the catch limits	No	No	Catch limits were reduced from 63.5 in 2014 to 44-45 thousand tons in 2017 Mastering the limit increased from 40.5 in 2014 to 44.0 thousand tons in 2016	Yes		Yes
Criteria for the designation of fishery bodies and (or) their plots to reservoirs and (or) sites for commercial fishing, amateur (sport)	Order of the Ministry of Agriculture	No	Criteria developed and approved Fishery associations participate in the distribution of fishing grounds and distribute quotas among users.	Yes		

fishing, lake and commercial fish farming, and cage fish farming						

Most of the indicators monitored by the state reporting and statistics show a positive trend, but at the same time there is a lack of dynamics. The overall assessment of performance for this target can be positive.

3.7. Assessment of performance in meeting national targets under Aichi Target 7.

Table 3.7.1. Alignment of national indicators with recommended indicators of performance in meeting the national target of increasing the efficiency of resource use (water, land, biological, etc.) and management equivalent to Aichi Target 7.

Recommended Indicators		**National indicators**
Generic indicators	**Specific Indicators**	
Trends in the proportion of agricultural areas in which sustainable agricultural practices are introduced	Agricultural areas occupied by organic production	Organic farming area (expert estimates)
	Agricultural areas where methods of environmental agriculture are practiced	Irrigation water costs
	The share of agricultural land, which provides productive and sustainable agriculture (for SDG target 2.4)	Agricultural productivity
Trends in the risk of extinction and species populations associated with agro-ecosystems	Forest Birds Index for Agricultural Land Birds / Living Planet Index (Agricultural Land Types)	No
Trends in the share of sustainable aquaculture production	*No specific indicators identified.*	Aquaculture production
Trends in the proportion of the area in which forest products are produced by sustainable methods	Forest area where sustainable management certification is introduced	No
	Progress in sustainable forest management (indicator for SDG target 15.2)	Ensuring protection, reproduction and rational use of flora and fauna, especially protected natural territories
	Forest Birds Index for Forest Specialist Birds / Living Planet Index (Forest Specialists)	No
Trends in extinction risk and populations of forest specialist species in productive forests	*No specific indicators identified.*	No

In Kazakhstan, introduction of biodiversity-friendly farming practices is just beginning. Accordingly, the introduction of such indicators as drip irrigation area, agricultural productivity

and aquaculture production is just beginning. Some indicators (areas of organic agriculture) have only expert estimates.

Table 3.7.2. Assessment of performance in meeting the national target of improving the efficiency of resources use (water, land, biological, etc.) and their management, equivalent to Aichi Target 7.

National assessment indicators	**Program documents which include indicators**	**Indicator's value**	**Dynamics of the indicator in 2013-2017**	**Assessment of indicator`s trends (performance assessment)**		
				positive	**negative**	**Insufficient**
Organic farming area (expert estimates)	No	No	For 2013 there is no data. In 2017, according to expert estimates, 300 thousand hectares.	Yes		
Irrigation water costs	Concept of transition of the Republic of Kazakhstan to Green Economy	2020 - 450 m³ / t, 2030 - 330 m³ / t).	2013 - 1589 m ^{3} per 1 ha 2016 year - 1186 m ^{3} per 1 ha	Yes		Yes
Agricultural productivity	Concept of transition of the Republic of Kazakhstan to Green Economy	An increase of 3 times by 2020 compared with 2008	2013 - an increase up to 28% 2016 - 2.5 times	Yes		
Aquaculture production	State program of development of AIC	to ensure the growth of aquaculture production to 5,000 tons by 2021	2017 - 2776 tons	Yes		Yes
Ensuring protection, reproduction and rational use of flora and fauna, especially protected natural territories	Strategic Plan of the Ministry of Environment and Water Resources for 2014-2018	1. Area of forest reproduction and afforestation for 2014	2013 - 68.5 thousand hectares; 2017 - 57.5 thousand hectares;	Yes		
		2. Reduction of the average forest fire area for 2014	2013 - 3.5 hectares; 2017 - 11.0 hectares;		Yes	
		3. Reduction of the average volume of 1 case of illegal felling	2013 - 6.2 m3; 2017 - 57.8 m3;		Yes	

		of forest;				

For all indicators of good trends in agriculture, there is positive dynamics, however, in terms of water consumption for irrigation and aquaculture production the dynamics is clearly insufficient to achieve the indicators set by the governmental programs. But the overall assessment can be positive.

During the reporting period, forest reproduction and afforestation throughout Kazakhstan was carried out on the area of 314.0 thousand hectares. Despite the decline in planting and sowing of forests after 2014, on average for the year in the specified period, artificial plantations were created on the area of 64.7 thousand hectares - that is more than the target indicator (55 thousand hectares) for 9.7 thousand established by the strategic Plan of the Ministry of Environment and Water resources for 2014-2018. Thus the performance assessment is positive.

Despite the measures taken to strengthen the protection of forests, a significant number of forest fires and illegal logging occur annually in the State Forest Estate (SFE). In 2013-2017, according to the reporting data of the Committee of Forestry and Wildlife on the territories of the State Forest Estate there were 2,200 cases of forest fires on the area of 27.8 thousand hectares. The average area of a single fire is 6.5 ha, which is lower than the target indicator (10.7 ha) established by the Strategic Plan of the Ministry of Environment and Water Resources for 2014-2018.

The target indicator for reducing the average volume of 1 case of illegal logging in 2013 was actually 6.2 cubic meters. In 2017 the indicator was 57.8 cubic meters. Thus, according to the reporting data of the Committee of Forestry and Wildlife, the target indicator for reducing the average volume of 1 case of illegal logging is not met. The main reason for the increase in illegal logging in 2017 is the illegal logging carried out in the Sandyktau training and production forestry of the Committee of Forestry and Wildlife in the amount of 25,724 cubic meters which accounted for 88% of the total illegal logging in the country with a loss of 809.96 million tenge.

Therefore, the assessment of the effectiveness of the protection of forests from fires and illegal logging is negative.

3.8. Assessment of the performance in meeting national targets under Aichi Target 8.

Table 3.8.1. Alignment of national indicators with recommended indicators of performance in meeting the national target for reducing pollution and improving the quality of the environment equivalent to Aichi Target 8

Recommended Indicators		**National indicators**
Generic indicators	**Specific indicators**	
Pollutant trends	Emission trends (nitrogen oxides)	Emissions of air pollutants from stationary sources (nitrogen oxides)
	Emission trends (sulfur oxides)	Emissions of air pollutants from stationary sources (sulfur dioxide)
	Emission trends (persistent organic pollutants)	Emissions of air pollutants from stationary sources (volatile organic

		compounds)
	Trends in mercury emissions	Emissions of air pollutants from stationary sources (mercury)
	Pesticide use trends	Number of pesticides applied
	Coastal eutrophication index and density of floating scrap of plastics (indicator for SDG target 14.1)	Pollutant discharges
	Mortality from air pollution in residential accommodation and the environment (indicator for SDG target 3.9)	No
	Mortality from lack of safe water, safe sanitation and hygiene (from lack of safe water supply, sanitation and hygiene services (WSSG) for all) (indicator for SDG target 3.9)	Availability of drinking water Sewage availability Pollutant discharges
	Mortality from unintentional poisoning (indicator for SDG target 3.9)	No
Trends in the risk of extinction and extinction of populations due to environmental pollution	Red List Index (impact of pollution)	No
Trends in ecosystems affected by environmental pollution	Biodiversity Water Quality Index	Water pollution index Pollutant discharges
Nutrient Level Trends	Nitrogen Deposition Trends	No
	Trends in loss of reactive nitrogen to the environment	No
	Trends in global nitrogen redundancy	Nutrients in fresh water Nutrients in coastal waters
	Proportion of reservoirs with good water quality (indicator for SDG target 6.3)	The number of reservoirs with clean water
	Percentage of safely treated wastewater (indicator for SDG target 6.3).	Discharge of treated wastewater

Analyzing this table, it is possible to note the dynamics of indicators on emissions of pollutants from industry, both in total emissions and in the number of specific pollutants that cause maximum damage to ecosystems and their biodiversity.

Kazakhstan has statistics of morbidity and mortality of the population from various diseases but there are no methods for determining the cause-effect relationships of diseases, including pollution of the environment, lack of safe water, and unintentional poisoning. Indirectly, these indicators can be tracked by public access to drinking water and sewage. Also in Kazakhstan there are no observations regarding the movement of free nitrogen in the environment. There are only observations on the concentration of nutrients (including nitrogen compounds) in freshwater and coastal waters.

Table 3.8.2. Assessment of performance in meeting the national target to reduce pollution and improve the quality of the environment, equivalent to Aichi Target 8.

National assessment indicators	Program documents which include indicators	Indicator's value	Dynamics of the indicator in 2013-2017	Assessment of indicator`s trends (performance assessment)		
				positive	negative	insufficient
Emissions of air pollutants from stationary sources (nitrogen oxides, sulfur dioxide, volatile organic compounds)	Industry-specific program Zhassyl Damu for 2010 - 2014 (expired) Ministry of Energy Strategic Plan for 2017–2021	The volumes of the established values of the standards for the gross emission of pollutants will not exceed 5 million tons. The volume of normative emissions of pollutants is 4.9 mln. tons. There are no indicators for specific substances.	The established indicators are approximately two times higher than the actual emissions, therefore not representative. Emissions in thous. tons: nitrogen oxides: 2012 - 249.4 2013 - 250.2 2014 - 256.5 2015 - 243.4 2016 - 246.6 sulfur dioxide: 2012 - 769.6 2013 - 729.2 2014 - 729.1 2015 - 710.6 2016 - 767.4 volatile organic compounds: 2012 - 58.1 2013 - 92.0 2014 - 114.4 2015 - 105.1 2016 year - 100.4 mercury in tons: 2012 - 0.2 2013 - 0.2 2014 - 0.2 2015 - 0.2 2016 - 0.5	Yes Yes Yes	Yes	Yes Yes Yes
Pollutant discharges	Zhasysl Damu industry-specific program for 2010 - 2014 (expired) Ministry of Energy Strategic Plan for 2017–2021	The amounts of the established allowed gross discharge of pollutants will not exceed 5 million tons. The amounts of allowed discharges of pollutants 4.8 million tons.	The allowed limit of pollutant discharges in 2016 in the republic was 2.9 million tons, whereas in 2013 it was 4.8 million tons (4.7 million tons in 2014, 3.5 million tons in 2015). The total volume of municipal wastewater from 2012 to 2016 decreased slightly from 5653.00 to 5205.11 million cubic meters. Out of this, the share of discharged without treatment decreased from	Yes Yes		Yes

			3.36 to 2.79%.			
Percentage of water users with constant access to the central drinking water supply system in cities	Concept of transition of the Republic of Kazakhstan to Green Economy	100% by 2020	2013 - 85% 2014 - 86% 2015 - 87% 2016 - 88%	Yes		Yes
Percentage of water users who have constant access to the central drinking water supply system in rural areas	Concept of transition of the Republic of Kazakhstan to Green Economy	80% by 2020	2013 - 47.7% 2014 - 50.3% 2015 - 51.5% 2016 - 52.3%	Yes		Yes
Comprehensive Water Pollution Index	No	No	The total number of water bodies surveyed in 2017 is as follows: - “high level of pollution” - 23 rivers, 8 lakes, 1 reservoir. - “extremely high level of pollution” - 2 rivers and 1 lake. Compared to 2012, the pollution situation has changed for the worse. Then of the class of "dirty" water bodies were 5 rivers and 1 lake. 1 river belonged to the class of "extremely dirty" water bodies.		Yes	

Nutrients in fresh water	No	No	In the Irtysh River in Ust-Kamenogorsk, Nitrates (NO_3), mg/l 2012 - 0.36 2013 - 1.88 2014 - 1.21 2015 - 1.42 2016 - 1.70		Yes	
Nutrients in coastal waters	No	No	Caspian Sea, Ural river coast, total nitrogen (N) content - summer, mg / l 2012 - 2.56 2013 - 2.05 2014 - 3.68 2015 - 3.13 2016 - 3.19		Yes	
The number of reservoirs with clean water	No	No	In 2017: Total of the total number of surveyed water bodies: Regulatory - clean - 4 rivers, 1 lake, the Caspian Sea. Moderate level of pollution - 60 rivers, 18 lakes, 13. in 2013: from the total number of surveyed water bodies, 19 rivers, 4 reservoirs, 1 lake, 1 channel are classified as “clean”; to the class of "moderately polluted" water bodies - 34 rivers, 7 lakes, 9 reservoirs, 1 channel, 1 sea;		Yes	
Discharge of treated wastewater	No	No	In million cubic meters m. and % of the total reset 2012 - 5463 - 96.6 2013 - 5865 - 97.1 2014 - 6052 - 97.5 2015 - 5804 - 97.7 2016 - 5112 - 98.2	Yes		

The analysis of this table demonstrates mainly positive dynamics (performance assessment) of all indicators on emissions and discharges of pollutants into the environment. Insignificant quantitative values of changes in these indicators are not insufficient, since such a decline occurs against the background of the general increase in production in recent years.

However, a negative factor is the continued decline in water quality in natural water bodies, which are most important for the conservation of ecosystems and their biodiversity. Therefore, additional measures are needed to protect water resources from pollution.

Ensuring public access to drinking water is of indirect importance for the conservation of ecosystems. Although there is a positive trend in these indicators, it is clearly insufficient to meet the targets set by national programmes.

3.9. Assessment of the performance in meeting national targets under Aichi Target 9.

Table 3.9.1. Alignment of national indicators with recommended indicators of performance in meeting the national target of banning or regulating the introduction of invasive alien species, equivalent to Aichi Target 9

Recommended Indicators		**National indicators**
Generic indicators	**Specific indicators**	
Trends in the identification and prioritization of invasive alien species	Indicator species in the animal world	
	Indicator species in agriculture	List of quarantine sites and alien species
Trends in the distribution and populations of invasive alien species	*No specific indicators identified.*	
Trends in the eradication of priority invasive alien species	Trends in the eradication of vertebrate invasive alien species	No
Trends in the risk of extinction and extinction of populations due to exposure to invasive alien species	Red List Index (impact of invasive alien species)	No
Trends in the impact of invasive alien species on ecosystems	*No specific indicators identified.*	
Trends in the incidence of introduction and introduction of invasive alien species	Trends in the incidence of invasive alien species introduction	No
Trends in the implementation of policy responses to prevent the introduction and introduction of invasive alien species	Proportion of countries adopting relevant national legislation and allocating sufficient resources to prevent the introduction or regulation of the number of alien invasive species (indicator for SDG target 15.8)	Legislative measures

Table 3.9.2. Assessment of the performance in meeting the national target on ban or regulating the introduction of invasive alien species, equivalent to Aichi Target 9.

National assessment indicators	**Program documents which include indicators**	**Indicator's value**	**Dynamics of the indicator in 2013-2017**	**Assessment of indicator`s trends (performance assessment)**		
				positive	**negative**	**insufficient**
List of quarantine objects and alien species	Strategic plan of the Ministry of Agriculture of the Republic of Kazakhstan	No	Determination of the species composition. 50 000 expert reviews have been conducted in 2013. 45 000 expert reviews have been conducted in 2017			yes

The control is purposefully carried out only for pests and diseases in agriculture: these are about 50 species of multi-eating and over 100 types of specialized pests, more than 70 types of diseases, 300 types of weeds, 10 types of quarantine objects that damage agricultural production. Phytosanitary monitoring, as well as phytosanitary measures against especially dangerous pests and quarantine objects are carried out at the expense of budget funds, within the framework of the state programs "Plant Protection" and "Plant Quarantine".

Currently, Kazakhstan does not have a system for the early detection of introduction of alien invasive species and their destruction. Accordingly, there are no indicators for the implementation of such system. Monitoring system is not created.

To create such a system, it is necessary to introduce on a legislative level a permit procedure for the import of animal and plant species. In particular, it is necessary to regulate the import of agricultural products for the distribution of insects and their larvae (Colorado potato beetle). Accordingly, it is necessary to tighten the control of the transboundary movement of such species.

3.10. Assessment of the performance in meeting national targets under Aichi Target 10.

This target is not entirely relevant for Kazakhstan due to the geographical location of the country.

Table 3.10.1. Alignment of national indicators with recommended indicators of performance in meeting the national target of protecting vulnerable ecosystems equivalent to Aichi Target 10.

Recommended Indicators		**National indicators**
Generic indicators	**Specific indicators**	
Trends in the extent and condition of other vulnerable ecosystems		Approved list of wetlands of international and republican importance
Trends in extinction risk for species and populations or the status of other vulnerable ecosystems exposed to climate change or acidification	Bird Climate Impact Index	no
	Red List Index (impact of climate change)	no
Trends in pressures on other vulnerable ecosystems impacted by climate change or ocean acidification		
Trends in response measures to reduce stress on other vulnerable ecosystems impacted by climate change or ocean acidification		

Wetlands, especially valuable plantations of the State Forest Estate and Important Bird

Areas can be classified as vulnerable from biodiversity conservation perspective in Kazakhstan.

Protection of listed vulnerable ecosystems in Kazakhstan is carried out within the framework of policy documents on protection and development of the network of specially protected natural territories.

Monitoring is carried out only on wetlands in accordance with the Ramsar Convention.

Table 3.10.2. Assessment of the performance in meeting the national target of protecting vulnerable ecosystems, equivalent to Aichi Target 10.

National assessment indicators	**Program documents which include indicators**	**Indicator's value**	**Dynamics of the indicator in 2013-2017**	**Assessment of indicator`s trends (performance assessment)**		
				positive	**negative**	**insufficient**
Approved list of wetlands of international and republican importance	Order of the Minister of Environment of the Republic of Kazakhstan as of 6 September 2013 No 273-a	No	54 objects with a total area of 3914639 ha. and 10 of them are of international importance.	Yes		

The lists of wetlands of international importance and republican significance were approved by the Order of the Minister of Agriculture of the Republic of Kazakhstan dated April 24, 2015 No. 18-03 / 369 and registered with the Ministry of Justice of the Republic of Kazakhstan on June 4, 2015 No. 11266.

Due to the constant increase in the number of protected vulnerable ecosystems, the performance assessment for Target 10 can be considered positive.

3.11. Assessment of performance in meeting national targets under Aichi Target 11.

Table 3.11.1. Alignment of national indicators with recommended indicators of performance in meeting the national target to increase the area of specially protected natural territories (PA) equivalent to Aichi Target 11.

Recommended indicators		**National indicators**
Generic indicators	**Specific indicators**	
Trends related to the conserved land and inland waters	Percentage of land area and inland waters belonging to protected areas	Percentage of the area of specially protected natural territories of the country Total area of PAs
	Proportion of land areas and inland water areas and/or marine and coastal areas covered by other effective neighbourhood-based environmental measures	No
	Number and length of sites important for biodiversity covered by other effective	No

	environmental measures on a district basis	
	Trends in the appropriate recognition and appropriate support of other effective environmental measures on a district basis	No
Trends in the area of preserved coastal and marine areas	Percentage of marine and coastal areas within protected areas	State Nature Reserve Zone of the Northern Caspian The territories of protected areas in the status of state natural reserves in the delta of Zhaiyk river (Ural), in the delta of Ili river in the floodplain of Syrdaria river
	Proportion of marine protected areas (indicator for SDG target 14.5)	State Nature Reserve Zone of the Northern Caspian
Trends in areas of particular importance to biodiversity conservation	Covered by protected areas of key biodiversity areas (including the most important bird aggregations and biodiversity sites, Alliance for Zero Disappearance sites)	Important Bird Areas of international importance
Trends in areas of particular importance for protected ecosystem services	*No specific indicators identified.*	No
Trends in ecological representativeness of protected areas	Coverage of protected areas of terrestrial and marine ecological regions	No
	Species Protection Index	No
	Protected area representativeness index	No
Trends in efficiency and / or equity management of conserved areas	Management Effectiveness of Protected Areas	Rating assessment of PAs nature protection organizations
	Analytical System Wildlife Index (disaggregated by protected area)	No

In the framework of the state programs of the authorized body in the field of biodiversity, the mandatory indicator is the area of PA and the share of PA from the total area of the country.

According to the Law “On PAs”, the water area of the eastern part of the Northern Caspian Sea with the deltas of the Volga River (within the Republic of Kazakhstan) and the Urals is included in the state reserve zone in the northern part of the Caspian Sea, designed to preserve fish stocks and ensure optimum living conditions and natural reproduction of sturgeons, and other valuable fish species. Along with this, this area is rich in hydrocarbons therefore the industrial companies are developing oil there. The Ministry of Energy of the Republic of Kazakhstan carries out environmental assessment, environmental monitoring and control during geological exploration.

Table 3.11.2. Assessment of the performance of the national target to increase the area of specially protected areas (PA), equivalent to Aichi Target 11.

National assessment indicators	**Program documents which include indicators**	**Indicator`s value**	**Dynamics of the indicator in 2013-2017**	**Assessment of indicator`s trends (performance assessment)**		
				positive	**Negativ**	**insufficie**

					e	nt
Percentage of the area of specially protected natural territories of the country	Zhassyl Damu industry-specific program.	10% by 2020	2013 - 8.76% in 2017 - 8.96%	Yes		
Total area of PAs	Zhassyl Damu industry-specific programme		2013 - 23.9 million hectares in 2017 - 24.4 million hectares	Yes		
State Reserve Zone of the Northern Caspian	No	No	No	Yes		
The territories of PAs in the status of the state nature reserves in the delta of Zhaiyk river (Ural), in the delta of Ili river in the floodplain of Syrdaria river	Zhassyl Damu industry-specific programme	Share of all PAs is 10% by 2020	2013 - 8,76% 2017 - 8,96%	Y=Yes		
Important Bird Areas of international importance	No	No	No	Yes		
Rating assessment of activities of nature protection organizations	The Order of the CFW of the MoA of the RK dated 28 April 2010, №177	No	No	Yes		

For the years analyzed, there has been an increase in the area of protected areas in Kazakhstan, the share in the total area of the country is constantly growing and corresponds to the program indicators.

There are no policy documents including indicators for the Reserve Zone of the Northern Caspian. However, industrial companies conducting exploration on the territory of the Kazakhstan part of the Caspian Sea are taking measures to preserve biodiversity. In particular, the North Caspian Operating Company has developed a strategy for the biodiversity conservation, and within the framework of this document it conducts seasonal monitoring of birds, aerial survey of seals, and other studies of the animal and plant world and habitats in

marine and land areas.

The deltas of the Zhayik River (Ural), Ili and the Syrdarya River floodplain are part of the protected areas of Kazakhstan. It is also planned to create a state natural reserve "Zhaiyk Orman" in the floodplain of the river Zhaiyk (Ural) in the West Kazakhstan region. For these purposes, EHE and feasibility studies have been prepared.

For 2017 in Kazakhstan there are 127 IBA of international importance with a total area of 154,147 km2, which is equivalent to 5.7% of the country's area. The Association for the Conservation of Biodiversity of Kazakhstan monitors IBAs and its conservation activities.

The rating assessment of the activities of nature protection organizations has been developed and annually conducted by CFW of the Ministry of Agriculture since 2010. Every year, the Committee’s employees score points on the developed criteria for the rating of organizational, environmental, research and environmental education activities, as well as financial, organizational and personnel issues. Each environmental institution is awarded points and based on the results of the assessment, the best institutions are encouraged. The score for this goal is positive.

3.12. Assessment of the performance in implementing the national targets under Aichi Target 12.

Table 3.12.1. Alignment of national indicators with recommended indicators of performance in meeting the national target for the conservation, sustainable use and reproduction of fauna resources, including artificial breeding of animal species, including valuable, rare and endangered, equivalent to Aichi Target 12.

Recommended Indicators		**National indicators**
General indicators	**Specific indicators**	
Trends in the number of extinctions	Number of species extinctions	Extinct species
Trends in the prevention of extinctions	Number of extinctions prevented due to environmental measures	Increase in the number of saigas, tugai deer, Asiatic wild ass, argali, goitered gazelle
Trends in the risk of extinction and extinction of species populations	Red List Index (indicator for SDG target 15.5)	Index is not applicable.
	Living Planet Index	In Kazakhstan, the assessment was not carried out, the index is not applicable.
	Species conservation index for decreasing species	Currently under development
	Biodiversity Integrity Index	Biodiversity Integrity Index - Tropical Ecology Assessment and Monitoring Network; a new concept, started to be used in the tropics and for assessment of fluvial systems. In Kazakhstan has not been tested.
	Forest Birds Index	not applicable
	Wildlife Index	not applicable

In Kazakhstan, only indicators of extinct and protected species are used. The species conservation index is currently under development (International Earth Observation Group Biodiversity Observation Networks/Life Map).

Red List Index (indicator for SDG task 15.5) is calculated on the basis of changes in the categories of the International Union for Conservation of Nature (IUCN) at a time interval, when evaluated at the regional (local) level. In Kazakhstan, the state assessment by IUCN categories was not carried out; in Kazakhstan this index is not applicable.

Forest Bird Index is not applicable in Kazakhstan, there are no prerequisites and information (used only in Europe by Bird Life International / Council for the Census of European Birds / World Wildlife Fund / London Zoological Society)

The Living Planet Index in Kazakhstan is also not applicable - the Living Planet Index is an indicator developed for monitoring the state of the biological diversity of the planet as a whole. LPI is an international population analysis of abundance (rather than reduction and extinction of species) on mass material 1970-2010. WWF and UNEP World Conservation Monitoring Centre (UNEP-WCMC). For groups of species are terrestrial, freshwater, marine; on biogeoregions; on protected areas / not protected areas.

Other biodiversity indices in Kazakhstan are also not used.

Table 3.12.2. Assessment of the performance in meeting the national target for conservation, sustainable use and reproduction of wildlife resources, including artificial breeding of animal species, including valuable, rare and endangered, equivalent to Aichi Target 12.

National assessment indicators	**Program documents which include indicators**	**Indicator value**	**Dynamics of the indicator in 2013-2017**	**Assessment of indicator`s trends (performance assessment)**		
				positive	**negative**	**insufficient**
Extinct species	Strategic plan of the Ministry of Agriculture RK	Prevention	Absence of extinct species	Yes		
Saiga	Strategic plan of the Ministry of Agriculture RK	annual increase in population by 10%	from 187,000 to 152,600 individuals, taking into account the mass mortality of saigas, more than 150,000 individuals of the Betpakdala population in 2015	Yes		
Tugai deer:	Strategic plan of the Ministry of Agriculture RK	annual increase in population by 0.1%	from 465 to 825 individuals	Yes		
Kulan:	Strategic plan of the Ministry of Agriculture RK	annual increase in population by 0.1%	from 3222 to 3984 individuals	Yes		
Argali:	Strategic plan of the Ministry of Agriculture RK	annual increase in population by 0.1%	from 14525 to 16802 individuals	Yes		
Goitered gazelle:	Strategic plan of the Ministry of Agriculture RK	annual increase in population by 0.1%	from 12888 to 13727 individuals	Yes		

There are no extinct species in Kazakhstan and there is a constant increase in protected

animal species. Therefore, the assessment for this problem can be positive. In addition, there is introduction of some species in Kazakhstan.

3.13. Assessment of performance in meeting national targets under Aichi Target 13.

Table 3.13.1. Alignment of national indicators with recommended indicators of performance in meeting the national target for the conservation of genetic resources equivalent to Aichi Target 13.

Recommended Indicators		**National indicators**
Generic indicators	**Specific indicators**	
Trends in genetic diversity of cultivated plants	The amount of genetic resources of plant and zoological origin, intended for the production of food and agriculture, which are stored at special facilities of either medium-term or long-term storage (indicator for SDG target 2.5)	Number of genetic resources in collections
	Number of surveyed / inventoried plant genetic resources for food and agriculture	Scientific research
	The proportion of threatened plant genetic resources for food and agriculture among those that were surveyed / inventoried	No
	Number of standard material transfer agreements reported to the Steering Body of the International Treaty on Plant Genetic Resources for Food and Agriculture	No
Trends in genetic diversity of farmed and domesticated animals	Percentage of local breeds classified as endangered, non-threatened, or category with unknown level of threat of extinction (indicator for SDG target 2.5)	Artificial breeding in captivity
Trends in extinction risk and extinction of wild relatives	Red List Index (wild relatives)	Conservation of rare species of ungulates and saiga In Kazakhstan, the state assessment by IUCN categories was not carried out, the index is not applicable.
	Species Habitat Index (wild relatives)	No
Trends in coverage of wild relatives in protected areas (subject to settlement)	Species Conservation Index (wild relatives)	Number of protected animal species
Trends in genetic diversity species of socio-economic and culturally value	*No specific indicators identified.*	All types of mammals, birds and fish and fur animals are valuable in socio-economic and cultural terms.
Trends in the design and implementation of strategies to minimize genetic erosion and conserve genetic diversity	Level of implementation of the global action plan for genetic resources for food and agriculture	No

In Kazakhstan, the collection of genetic resources and research in this area is monitored.

indicators on artificial breeding in captivity and on preservation of rare species of animals.

The remaining indicators on genetic resources in Kazakhstan are absent.

Table 3.13.2. Assessment of the performance in meeting the national target of preserving genetic resources equivalent to Aichi Target 13

National assessment indicators	Program documents which include indicators	Indicator's value	Dynamics of the indicator in 2013-2017	Assessment of indicator`s trends (performance assessment)		
				positive	negative	insufficient
Number of genetic resources in collections, research	No	No	In the collection of LLP "SPC Microbiology and Virology" 312 strains of microorganisms, including bacteria 123, actinomycetes 105, yeast 35, mycelial fungi 49 are stored. Continuing research on genetic resources is hold. The volume of the gene pool in the context of crops - 72595 samples, including: grains - 29096; grain-fodder - 3259; legumes - 1835; oilseeds - 3778; fodder- 11205; cereals - 1636; vegetables and melons and potatoes - 15453; technical - 2280; fruit and berry - 3682. 2. Replenishment of the gene pool in the context of agricultural crops for 2012-2017 - 16260 samples, including: Grains - 6607; grain-fodder - 1093; legumes - 1253; oilseeds - 535; fodder - 2246; cereals - 486; vegetables and melons and potatoes- 2299; technical - 1230; fruit and berry - 511.	Yes		
Artificial breeding in captivity	No	No	For the period from 2015 to 2017, the Center for the breeding of Houbara bustard produced 2021 birds. More than 300 local residents are involved in ensuring the functioning of the Center. Also, in the period from 2013 to 2017, the United Arab Emirates imported and released into the nature of Kazakhstan 8506 Houbaras and 314 falcons. In Kazakhstan, private nurseries are also engaged in captive falcon breeding. So, for 2007-2014 years the	Yes		

			Falcon nursery of "Sunkar" LLP has released 162 individuals of the falcon-baloban, grown in this cattery in Almaty oblast. For agricultural purposes a wide range of wildlife of the country with the required consumer properties is used. The most successful examples are artificial breeding of deer (Cervus elaphus), wild fur-bearing animals, some of which were successfully bred in captivity: mink (Mustela vison, M.lutreold), sable (Maries zibelind), fox (Vulpes vulpes).			
Protection of rare species of ungulates and saiga	Strategic Plan of the Ministry of Agriculture RK	Annual increase in the number of rare ungulate species by 0, 1% and increase in the number of saigas by 10%	from 187,000 to 152,600 individuals, taking into account the mass mortality of more than 150,000 individuals of the Betpakdala population in 2015; tugai deer: from 465 to 825 individuals; Kulan: from 3222 to 3984 individuals; argali: from 14525 to 16802 individuals; goitered gazelle: from 12888 to 13727 individuals	Yes		
Number of protected animal species	No	No	An analysis of the current state of the natural reserve fund of the Republic of Kazakhstan shows that out of 178 mammal species, 140 (78.6%) are protected, among them 22 species listed in the Red Book of the Republic of Kazakhstan (2011 release), 346 species of birds (87.4%), 31 species of reptiles (63.2%), 23 species of fish (22.1%), but they far do not ensure the preservation of the unique floristic and fauna diversity of Kazakhstan and support the steady state of the whole complex of natural ecosystems	Yes		Yes

In Kazakhstan, collections of genetic resources are constantly refilled. Scientific research is being conducted in this direction as well. Breeding of certain species in captivity is also taking place. For example, in 2014, in order to implement the project, a cooperation agreement was signed between the Forestry and Hunting Committee and the International Fund for the Conservation of Houbara bustard in Abu Dhabi (UAE). The number of protected species requires

an increase. The overall assessment for this target may be positive.

3.14. Assessment of performance in meeting national targets under Aichi Target 14.

Table 3.14.1. Alignment of national indicators with recommended indicators of performance in meeting the national target to improve the well-being of the population, the quality of the environment and increase the water security of the population equivalent to Aichi Target 14

Recommended Indicators		**National indicators**
Generic indicators	**Specific indicators**	
Trends in the conservation of ecosystems that provide important services	*No specific indicators planned.*	Amount of renewable water resources Water productivity in agriculture
Trends in extinction risk and extinction of populations of species providing essential services	Red List Index (species used for food and medicine; pollinator species)	No
	Living Planet Index (species used)	No
	Species habitat index (species providing important services)	No
Trends in benefits provided by ecosystem services	Better life index	No
	Mountain vegetation index (indicator for SDG target 15.4)	No
	Percentage of protected areas among areas important for mountain biodiversity (indicator for SDG target 15.4)	Separately, mountain protected areas are not considered.
	Ocean Health Index	Not applicable
Trends in ecosystem restoration that provide important services	*No specific indicators identified.*	Restoration of the Aral Sea
Trends in the level of needs of women, indigenous peoples and local communities, and the poor and vulnerable sectors of the population through ecosystem services	Scale of moderate or acute food insecurity (based on scale for assessing food insecurity experienced)	No
	Proportion of population using water supply services organized in compliance with safety requirements (indicator for SDG target 6.1)	Urban access to the centralized water supply system Access of the rural population to the centralized water supply system

In Kazakhstan, monitoring covers only aquatic ecosystems and public access to water resources; various indices of mountain and plant biodiversity are not applied. In accordance with international projects, the restoration of the Aral Sea is being monitored.

Table 3.14.2. Assessment of performance in meeting the national target to improve the well-being of the population, the quality of the environment and increase the water security of the population, equivalent to Aichi Target 14.

National assessment indicators	**Program documents which include**	**Indicator's value**	**Dynamics of the indicator in 2013-2017**	**Assessment of indicator`s trends (performance assessment)**

	indicators			positive	negative	insufficient
Amount of renewable water resources	No	No	In 2013 - 121100 million m ^{3} in 2015 – 107400		Yes	
Water productivity in agriculture	Concept of transition of the Republic of Kazakhstan to Green Economy	Increase	From 2013 to 2016 increased by 2 times	Yes		
Restoration of the Aral Sea	No	No	Restored Small Aral Sea	Yes		
Urban access to the centralized water supply system	Concept of transition of the Republic of Kazakhstan to Green Economy	100% by 2020	In 2013 - 55%, in 2016 - 88%	Yes		
Access of the rural population to the centralized water supply system	Concept if transition of the Republic of Kazakhstan to Green Economy	80% by 2020	In 2013 - 11% in 2016 - 52.3%	Yes		

The number of renewable freshwater resources tends to decrease, but is mainly due to natural factors, possibly related to climate change. The use of water resources by neighboring States is partially affected.

The measures taken for water conservation in agriculture and the provision of water to the population are quite effective and achieve the established program indicators. The restoration of the Small Aral Sea is especially effective. Therefore, the overall assessment for this target can be positive.

3.15. Assessment of performance in meeting national targets under Aichi Target 15.

Table 3.15.1. Alignment of national indicators with recommended indicators of performance in meeting the national target of preventing and restoring degraded ecosystems, adapting to climate change and combating desertification equivalent to Aichi Target 15.

Recommended Indicators		National indicators
Generic indicators	**Specific indicators**	
Trends in ecosystem resilience	*No specific indicators identified.*	Reduction of forest fires Reduction of illegal logging Disturbed land Reclamation of disturbed land water erosion Wind erosion Overgrazing
Trends in carbon stocks in ecosystems	Trends in forest carbon stocks	Carbon runoff
	Global Ecosystem Restoration Index	No

Analysis of this table illustrates that there is direct monitoring of indicators on forest and land degradation, which are essential for the conservation of ecosystems and their biodiversity.

Table 3.15.2. Assessment of performance in meeting the national target of preventing and restoring degraded ecosystems, equivalent to Aichi Target 15.

National assessment indicators	Program documents which include indicators	Indicator's value	Dynamics of the indicator in 2013-2017	Assessment of indicator`s trends (performance assessment)		
				positive	negative	Insufficient
Reduction of forest fires	Strategic plans of the Ministry of Agriculture RK	Reduction of the average area of forest fire to 10.8 hectares	2013 - 3.5 hectares 2014 - 2.2 hectares 2015 - 1.8 hectares 2016 - 0.9 hectares 2017 - 11.0 hectares, on average for 5 years - 6.5 hectares	Yes		Yes
Reduction of illegal logging	Strategic plans of the Ministry of Agriculture RK	Illegal logging volume	2013 - 2971 m^3 2014 - 4325 m^3 2015 - 19426 m^3 2016 - 2624 m^3 2017 - 29150 m^3		Yes	
Disturbed land	No	No	Increased from 247,136 thousand hectares in 2013 to 248,297 thousand hectares in 2017		Yes	
Reclamation of disturbed land	No	No	Decreased from 2,147 thousand hectares in 2013 to 1,152.8 thousand hectares in 2017		Yes	
Water erosion	No	No	Virtually unchanged and amounts to 4.9 million hectares		Yes	
Wind erosion	No	No	Virtually unchanged at 24.2 million ha		Yes	
Overgrazing	No	No	Virtually unchanged and amounts to 27.1 million hectares		Yes	
Carbon stocks by forests	No	No	Since 1995, greenhouse gas emissions from forests have become positive[75] in 2013 - 7351.11 thousand tons of CO_2 - eq. In 2014 - 10,649.05, in 2015 - 13993.93.		Yes	

[75]The Seventh National Communication and the Third Biennial Report of the Republic of Kazakhstan of the UN Framework Convention on Climate Change 2017

Analysis of this table illustrates the negative dynamics (performance assessment) of all indicators on the factors of degradation of ecosystems that are most important for biodiversity. Moreover, as a rule, improvement of these negative factors is not planned within state plans and programs. The increase in greenhouse gas emissions by forests is particularly noteworthy.

3.16. Assessment of performance in meeting national targets under Aichi Target 16.

Table 3.16.1. Alignment of national indicators with recommended indicators of performance in meeting the national target of creating and operating a national Clearing House Mechanism under the Nagoya Protocol equivalent to Aichi Target 16

Recommended Indicators		**National indicators**
Generic indicators	**Specific indicators**	
Trends in the implementation of the Nagoya Protocol	Deposit of the instrument of ratification, acceptance, approval or accession to the Nagoya Protocol	Accession to the Nagoya Protocol
	Adopt legislative, administrative and policy frameworks to ensure fair and non-discriminatory distribution of benefits (indicator for SDG target 15.6)	Adoption of legislative and administrative measures for the implementation of the Nagoya Protocol

Analysis of the table shows the alignment of national indicators with indicators of the CBD.

Table 3.16.2. Assessment of the performance in meeting the national target of creating and operating a national Clearing-house mechanism under the Nagoya Protocol, equivalent to Aichi Target 16.

National assessment indicators	**Program documents which include indicators**	**Indicator's value**	**Dynamics of the indicator in 2013-2017**	**Assessment of indicator`s trends (performance assessment)**		
				positive	**negative**	**insufficient**
Accession to the Nagoya Protocol	No	No	By Decree of the President of the Republic of Kazakhstan dated March 17, 2015 No. 1025 Kazakhstan acceded to the Nagoya Protocol	Yes		
Adoption of legislative and administrative measures to implement the Nagoya Protocol	No	No	Preparations for the adoption of legislative acts are underway.		Yes	

Kazakhstan has acceded to the Nagoya Protocol but has not yet taken legislative and administrative measures to implement it. Therefore, the assessment of this target may be positive, but the measures taken are not sufficient.

3.17. Assessment of performance in meeting national targets under Aichi Target 17.

Table 3.17.1 Alignment of national indicators with recommended indicators of performance in meeting the national target to adopting national biodiversity strategy and action plan equivalent to Aichi Target 17.

Recommended Indicators		**National Indicators**
Generic indicators	**Specific Indicators**	
Trends in the development, adoption and implementation of national biodiversity strategies and action plans (NBSAPs) as policy tools	Designed or revised NBSAPs	Development of the Concept on Biodiversity
	NBSAP adopted as policy tools	Biodiversity Concept Approved

The NBSAP has been developed and updated in accordance with the recommendations of UNEP-WCMC but it has not been yet approved by the Government of the Republic of Kazakhstan as a strategic document, supported by public funding and binding.

Table 3.17.2. Assessment of performance in meeting the national target of adopting national biodiversity strategy and action plan equivalent to Aichi Target 17.

National assessment indicators	**Program documents which include indicators**	**Indicator's value**	**Dynamics of the indicator in 2013-2017**	**Assessment of indicator`s trends (performance assessment)**		
				positive	**negative**	**insufficient**
Development of the Biodiversity Concept	No	No	Biodiversity Concept developed	Yes		
Biodiversity Concept Approved	No	No	Biodiversity Concept is not approved		Yes	

Presently, CFW of the MoA RK is developing state sector programs for the development of forestry and protected areas, wildlife, fisheries. The goals and objectives of the Biodiversity Concept will be integrated into these sectoral development programs. However, measures to adopt the Biodiversity Concept as a single long-term strategic document in order to achieve the Aichi Target 17 will continue to be taken.

3.18. Assessment of performance in meeting national targets under Aichi Target 18.

Table 3.18.1**.** Alignment of national indicators with recommended indicators of performance in meeting the national target for conservation and reviving the intangible cultural heritage, equivalent to Aichi Target 18.

Recommended Indicators		**National indicators**
Generic indicators	**Specific indicators**	
Trends in land use change and land tenure in the traditional territories of indigenous and local	a) Percentage of people who own or have a guaranteed right to use agricultural land (among the population engaged in agriculture), disaggregated by sex; (b) Proportion of women	Number of owners and land users, including men and women. Percentage of women heads

communities (decision X / 43)	owning or having the right to use agricultural land, disaggregated by land tenure (indicator for SDG target 5.a)	of peasant and farm households
	Percentage of total adult population with guaranteed land tenure rights, supported by legally recognized documents, and considering their land rights guaranteed, by sex and by land tenure (indicator for SDG target 1.4)	Norms of the Land Code of the Republic of Kazakhstan
Trends in the practice of traditional occupations (decision X / 43)	*No specific indicators identified.*	No
Trends in respect for traditional knowledge and practices achieved through their full integration into the national implementation process of the Strategic Plan, their protection and the full and effective participation of indigenous peoples and local communities in this process	Number of local community-based systems for monitoring traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity	No
Trends in linguistic diversity and abundance of speakers of indigenous languages (decisions VII / 30 and VIII / 15)	Linguistic Diversity Index	No

In Kazakhstan, from the recommended indicators, statistical monitoring is conducted only on owners and landowners, including the gender aspect.

Table 3.18.2. Assessment of performance in meeting the national targets of conservation and reviving the intangible cultural heritage, equivalent to Aichi Target 18.

National assessment indicators	**Program documents which include indicators**	**Indicator's value**	**Dynamics of the indicator in 2013-2017**	**Assessment of indicator`s trends (performance assessment)**		
				positive	**negative**	**insufficient**
Number of owners and land users, including men and women.	No	No	Total, men 2013 — 2633489 2014 — 2333740 2015 — 2678797 2016 — 2748637 Women: 2013 — 994661 2014 — 1112332 2015 — 1063053 2016 — 1069288	Yes		
Percentage of women heads of peasant and farm	No	No	2013 — 18,3% 2014 — 18,7% 2015 — 20,3% 2016 — 20,7%	Yes		

households						
Norms of the Land Code of the Republic of Kazakhstan	No	No	According to the Article 23 of the Code, private property of citizens of the Republic of Kazakhstan may be land plots for conducting peasant or farm economy, personal subsidiary economy, forest cultivation, gardening, individual housing and house construction, according to their purpose.	Yes		

The analysis of this table shows positive tendencies of increase in number of land owners in Kazakhstan, including women owners. The proportion of women heads of peasant and farm households is also increasing.

3.19. Assessment of the performance in meeting national targets under Aichi Target 19.

Table 3.19.1. Alignment of national indicators with recommended indicators of performance in meeting the national target of on the implementation of applied scientific research in the field of forestry, wildlife and specially protected natural areas with further implementation of scientific developments, equivalent to Aichi Target 19.

Recommended Indicators		**National indicators**
Generic indicators	**Specific indicators**	
Number of inventories of conserved species used for the implementation of the Convention	Species represented in the data system barcode - life	No
	Increase in the number of species distribution records available through the Global Biodiversity Information Facility	No
	Species Status Information Index	Preparation of biological justification on the harvesting of game species
	Percentage of known species that were assessed using the IUCN Red List	Update of the Red Book of Kazakhstan

Table 3.19.2. Assessment of performance in meeting the national target on the implementation of applied scientific research in the field of forestry, wildlife and specially protected natural areas with further implementation of scientific developments, equivalent to Aichi Target 19.

National assessment indicators	**Program documents which include**	**Indicator's value**	**Dynamics of the indicator in 2013-2017**	**Assessment of indicator`s trends (performance assessment)**

	indicators			positive	negative	insufficient
Preparation of biological justification on the removal of hunting species.	Strategic plan of the Ministry of Agriculture RK	Game species withdrawal limit, in accordance with the withdrawal rate	Taking of hunting animals according to the approved withdrawal limit	Yes		
Updating the Red Book of Kazakhstan	No	No	In Kazakhstan, it is planned to conduct an revision of the List of rare and endangered species of animals (the Red Book of the Republic of Kazakhstan), in order to align it with the categories of the International Union for Conservation of Nature (IUCN) and generally accepted international requirements.	Yes		Yes

Scientific research in Kazakhstan is done on a constant basis. Therefore, performance in meeting this target can be assessed as positive.

3.20. Assessment of performance in meeting national targets under Aichi Target 20.

Table 3.20.1. Alignment of national indicators with recommended indicators of performance in meeting the national target of providing the conservation of biodiversity with sufficient financial resources from all sources, equivalent to Aichi Target 20.

Recommended Indicators		National indicators
Generic indicators	**Specific indicators**	
Trends in mobilizing financial resources	Information provided through the Financial reporting framework approved in decision XII/3 (https://chm.cbd.int/search/financial-reporting)	presented
	The amount of official development assistance and public expenditure allocated to the conservation and sustainable use of biodiversity and ecosystems (indicator for SDG targets 15.a and 15.b)	Total environmental investment and costs Costs of management, ensuring the conservation and development of forest resources and wildlife

Information on financial statements is presented in the framework of BIOFIN project. Statistics on total costs and investments in environmental protection include data from all sources.

Table 3.20.2. Assessment of the performance of the national target of providing the conservation of biodiversity with sufficient financial resources from all sources, equivalent to Aichi Target 20.

National assessment indicators	**Program documents which include indicators**	**Indicator's value**	**Dynamics of the indicator in 2013-2017**	**Assessment of indicator`s trends (performance assessment)**		
				positive	**negative**	**Insufficient**
Total environmental costs	Strategic plan MoA RK, ME RK	No	2013 - 218.9 billion tenge 2016 - 196.1 billion tenge		Yes	
Investment in environmental protection	Environmental protection plans for industrial companies	No	2013 - 77.5 billion tenge 2016 - 43.9 billion tenge		Yes	
Costs of management, ensuring the conservation and development of forest resources and wildlife	Strategic plan of the Ministry of Agriculture of the Republic of Kazakhstan for 2017-2021	13% increase in funds	2013 - 15372907 thousand tenge; 2017 - 17406943.3 thousand tenge	Yes		

The analysis of the above table demonstrates negative dynamics (performance assessment) of all indicators on environment protection funding. This is linked to the general decline of production after 2015 which is slowly restoring now. There are no measures envisaged for the improvement of these indicators by national programs.

At the same time, according to the budget program 256 "Management, conservation and development of forest resources and wildlife" according to the report of the Committee of Forestry and Wildlife for 2017 in order to create conditions for the conservation of biological diversity, increasing the resource potential of forests, rational use of biological resources, their protection and reproduction, funds in the amount of 17406943.3 thousand tenge were used. In 2013 for the same purpose 15372907.0 thousand tenge were spent. The growth is 113%. This program is aimed at protection, reproduction and rational use of forests, fauna and objects of the State Nature Reserve Fund, organization of ecological tourism on the territory of PAs, carrying out applied scientific researches in the field of forestry, fauna and specially protected areas with further introduction of scientific developments into production.

However, in general, the performance assessment for this target can only be negative, since a stable system with financial resources for ensuring the conservation of biodiversity has not been created.

Section IV. Description of the national contribution towards each Aichi global target for the conservation and sustainable use of biodiversity in the industrial sector.

4.1. National contribution of Kazakhstan towards achievement of Aichi Target 1.

Kazakhstan is always increasing introduction of environmental education at all levels. In the standard curricula of higher education institutions in all specialties in the cycle of general subjects the mandatory subject is "Ecology and Sustainable Development" to be delivered within 90 hours. Since 2013, the following topics have been introduced into the model curriculum: "Economic aspects of sustainable development. Green economy and sustainable development. Water Resources Management", "Ecoenergy. The strategy of global energy-ecological sustainable development in the XXI century. Renewable energy sources. In 2014-2016, 10 professional standards were developed for 20 specialties related to the protection and use of water and land resources. In 2017, 4 professional standards were developed in the areas of "Water Management"; "Fisheries"; and "Forestry".

Hosting of the international exhibition **EXPO-2017** in Kazakhstan was of great importance in the formation of international environmental culture and education**.** Never before has an international exhibition of this scale been held in the Central Asian region and the CIS.

EXPO-2017 is an international specialized exhibition under the auspices of the International Bureau of Exhibitions (BIE), held in the capital of Kazakhstan , Astana, from 10 June to 10 September 2017 . During this time the exhibition was visited by about 4 million people. High-ranking officials from 40 countries visited the exhibition and dozens of companies presented their products. The exhibition was attended by 115 countries and 22 international organizations[76].

The theme "Energy of the Future" chosen by Kazakhstan meets the global trend of the need for a gradual transition to renewable energy sources. The Energy of the Future project is based on the ideology of sustainable development that is understood as a process aimed at meeting economic and social needs while preserving cultural diversity and clean environment. The Energy of the Future concept also involves raising awareness about energy, as one of the basic values of humanity, involving a responsible and effective approach.

EXPO 2017 has focused on the idea of personal responsibility and personal participation of everyone in the creation and implementation of a sustainable plan for the production, distribution and use of Future Energy. The World Congress of Engineers and scientists WSEC-2017 "Energy of the Future: Innovative scenarios and methods of their implementation" was held within the framework of Expo-2017 and as well as a large number of other activities.

Post-Expo use of the complex envisages establishment of the International Center for Green Technologies, targeting new generation - students, young scientists and entrepreneurs, as well as young families from both Kazakhstan and from abroad.

The initiative to establish the International Center for the Development of Green Technologies and Investment Projects "Energy of the Future" was announced by the Head of the State N. Nazarbayev at the 70th Session of the UN General Assembly.

It is worth mentioning that the creation of the International Center for Green Technologies in Kazakhstan was supported by many international organizations, in particular UNDP, UNEP, the United Nations Economic Commission for Europe, OSCE, ESCAP, UNIDO and the Astana International Finance Center and others.

Besides consulting services, training and demonstration of technologies, including expertise, advising on green financing the Center for Green Technologies will help to accelerate implementation of green economy projects.

The centre will focus primarily on the Central Asian countries (Republic of Kazakhstan,

[76] https://www.inform.kz/ru/itogi-ekspo-2017-predstavili-v-mezhdunarodnom-byuro-vystavok_a3072543

Republic of Uzbekistan, Kyrgyz Republic, Tajikistan, Turkmenistan), Iran, Afghanistan, Mongolia, Belarus and Azerbaijan and others.

Constant increase of the information flow on biodiversity conservation is very important. In most of the PAs, nature museums have been established, school forestries work in the state forestry institutions and nature conservation institutions, which organize and conduct environmental campaigns every year: "March of Parks", "Zhassyl zhapyrak" "Kazakhstani Day of Tree Planting", "Day of the Earth", "Plant Your Tree", "Green Kazakhstan" and others. On the issues of biodiversity conservation, dozens of films have been made that are shown on television.

Moreover, in frames of almost all international projects implemented in Kazakhstan, there are components for training and public awareness, various training seminars, round tables and conferences are being held.

4.2. National contribution of Kazakhstan towards achievement of Aichi Target 2.

In Kazakhstan, activities to introduce the economic valuation of ecosystem services were done in pilot form and carried out only in the framework of international projects.

Pilot examples of assessing the value of ecosystem services were conducted in the Karkaraly National Park and in Ili-Balkhash National Nature Reserve which will be created in 2017. In the Karkaraly National Park, the study determined the annual value of flows of ecosystem goods and services (tourism and recreation, CO2 absorption, forest by-products, pastures, water supply) equal to KZT 12.935 million or USD 86.2 million (at the dollar exchange rate for 2012)[77]. However, this amount is only a small part of the real value of the National Park which in principle is very difficult to estimate. As part of the study of the economic value of the ecosystem services of Ili-Balkhash Reserve, 11 services were evaluated – carbon sequestration by forest ecosystems, soil protection, redistribution of sediments, medicinal plants, wildlife resources, maintenance of hydrological regime, fishery resources, water resources, tourism and recreation, hay, carbon sequestration by pasture ecosystems. The total value of ecosystem services for the base year (2015) was USD 25.8 million[78], and this amount exceeded more than 4 times the amount of required capital investments for the creation and development of the reserve[79].

In Kazakhstan, the economic assessment of protected areas is especially important when developing a feasibility study for protected areas and preparing a management plan for protected areas, as well as when making decisions about various investment projects affecting protected areas, migration routes and habitats of animals and birds, plant ranges. Available tools for assessing biological resources and ecosystems, such as EIA, require improvement.

The economic assessment can play an important role in the development of tariffs for PA paid services. It can guarantee that fixed prices reflect the maximum (but not full) real value of the goods and services provided, but also serve as means of obtaining accurate prices and market demand data.

4.3. National contribution of Kazakhstan towards the achievement of Aichi Target 3.

In terms of beneficial subsidies for the biodiversity in Kazakhstan it is possible to mention only introduction of subsidies to beekeeping, aquaculture and mariculture, which are introduced in accordance with the State Program of Development of Agro-Industrial Complex for 2017-2021 years. At the same time there are no organic biodiversity and organic farming subsidies that

[77] Methodological guide on economic valuation of ecosystem services of specially protected natural areas, Astana 2014

[78] Economic valuation of ecosystem services of the Ile-Balkash nature reserve, Astana, 2017

[79] https://new-kz.chm-cbd.net/library

are useful for biodiversity in agriculture.

Subsidy rules on partial reimbursement of expenses incurred by a subject of agro-industrial complex in the form of investment (Order No. 317 of the Ministry of Agriculture as of 23 July 2018) provide for 25% reimbursement of investments for:

- purchase of equipment and machinery by fish farms with more than 1 million yearlings;
- purchase of equipment and machinery by lake commercial fish with the areas of at least 50 hectars

Subsidies in the maral breeding are paid for the head of the breeding stock of marals (deer) involved in selection and breeding.

According to the team of the Desert Project: The Eco-Damu micro-credit program financed 83 business projects for the development of sustainable activities in the amount of 275.0 million tenge, 30 projects of which were headed by women, which is a pretty good indicator for rural areas. And as experience has shown, women as borrowers were responsible in terms of timely payment, all projects are sustainable.

According to the participants of the focus group (September 24, 2018), the beneficiaries of the Eco-Damu Microlending Program, such projects are very necessary - especially for women in rural areas where there is a lack of resources. Microcredit at 4% is undoubtedly more accessible than in banks - at 22-28%. This contributes to increasing the socio-economic potential of women.

Also, within the framework of the project training activities were conducted for rural women in the framework of the grant project on tourism, 40 women from Miyaly village were trained felting skills and tailoring national products.

Moreover in 2018 the project work plan included a gender analysis of the UNDP national biodiversity project portfolio, a fact that confirms the promotion of gender equality.

4.4. National contribution of Kazakhstan towards the achievement of Aichi Target 4.

Implementing the decisions of the World Summit of 2012, Kazakhstan in 2013 was **one of the first countries in the world** that adopted, at the state level, the Concept for transition of the Republic of Kazakhstan to Green Economy and has successfully implemented it for 5 years.

The main goals and objectives of this Concept are set in accordance with the country's international environmental obligations, including the Rio principles, Agenda of the 21st century, Johannesburg Plan and Millennium Declaration, as well as global environmental conventions, including Convention on Biodiversity.

This concept can serve as an example for other countries, especially for countries in transition to a market economy.

The following target indicators of the Concept are most important and correspond to global ones:

- reduction of energy intensity of GDP by 10% by 2015 and by 25% by 2020 compared with the initial level of 2008;
- by 2020, a reduction in water consumption per unit of GDP in real terms by 33% compared to 2012, as well as on water resources, the challenge is to solve problems of providing the population with drinking water by 2020 and providing agriculture with water by 2040.
- by 2030, the share of recycled waste should be 40%, and by 2050 - 50%;
- in agriculture, the task is to increase the productivity of agricultural land in 1.5 times by 2020;
- the share of renewable sources in total electricity production is at least 3% by 2020 and 10% by 2030, in general 50% by 2050;
- reduction of greenhouse gas emissions by 15% from the level of 2012 by 2030 and by

25% by 2050.

All listed targets are being successfully reached by Kazakhstan.

The main national contribution of Kazakhstan to the achievement of Aichi Target 4 is reduction of greenhouse gas emissions in accordance with international processes to combating climate change. Kazakhstan, within the framework of the Paris Agreement, provided its quantitative contributions (INDC) to the UNFCCC Secretariat to limit or reduce greenhouse gas emissions for the period from 2021 to 2030, in the form of an unconditional goal of 15% and a conditional goal of 25% until 2030 of the baseline year 1990.

To fulfill its obligations, Kazakhstan has introduced restrictions (allowances) for enterprises that emit more than 20 thousand tons of carbon dioxide per year. Allowances are determined by three-year national plans. In 2013, Kazakhstan launched an internal trading system for quotas, which has been successfully operating up to date.

By 2016 the marginal amount of greenhouse gas emissions in relation to 1990 was 80.5% and did not exceed the figure set by the target indicator. This reduction is due to increased energy efficiency of industrial production in Kazakhstan and the introduction of renewable energy sources (RES).

Also, the **Republic of Kazakhstan ratified 27 environmental conventions and protocols to them.**

Along with the four global environmental conventions, Kazakhstan has ratified such important international documents as the Basel Convention on the Transboundary Movement of Hazardous Wastes, Stockholm Convention on Persistent Organic Pollutants, four UNECE transboundary conventions, Aarhus Convention on Access to Environmental Information, Decision-Making and Justice in Environmental Protection and others.

In accordance with the obligations under the Stockholm Convention, Kazakhstan needs to destroy wastes containing persistent organic pollutants (POPs) before 2028. In terms of the amount of such waste, Kazakhstan ranks second place among the CIS countries after Russia. In order to fulfill its obligations, the Ministry, together with the World Bank, is developing a feasibility study for the construction of a plant for the destruction of POPs-containing and hazardous waste.

Also, Kazakhstan plans to accede to the Minamata Convention, the Framework Convention on Environmental Protection for Sustainable Development in Central Asia, the Protocol on Pollutant Release and Transfer Registers to the Aarhus Convention, etc.

At the 66th session of the UNGA, the Republic of Kazakhstan initiated the Green Bridge Partnership Program (hereinafter referred to as the GBPP) and was endorsed by all states at the United Nations Conference on Sustainable Development as an interregional initiative on sustainable development, which is voluntary and open to all partners.

In addition, at the Rio+20 World Summit, Kazakhstan's GBPP initiative was included in the final document of the summit "The Future We Want" and supported by the international community[80].

According to the results of 2017, the participants of the Charter on the "Green Bridge" Partnership Program are **16 countries** (Kazakhstan, Russia, Kyrgyzstan, Georgia, Germany, Mongolia, Belarus, Montenegro, Latvia, Albania, Finland, Hungary, Bulgaria, Sweden, Spain, Poland) and **16 non-governmental organizations** (Association Finnish Water Forum, Association of Legal Persons Association International Secretariat G-Global, Association of Legal Entities Coalition for Green Economy and Development G-GLOBAL, Establishment-club Zhanata, Public Foundation GREEN BRIDGE & G-GLOBAL, Public Association KazAlliance, German Kazakhstan Society (Germany), PF UNISON (Kyrgyzstan), LLC Scientific and Production Association Green Peak (Russia), OEO Fund for Support of Civil Initiatives (Tajikistan), Green PIK in Turkey (Turkey), MTU Rohiline sild (Estonia), NGO Center of Green

80 The future we want. The final document of the Conference. Rio de Janeiro, Brazil. June 20–22, 2012 http://www.un.org/ru/sustainablefuture/

Standards (Russia), Corporate Development Agency CSR Central Asia (Kyrgyzstan), NGO Ecological Union (Russia), Alternative Energy Club (Uzbekistan).

In order to promote the GBPP ME, 5 major international conferences “Green Bridge” were held.

A Memorandum of Understanding between the ME and ESCAP on the joint implementation of sustainable development priorities in the framework of the GBPP was developed and signed.

4.5. National contribution of Kazakhstan towards achievement of the Aichi Target 5.

Reforestation and afforestation in Kazakhstan have international importance, since the forests of Kazakhstan cover an area of about 13 million hectares.

By 2017, Kazakhstan reached an annual increase of 8.5 thousand hectares of forest covered land. As a result, the forest covered area from 12,548.6 thousand hectares in 2013 increased in 2017 by 158.2 thousand hectares (by 1.3%) to 12,706.8 thousand hectares, and the total area of the State Forest Estate of the republic since 2013 in 2017 increased by 1 million thousand hectares (3.7%).

The increase in the area of forest-covered land was mainly due to the transfer of unstitched forest crops to the forest-covered land, which reached the standards allowing them to be converted into forest-covered land, renewed logging, burying, and dead plantings and glades. The area of non-forest land increased by 1 million 29.4 thousand hectares.

In nurseries of breeding centers, planting material with improved hereditary qualities in the amount of 1,100 thousand units is grown annually.

On the dried bottom of the Aral Sea, 61 thousand hectares of saxaul plantations were created, for which a forest nursery complex was built with a research station in Kazalinsk with a capacity of 4.4 million seedlings per year.

In order to restore ribbon forests of the Irtysh region on an area of 30 hectares, a forest nursery was created with a productivity of 15 million pine seedlings per year.

A unique for Kazakhstan is the creation of a sanitary protective green zone (SPGZ) of the capital of Kazakhstan, Astana, in the conditions of arid steppe, which is being created on the instructions of the President of the Republic of Kazakhstan. In accordance with the Strategic Plan of the Ministry of Agriculture of the Republic of Kazakhstan for 2014-2018, approved by order of the Minister of Agriculture of the Republic of Kazakhstan dated December 15, 2014 No.1-1/665, the total area of the green zone of Astana during its establishment from 1997 to 2017 was 75 thousand hectares, until 2023 it is planned to increase the area to 100 thousand hectares.

A large-scale work to stimulate activities in the field of forestry was carried out within the framework of the project “Conservation of forests and increase in forest cover of the territory of the republic”. The Project was implemented in accordance with the Law of the Republic of Kazakhstan as of June 7, 2007 No. 263-III on ratification of the loan and grant agreements between the Government of Kazakhstan and the International Bank for Reconstruction and Development.

Successful implementation of the project allowed creating more than 100 thousand hectares of forest plantations and, thereby, increasing the forest cover of the territory of the republic, improving the ecological situation in terms of reducing land degradation, desertification, preserving biological diversity, carbon sequestration.

Kazakhstan implements 8 international treaties and agreements related to forestry issues concluded at the governmental and ministerial levels:

1. Agreement on cooperation in the field of timber industry and forestry (September 11,

1998, Moscow).

2. Agreement between the Government of the Republic of Kazakhstan and the Government of the Russian Federation on the establishment of the Altai transboundary reserve (September 15, 2011, Astrakhan).

3. Agreement between the Ministry of Agriculture of the Republic of Kazakhstan and the Ministry of Natural Resources and Ecology of the Russian Federation on the Protection, Reproduction and Use of the Volga-Ural Saiga Group (Saiga tatarika) (September 19, 2012, Pavlodar).

4. Agreement between the Ministry of Agriculture of the Republic of Kazakhstan and the Ministry of Forestry of the Republic of Belarus on cooperation in the field of forestry (November 9, 2012 Astana).

5. Agreement on the prevention and suppression of natural fires in the border areas of the CIS member states (May 31, 2013, Minsk).

6. Agreement between the Government of the Republic of Kazakhstan and the Government of the Russian Federation on the prevention and suppression of forest and steppe fires in border areas (June 2, 2013, Yekaterinburg).

7. Agreement on the conservation and rational use of aquatic biological resources of the Caspian Sea (September 29, 2014, Astrakhan).

8. Memorandum of Understanding on cooperation in the field of forestry and forest restoration in the Republic of Kazakhstan between the Ministry of Environment and Water Resources of the Republic of Kazakhstan and the Forest Service of Korea (June 20, 2014).

Restoration of environmental ecosystems is a much more difficult task than simply reducing emissions, and requires significant expenditures. Nevertheless, such projects are being implemented in Kazakhstan. An example is the project to restore the Small Aral Sea, which is still ongoing.

The project "Regulation of the Syr Darya River and Conservation of the Northern Aral Sea" is funded by the World Bank and the republican budget. The first phase of the project to rescue the northern part of the Aral Sea was completed in 2010. At the first stage, the Kokaral Dam was built to regulate the water level in the Small Sea, after which the water level in the Northern Aral Sea rose by 12 meters and the mineralization of water decreased. The number of fish and its species diversity increased, the microclimate began to change. The distance from Aral to the sea was reduced from 100 to 25 km. The second stage was to start four years later but its start was repeatedly postponed. The second phase of the project will begin in 2018. Upon completion of the project, the sea is expected to approach Aralsk at a distance of one kilometer.

A significant national contribution to the restoration of the unique ecosystems of the Caspian Sea can be considered the implementation of North Caspian Operating Company N.V. (NCOC) a special strategy for the conservation of biodiversity. Biodiversity conservation measures include the development and implementation of wildlife conservation measures based on the results of a study of birds and the Caspian seals. Monitoring of environmental parameters of the environment is also conducted, including studies of air, soil, vegetation, wildlife, sea water and bottom sediments. In total for these purposes in 2013-2017 was spent 2,024 billion tenge. In total, 354.7 million tenge was allocated to environmental protection measures in 2014, in 2015 - 101.5 million tenge, in 2016 - 234.5 million tenge, in 2017 - 493.1 million tenge, mainly on environmental monitoring.

Significant national contribution of all Caspian states, including Kazakhstan, is the signing of four international Protocols to the Framework Convention for the Protection of the Marine Environment of the Caspian Sea (Tehran Convention):

- Protocol on regional readiness, response and cooperation in the event of incidents causing oil pollution (Aktau Protocol);

- Protocol on the Protection of the Caspian Sea from Pollution from Land-Based Sources (Moscow Protocol);

- Protocol on the Conservation of the Biological Diversity of the Caspian Sea (Ashgabat

Protocol);

- The Protocol on Environmental Impact Assessment (Moscow Protocol).

The Aktau Protocol has already been ratified by all the Caspian littoral states and entered into force in 2017.

A significant national contribution to the implementation of Aichi Target 5 in the framework of the implementation of the Stockholm Convention on Persistent Organic Pollutants (POPs) is the **destruction of POPs and other hazardous chemicals** and the rehabilitation of anthropogenically contaminated areas of Kazakhstan.

In 2014, an updated NIP was adopted (a plan to implement the obligations of the Republic of Kazakhstan on the Stockholm Convention on Persistent Organic Pollutants for 2015–2028, approved by Order of the Minister of Energy of the Republic of Kazakhstan as of December 30, 2014 No. 102).

During the implementation of the joint project of the Ministry of Energy (formerly Ministry of Environmental Protection) with UNDP-GEF "Development and Implementation of a Comprehensive PCB Management Plan in Kazakhstan" for 2013-2015, 169 tons of PCB capacitors from 6 enterprises were collected, packed and taken to France for destruction (Coal Department ArcelorMittal Temirtau - 288 pcs., East Kazakhstan Electric Distribution Company - 333 pcs., Ust-Kamenogorsk Condenser Plant - 4 pcs., Alatau Zharyk Company - 348 pcs. and Aksu ferroalloy plant - 13.. pcs.) and 80 tons of PCD oil and waste from 33 transformers of four enterprises (ArcelorMittal Temirtau - 25, Atyrau Oil Refinery - 4, Stepnogorsk Bearing Plant - 2, Kazakhmys - 2). All work was carried out with the participation of funds of enterprises.

In addition, packing and removal of all capacitors and contaminated soil from the Daryal-U facility on the shore of Lake Balkhash was completed for the destruction of all capacitors and contaminated soil.

At the same time, in collaboration with the World Bank in Kazakhstan, work is underway to design and select a site for the construction of a plant for the destruction of POPs.

As a part of the implementation of the Strategic Plan for 2014-2018, the Ministry of Energy has implemented several projects in Kazakhstan for the elimination of historical wastes owned by the republic. Thus, work was carried out on the sale of mercury-containing wastes in Karaganda, oil slags in the Mangistau oblast, in the village of Toguzak, Kostanay oblast, a territory of 4 hectares was cleaned of toxic chemicals. In total in the republican property there are 15 objects of historical waste.

4.6. National contribution of Kazakhstan towards achievement of Aichi Target 6.

Kazakhstan makes a significant contribution to the restoration and increase of fish resources of the country. Until 2017, the Republican state public enterprises annually released into their natural habitat about 168.4 million juveniles of valuable species of fish, including for fish-breeding enterprises:

- Atyrau sturgeon fish factory - 3.5 million sturgeon fingerlings;
- Ural-Atyrau sturgeon hatchery - 3.5 million sturgeon fingerlings;
- Kamyshlybashsky fish farm - 15.2 million pieces of fingerlings and two-year-olds of carp and herbivorous fish;
- Kapshagai spawning and outgrowing farm - 8.4 million pieces of carp and plant-eating fish yearlings;
- Petropavlovsk fish farm - 96 million pieces of larvae and yearling of whitefish and carp;
- Maybalyk fish farm - 41 million larvae and carp yearlings;
- Kazakh production and acclimatization station - 0.8 million pieces of carp and herbivorous fish fingerlings.

In addition, as part of the fulfillment of obligations, in 2016, users of fisheries reservoirs stocked fixed reservoirs in a total volume of more than 180.0 million juveniles of valuable

species of fish (2015 - 200 million pieces).

The international cooperation. Given that the Zhaiyk river is a transboundary water body its use and protection are regulated by the Agreement between the Government of the Republic of Kazakhstan and the Government of the Russian Federation on the joint use and protection of transboundary water bodies of September 7, 2010.

By agreement of the parties, at the 22nd meeting of the Kazakhstan-Russian Commission, from 2016, with the financial support of the United Nations Economic Commission for Europe, joint research was launched to develop a strategy for adapting to changes in water content in the river Zhaiyk, for which the Kazakhstan-Russian project working group was created.

To preserve the ecosystem of the Caspian Sea the following measures are being implemented:

1) A time-based method for counting the stocks of semi-migratory fish species in the Zhaiyk River was developed and tested, giving more reasonable results than the previously used bio-statistical method of stock assessment.

2) In 2015-2017 studies of the state and number of seals in the Kazakhstan sector of the Caspian Sea were carried out, factors threatening the population were identified, and areas for creating protected areas to protect seals were identified.

3) Every year in the Zhayyk-Caspian basin a large-scale fish protection action "Bekir" is held, aimed at identifying and preventing the facts of illegal fishing during spring spawning. This action is held annually with the participation of the inspection for the protection of fish resources, environmental protection and law enforcement agencies of the Republic of Kazakhstan.

4) Every year, in order to preserve and reproduce sturgeon species in the Caspian Sea, two sturgeon fish farms (Atyrau and Ural-Atyrau sturgeon hatcheries) as part of the state order, young sturgeon species are raised and released into the natural environment. In 2015, 7.5 million of juveniles were released, in 2016 - 7.86 mln., in 2017 - 7.0 mln., 2018- 7.0.

5) The "Agreement **on the conservation and rational use of the aquatic biological resources of the Caspian Sea" was signed (Astrakhan, September 29, 2014)**. In June 2016 the Ministry of Agriculture of the Republic of Kazakhstan, as the presiding party to the Commission on Aquatic Biological Resources of the Caspian Sea, held the next 36th meeting of the Commission with the participation of representatives of state fisheries departments of the Azerbaijan Republic, the Islamic Republic of Iran, the Russian Federation and Turkmenistan. Developed joint recommendations for the conservation of aquatic biological resources of the Caspian Sea, as well as recommendations on the total allowable catch of aquatic biological resources in the Caspian Sea.

6) In April 2017 Kazakhstan participated in the CBD regional workshop on promoting the description of ecologically or biologically significant marine areas (EBSAs) in the Black Sea and Caspian Sea region. The Kazakh side proposed to allocate 5 EBSAs in the Kazakh part of the Caspian Sea - Kendirli Bay, Durnev Islands (seal rookery), an ice field transboundary with Russia in the Northern Caspian (seal breeding site), the outflow area of Zhaiyk river (Ural) (the place of pre-spawning concentrations of producers of sturgeon and semi-anadromus fish and their juvenile feeding), pre-living space of Kigash river (cross-border part of the Volga delta with Russia).

The Order of the Chairman of the Committee for Forestry and Wildlife of the Ministry of Agriculture of the Republic of Kazakhstan dated May 14, 2018 No. 17-5-6/135 amended the "Restrictions and prohibitions on the use of wildlife objects" in the Zhaiyk-Caspian basin. The boundaries of the restricted fishing zone in the pre-drainage area of the Zhaiyk river (Urals), where the spawning concentration of sturgeon and semi-migratory fish species occurs, as well as the feeding of their fry, has been significantly expanded.

4.7. National contribution of Kazakhstan towards the achievement of Aichi Target 7.

Kazakhstan was one of the first countries in the world to develop **organic agriculture.** In the field of organic agriculture in November 2015, the Law of the Republic of Kazakhstan "On the production of organic products" was adopted. Many experts believe that today Kazakhstan has significant potential in the field of organic agriculture. For its successful implementation, it is necessary to improve the regulations, raise awareness, as well as organize a quality control system, certification and relevant national institutions.

According to expert estimates,[81] about 30 farms in three oblasts (Almaty, North Kazakhstan and Kostanay) are engaged in organic production in Kazakhstan with a total coverage of about 300 thousand hectares of agricultural land for growing organic wheat, rapeseed, rice and soybeans. They are certified in accordance with international standards, in particular, they comply with the legislation of the European Union".

The United Nations Development Program in Kazakhstan, together with the Ministry of Agriculture, developed a single brand logo for organic food from Kazakhstan - "Organic Food". In matters of certification of organic products, UNDP provided significant support to the Government of the Republic of Kazakhstan in the certification of Kazakhstan honey in China and its promotion to foreign markets.

In Kazakhstan, the volume of production of **aquaculture** products in 2017 amounted to 2,776 tons, its growth by 2021 will reach 5 thousand tons, and the potential volume is estimated at 50 thousand tons. Such growth of aquaculture is possible only with the support of the sector from the state in the form of subsidies and benefits to farmers.

4.8. National contribution of Kazakhstan towards the achievement of Aichi Target 9.

The main national contribution of Kazakhstan to the achievement of Aichi Target 8 is to reduce emissions and discharges of pollutants into the environment. Kazakhstan has ratified and successfully fulfills its obligations under the four UNECE transboundary conventions.

So in 2012, emissions of pollutants into the air from stationary sources amounted to 2,384.3 thousand tons, and in 2016 - 2,271.6 thousand tons, i. e. over 5 years there was an overall decrease of more than 110 thousand tons. In addition, in 1990, emissions of pollutants amounted to 4649, 9 thousand tons, that is, almost 2 times more than at present.

Kazakhstan plans to ratify the Protocol on the Pollutant Release and Transfer Register (PRTR) to the Aarhus Convention and legally created the corresponding internal state register. Already at present users of nature having objects of category I, each year before April 1 provide information about the permitted and actual emissions to the environment, their impact on health and the environment. All information is posted on the website of the Information and Analytical Center for Environmental Protection of the Ministry of Energy of the Republic of Kazakhstan.

Kazakhstan has significantly reduced the volume of associated gas during oil production. The country burns 2.4 billion cubic meters of unused energy carrier annually, forming 7 million tons of emissions. This is stated in the report of the World Bank (WB), published in mid-July 2018 (https://abctv.kz/ru/news/kazahstan-snizil-obemy-szhiganiya-poputnogo-gaza). In 2017, the country burned 2.422 billion cubic meters of associated gas at oil and gas fields. This is 9% less than the level of 2016, when 2.655 billion cubic meters flew into the pipe. At the same time in 2015 oil and gas companies in Kazakhstan burned unused gas in flares in the amount of 3.694 billion cubic meters, in 2014 - 3.932 billion, and in 2013 - 3.764

[81] V.V. Grigoruk, E.V. Klimov. Under the general editorship of Doctor of Agricultural Sciences, Professor Hafiz Mumindjanov. The development of organic agriculture in the world and Kazakhstan. Ankara 2016.

billion cubic meters. Given that the oil production over the years has not decreased or increased. According to the rating report, Kazakhstan ranks 13th in the world in terms of gas flaring. According to the World Bank, taking into account the efficiency of combustion in 98%, 2.4 billion cubic meters of flared associated gas in Kazakhstan yield 7 million tons of emissions, of which 6 million tons are carbon dioxide.

Kazakhstan has very long borders with neighboring states and therefore a significant amount of its water bodies is transboundary. In accordance with the Helsinki Convention on the Protection of Transboundary Watercourses, Kazakhstan has concluded agreements with all neighboring states on the protection and joint use of transboundary rivers.

To reduce pollution of water bodies, **since 2012, the Ministry of Energy of the Republic of Kazakhstan has been pursuing a policy to reduce the allowed limit of pollutant discharges.** So the allowed limit of pollutant discharges in 2016 in the republic was 2.9 million tons, whereas in 2013 it was 4.8 million tons (4.7 million tons in 2014, 3.5 million tons in 2015 year).

4.9. National contribution of Kazakhstan towards the achievement of Aichi Target 9.

By the decision of the Government of the Republic of Kazakhstan, the Committee of Forestry and Fauna of the Ministry of Agriculture of the Republic of Kazakhstan has determined **the CITES Administrative Authority** in the Republic of Kazakhstan to fulfill Kazakhstan's obligations under the Convention. The **fulfillment of the terms of reference** for the issuance of permits to import to Kazakhstan and export species of wild animals, their parts or derivatives included in Annexes I, II, III of the CITES Convention is a mechanism for the collection of information on invasive alien species and control.

In 2017, 223 permits of CITES Convention were issued for import into the Republic of Kazakhstan and export out of it of species of animals, their parts or derivatives.

The purpose of the importation or exportation of samples is commercial operations, scientific research, circus performances or mobile exhibitions, the exchange between zoos, botanical gardens and museums, as well as a personal goal.

It is planned to prepare a list of identified invasive species according to the degree of threats to biodiversity and the creation of an integrated system for collecting information and monitoring.

4.10. National contribution of Kazakhstan towards achievement of Aichi Target 10.

Kazakhstan has the largest population of waterfowl in Asia, more than 130 species. Every six months, more than 50 million birds migrate through Kazakhstan. Of these 20 percent breed in the territory of Kazakhstan[82]".

With the assistance of the Global Environment Facility, the United Nations Development Program and the Government of the Republic of Kazakhstan a project for conservation of wetlands in Kazakhstan was implemented. Thanks to this project seven sites with a total area of more than 1.6 million hectares were listed as wetlands of international importance. In total, 54 objects with a total area of 3914639 ha are currently registered in Kazakhstan. And 10 of them are of international importance.

Kazakhstan`s national report on the implementation of the Ramsar Convention on the Protection of Wetlands for 2018 is presented on the convention website

[82] Kerteshev T.S. Wetlands of Kazakhstan: role, problems and prospects. 2011

(https://www.ramsar.org/sites/default/files/documents/importftpp/COP13NR_Kazakhstan_e.pdf).

In Kazakhstan, as of January 2018, a total of 127 **Important Bird Areas (IBA) have** been allocated. Together, they cover more than 15,400,000 hectares, which is equivalent to 5.7% of the country`s area, with 4,584,592 hectares (39 IBA in whole or in part) being part of specially protected natural areas (PAs). The map of the location of the Important Bird Areas of Kazakhstan with their numbers is presented on the ACBK website[83]

4.11. National contribution of Kazakhstan towards the achievement of Aichi Target 11.

There were active efforts to increase the area of specially protected natural territories, which directly corresponds to the achievement of the goals of the Strategic Plan and Aichi Targets in 2013-2017 in Kazakhstan.

The achievement of this period is the expansion of the territory of 2 PAs:

- Altyn-Emel State National Nature Park in 2015, the area of which was increased by 146,500, 35 hectares and, at present, is 307,653.35 hectares*;*

- Irgiz-Turgay State Nature Reserve, in 2016 the area of which increased by 409,962 hectares and is 1,173,511 hectares.

In the period 2013-2017, a full package of documents was prepared and land reservation was made for another 3 PAs as legal entities but no decisions of the Government of the Republic of Kazakhstan have been adopted yet:

- expansion of the territory of the Barsakelmes State Nature Reserve on the site of the Syr Daria river delta (2,300 ha) at its confluence with the Small Aral Sea, this site is part of the water area that has the status of Ramsar wetlands of international importance;

- creation of the Aral State Nature Reserve (415,000 hectares, dried bottom of the Aral Sea) in the Kyzylorda oblast.

- creation of the State Nature (forest) reserve Zhaiyk Orman (46,969 ha) in the floodplain of the Zhayik river (Ural river) in the West Kazakhstan Oblast.

In June 2018, the Government adopted resolutions on the 2nd new PAs in the status of a legal entity, the creation of which was planned under the Zhassyl Dam Program in 2012-2014, but they are not taken into account in this report, these are:

- creation of the Tarbagatay State National Nature Park (143,550.5 hectares) in the Tarbagatay mountains, Urdjar district, East Kazakhstan oblast*;*

- creation of the state natural reserve Ile-Balkhash (415,164.2 hectares) in the delta of the Ile river, Balkhash district, Almaty oblast; The reserve was created with the financial support of UNDP in Kazakhstan. The World Conservation Fund (WWF-Russia) also provided informational assistance.

Also, with the assistance of UNDP-Kazakhstan, in 2018 the state nature reserve of republican significance Arganaty (12,000 hectares) in the Almaty oblast was created.

In 2014 in accordance with the law of the Republic of Kazakhstan "On Specially Protected Natural Territories", new protected areas in the status of legal entity, **state dendrological parks (SDP), were created in Kazakhstan.** The first in 2014 was the Issyk State Dendrological Park, with an area of 139 hectares based on Forest Nursery JSC (Almaty oblast), its departmental subordination remained the same - the Committee of Science of the Ministry of Education and Science of the Republic of Kazakhstan.

In 2018, by the initiative of CFW MoA RK, work began on the creation of the Shchuchinsk State Dendrological Park in the town of Schuchinsk, Akmola oblast. It is also planned to create a Zhanibek SDP in the West Kazakhstan oblast.

Creation of wildlife corridors as a framework for the ecological network of protected

[83] http://acbk.kz/article/default/view?id=12

areas.

The beginning of the creation of ecological networks in Kazakhstan was at the intergovernmental level, within the framework of GEF/UNDP projects in the region of the Western Tien Shan and the Altai-Sayan Ecoregion (2007-2011), which are currently successfully performing their functions.

In 2012-2013, an ecological corridor was created between the Altyn-Dala DPR and Irgiz-Turgai in the steppe zone of Kazakhstan for the migration of saiga and other wild animals.

In the period 2015-2017, 2 more wildlife corridors were created:

- for the migration of Karatau argali in the mountains of the Western Tien Shan (South Kazakhstan oblast) between the Aksu-Zhabagly and Karatausky reserves;

- for the migration of goitered gazelle and other ungulates between the SNNP Altyn-Emel; and the new GPR Ile-Balkhash; in the Almaty oblast, including the arrangement of aqueducts on the Almaty-Taldykorgan highway.

Such works should be initiated throughout the territory of Kazakhstan, since the positive effect of such actions is quite convincing.

From July 10-17, 2016, the 40th session of the UNESCO World Heritage Committee was held in Istanbul (Turkey). For Kazakhstan, an important outcome of the Istanbul session was the approval of the World Heritage property of the transboundary serial category Western Tien Shan, prepared jointly with Kyrgyzstan and Uzbekistan. International experts highly appreciated the diverse landscapes of the object, which are characterized by exceptionally rich biodiversity.

The nomination Western Tien Shan includes 8 PAs located in the territory of three countries - Kazakhstan, Kyrgyzstan and Uzbekistan. The Kazakhstan part includes two state natural reserves, and one state national natural park: Sairam-Ugam SNNP, Aksu-Zhabagly SNR, Karatau SNR.

The preliminary list of the World Natural Heritage of UNESCO includes the Northern Tien Shan (Ile-Alatau National Park) and the Aksu-Zhabagly Reserve[84] .

Active work is underway to integrate specially protected natural territories of Kazakhstan into the World Network of Biosphere Reserves of UNESCO.

The first biosphere reserve in Kazakhstan appeared in 2012, when UNESCO accepted the first Kazakhstani application of the Korgalzhyn State Nature Reserve.

Currently, already 9 specially protected natural territories of Kazakhstan are included in the World Network of Biosphere Reserves. These are the Korgalzhyn Reserve (2012), the Nauruzum Reserve (2012), Akzhaiyk Reserve (2014), Katon-Karagai National Park (2014), Aksu-Zhabagly (2015), Alakol reserve (2016) and Barsakelmes reserves (2016). In June 2017, the National Park Altyn Emel and Karatau Reserve (2017) are included.

The Great Altai transboundary biosphere reserve, filed jointly by the Russian Federation and the Republic of Kazakhstan, was also included in the World Network of Biosphere Reserves. The Russian part of the biosphere reserve is represented by the Katun Biosphere Reserve, introduced into the World Wide Web in 2000; The Kazakhstani part is represented by the Katon-Karagai Biosphere Reserve introduced in 2014.

The Agreement on the establishment of a transboundary reserve Altai was signed by the Government of the Republic of Kazakhstan and the Government of the Russian Federation on September 15, 2011 in Astrakhan (Russian Federation). In March 2012, this agreement entered into force.

To implement the Agreement, a mixed Kazakhstan-Russian commission has been created. The meetings of the Commission are held once a year on the territory of the parties in turn.

The transboundary reserve Altai was created to preserve the biological and landscape diversity of the mountainous part of Altai, to promote bilateral cooperation in the field of environmental protection and the rational use of natural resources.

[84] Opportunities for Nomination of World Natural and Mixed Heritage Objects in Central Asia. Protocol of the regional seminar of UNESCO.

During the existence of a transboundary reserve, events are being held to exchange experience between employees of the Katon-Karagay SNNP and the Katun Reserve. A section of the RSE Katon-Karagai SNNP has been created on the website of the Katun SNBR, which contains information on PAs and joint partnerships. Currently work is underway to collect materials for a collection of scientific papers devoted to the study of the biodiversity of the Altai TR.

According to the General Scheme for the organization of the Territory of the Republic of Kazakhstan, approved by the Government of the Republic of Kazakhstan No. 256 of May 12, 2017, in order to preserve and develop the network of protected areas of the Republic, the planned target indicators are set: bringing to 2020 25.6 million hectares (9.4% of the territory countries), by 2030 - up to 28.1 million hectares (10.3%), by 2050 - up to 35.6 million hectares (13.0%), which will contribute to the achievement of Target 11. (Annex 18)

4.12. National contribution of Kazakhstan towards the achievement Aichi Target 12.

In 2013-2017 in Kazakhstan as a result of the implementation of effective measures the stabilization of the number of rare and endangered species of wild ungulates in their habitats (tugai red deer, Asiatic wild ass, goitered gazelle, argali) and the positive dynamics of the population of saiga and hunting species were achieved.

Saiga

It is a known fact the saiga is one of the oldest remained species of animals of the Mammoth period. Today the main part of the range and resources of the saiga population (Betpak-dala, Ural and Ustyurt populations) are located on the territory of Kazakhstan.

The modern range of saiga in Kazakhstan covers the territory of ten administrative oblasts: Akmola, Aktobe, Atyrau, Zhambyl, East Kazakhstan, West Kazakhstan, Karaganda, Kostanay, Kyzylorda and Mangystau. The animal habitat also extends to the neighboring regions of Uzbekistan and the Russian Federation.

As a result of the organization of effective work on the protection of saigas, their numbers reached up to 295 thousand individuals by 2015, compared with 2001 (when the lowest number was 21 thousand) increased 14 times.

For more than 10 years in Kazakhstan, successful work has been carried out **on the introduction of rare and endangered species of animals:** houbara bustards, falcons, Bukhara deer (tugai red deer), tiger, Asiatic wild ass, Przewalski`s horse. Successful measures are also being taken to study and preserve the snow leopard.

4.13. National contribution of Kazakhstan towards the achievement of Aichi Target 13.

In Kazakhstan, the conservation of natural genetic resources is carried out using the *in situ and ex situ* method. The first method is used mainly in the territories of the State Forest Estate and in specially protected natural territories. In particular, in areas of the forest with the presence of relict and endemic species that are unique not only in their species composition, but also in their productive and genetic qualities, as well as which perform important protective functions in difficult conditions, a special category of forest valuable forest land, which has the status of a reserve, where all types of forest use are prohibited. Such plots are distinguished when planning a forest inventory, which is held every 10-15 years.

Ex situ conservation methods are used by research institutes, botanical gardens, which are part of the Ministry of Education and Science of the Republic of Kazakhstan and the research holding JSC KazAgroInnovation of the Ministry of Agriculture, zoological parks and nurseries

of Kazakhstan.

Botanical gardens play an important role in the preservation of the gene pool of plants. They have a documented collection of living plants and use it for scientific research, plant biodiversity conservation, demonstration and educational purposes, as well as for international exchange in the framework of the International Council of Botanic Gardens. There are 5 of them in Kazakhstan: The chief, Altai, Ili, Zhezkazgan, Mangyshlak, with a total area of 424 hectares. They are created in different natural zones and have their own specialization.

The most representative collection of flora is in the Main Botanical Garden, which has over 7,000 species, varieties and forms of plants, as well as a collection fund of woody plants - 895 taxa from 49 families and 129 genera. The Alpinaria exhibition has about 200 species of native plants and more than 100 species and varieties widely used in the culture of herbaceous perennials and miniature bushes. In the Altai Botanical Garden there are 3,600 species, forms, plant varieties, in the Mangyshlak Experimental Botanical Garden there are 936 plant taxa, including a collection of woody plants - 321 species belonging to 64 genera and 29 families, etc.

The RSE on PVC Institute of Botany and Phytointegration has 250,000 species of herbaria of bryophytes, ferns, gymnosperms and angiosperms. There are more than 500 collections of fossil plants collected in various regions of the country. This is the largest collection of remnants of the Jurassic, Cretaceous, Paleogene and Neogene periods not only in Kazakhstan but throughout Central Asia.

Some international projects were implemented with the participation of a number of research groups in the south and south-east of the country:

- The pilot project of the country of UNDP-GEF *In situ conservation of* mountain agrobiodiversity in the Republic of Kazakhstan is aimed at preserving the gene pool of globally significant wild fruit (apple, apricot) reserves at the local level;

- GEF-UNEP regional project *In situ conservation/on the farm* and the use of agricultural biodiversity (fruit crops and their wild related forms) in Central Asia.

4.14. National contribution of Kazakhstan towards the achievement of Aichi Target 14.

Guaranteed water supply to the population is one of the most important goals of sustainable development not only in Kazakhstan, but throughout the world.

In Kazakhstan it is planned to provide the population with access to centralized water supply by 2020 in cities - 100%, in rural areas - 80%, and by 2030 - 100% of the total population.

As a result of the use of water-saving technologies, the **productivity of water resources in agriculture** increased almost 1.5 times. The overall labor productivity in agriculture has increased almost 2 times, and the grain yield is almost 15%.

The solution to the problem of reducing the consumption of water and other resources is carried out through the introduction of water and resource-saving technologies in most agricultural land. Thus in the report of the Minister of Agriculture in 2016, it was noted that currently in Kazakhstan the use of “zero” technologies is carried out on an area of 3.0 million hectares, resource-saving technologies on an area of 12.6 million hectares, which is more than 84% of the total cereal area. For comparison, in 2013 this figure was 78%. In total, according to the Ministry of Agriculture and the Akimats of oblasts in 2014, in the sown areas of the republic, the use of the drip irrigation method is 38,922 hectares. This figure compared with 2013 increased by 7050 hectares. The area where this water saving method was implemented increased in Almaty oblast by 728 hectares, Zhambyl - 114 hectares, Karaganda - 82 hectares,

Mangistau - 173 hectares, North Kazakhstan - 46 hectares and South Kazakhstan by 5990 hectares.

4.15. National contribution of Kazakhstan towards the achievement of Aichi Target 15.

In addition to reducing pollution, it is very important to preserve natural water bodies with a sufficient amount of water in order to preserve biodiversity of near-water ecosystems. To solve the tasks of **providing natural water bodies** set by the Strategy "Kazakhstan-2050", environmental releases, shore protection and dredging works are annually held.

One of the most problematic natural reservoirs is currently considered **Lake Balkhash.** The water level in the lake is directly dependent on the water content of the year. As of January 1, 2017, the water level in the Lake Balkash was 342.30 m of the Baltic system (BS). The minimum allowable level mark Lake Balkhash - 341 m BS, so at present the level regime of the lake does not cause any particular concerns.

With the support of the World Bank, the Third Aral Sea Basin Program (ASBP-3) was implemented on the **Aral Sea** problem, to address the rationing of environmental and sanitary water releases in the Aral-Syrdarya basin, the Small Aral dam's capacity was increased to the absolute level of 48 m; management of irrigated ecosystems; phytomelioration works were carried out to prevent degradation and restoration of land in the Aral Sea Basin; an information system on the Aral Sea. At the same time, the mirror area of the Small Aral was expanded almost to the city of Aralsk, the ecosystems of the Syrdarya river delta were restored, the salt and dust transfer in the Kazakhstan sector of the Large Aral was reduced.

In 2018 the UNDP/GEF project "Improving the sustainability of the system of specially protected areas in desert zones through the promotion of biodiversity-compatible sources of livelihood in and around protected areas" was completed. As part of this project, to ensure the **sustainability of desert ecosystems to human impacts, climate change and environmental risk:**

- the territory of the national natural park Altyn-Emel is expanded on an area of 146,500 hectares (Resolution of the Government of the Republic of Kazakhstan dated December 24, 2015 No. 1047);

- The State Natural Reserve Ile-Balkhash was created in the Almaty oblast on an area of 415,164 hectares (Decree of the Government of the Republic of Kazakhstan dated June 27, 2018 No. 381);

- the Arganatinsky complex natural reserve of local significance was created on the area of 186,960 hectares (Resolution of the Akimat of the Almaty oblast of April 24, 2018 No. 188);

- technical documents (NSR and feasibility studies) have been prepared for the extension of the territory of the Ustyurt reserve to 78,000 hectares;

- a local reserve Zhabaushkan was created on the area of 316,141 hectares (Resolution of the Akimat of Mangystau Oblast No. 53 of February 27, 2015);

- lands for the expansion of the Barsakelmes Reserve by the Akimat of Kyzylorda Oblast on the area of 2,300 hectares (resolution of the Akimat of Kyzylorda Oblast No. 897 of October 10, 2017) were reserved;

- a wildlife corridor Kapshakay-Balgash was created on an area of 973,765 hectares (Resolution No. 51 of the Akimat of Almaty Oblast dated February 21, 2018).

The total area of the expansion of the network of protected areas in the desert areas amounted to 2 million 388 thousand hectares.

4.16. National contribution of Kazakhstan towards the achievement of Aichi Target 16.

In order to ensure the implementation of the Nagoya Protocol on its territory, Kazakhstan became a member of the UNDP-GEF Global Project "Strengthening Human Resources, Legal Framework and Institutional Capacity to Implement the Nagoya Protocol" (2017-2019). The project implementer in Kazakhstan is the UNDP Country Office, as well as the Institute of Ecology and Sustainable Development (Almaty), which became the winner of the competition held by UNDP.

International exchange (purchase and sale) of rare and endangered species of flora and fauna, their parts and derivatives is carried out in accordance with CITES obligations. Permission for their movement (import-export) and control over their implementation is carried out through the country by the national administrative and scientific bodies of the Convention.

International scientific exchange (trade) of species of flora and fauna, their parts and derivatives is possible based on international agreements (agreements) to which Kazakhstan is a party.

The main movement of genetic material from natural species of flora and fauna facilitates the exchange between scientific botanical gardens and zoos. In particular, according to available information, within the framework of the International Council of Botanical Gardens, national botanical gardens exchange planting materials and seeds to replenish the collections of 108 botanical gardens from 48 countries.

Kazakhstan is a party to:

1. Agreement on cooperation in the field of conservation and use of plant genetic resources of the CIS countries (entered into force on October 16, 2000). Along with the issues of mutually beneficial cooperation in this area, the Agreement provides for:

- implementation of mutually beneficial exchange of genetic resources of cultivated plants and their wild close forms;
- mutually beneficial access to samples of the gene pool of plants gathered together in the gene pools of the former Soviet republics;
- assistance in the creation of national banks of plant genetic resources based on the exchange of the gene pool, methods and technologies of work;
- creation of joint automated databases of the national gene pool for the accelerated use of plant genetic resources in breeding programs;
- support of free and duty-free movement of gene pool samples across borders, taking into account the requirements of phytosanitary control.

2. The agreement of the CIS Council of Heads of Government on the legal protection of plant varieties (entered into force on November 29, 2004), which aims to cooperate in order to create the most favorable conditions for the protection, use, transfer and distribution of plant varieties for the mutual benefit of producers and consumers.

Kazakhstan acceded to the Budapest Treaty on the International Recognition of the Deposit of Microorganisms for the Purposes of Patent Procedure. It was signed in Budapest on April 28, 1977 (Law of the Republic of Kazakhstan dated November 16, 2001 No. 259).

4.17. National contribution of Kazakhstan towards the achievement of Aichi Target 17.

CFW MoA RK, with the support of UNDP biodiversity projects, is taking measures to adopt the Concept on biodiversity at the national level. Over the years, this document was presented at a hearing in the Senate of the Parliament of Kazakhstan on the conservation of biodiversity. The Government of Kazakhstan has been notified of the need to adopt the Concept on Biodiversity.

At present, CFW MoA RK is developing state sector programs for the development of forestry and protected areas, wildlife, fisheries. The goals and objectives of the Biodiversity Concept will be integrated into these sectoral development programs. However, measures to adopt the Concept on Biodiversity as a single long-term strategic document in order to achieve the Aichi 17 Target will continue to be taken.

4.18. National contribution of Kazakhstan towards achievement of Aichi Target 18.

Based on the conducted gender analysis in the framework of international projects on biodiversity conservation and analysis of documents on gender equality in the Republic of Kazakhstan, the following general conclusions were made:

1. In recent years, the Republic of Kazakhstan has made significant progress in promoting gender equality. At this stage, there is an impressive legislative and regulatory framework in the country, and a national mechanism has been established to promote gender equality.

2. By joining the post-2015 Development Agenda, the country reaffirmed the fact that the targets of the Sustainable Development Goals (SDGs) coincide with the priorities and objectives of Kazakhstan. Developed a national Concept for transition of the Republic of Kazakhstan to Green Economy, national programs aimed at ensuring sustainable development in key sectors: energy, water, utilities and agriculture, industry, biodiversity.

3. The process of adapting the national statistical system has begun to produce global indicators for monitoring the SDGs, as well as defining additional national indicators that will be relevant for Kazakhstan. A specially created interdepartmental Working Group on the implementation of indicators for monitoring the SDGs is developing a system of indicators that includes both global and national indicators, taking into account the priorities of Kazakhstan including in the field of biodiversity.

4. Kazakhstan is a member of the High-level Group for Partnership, Coordination and Capacity Building to provide statistics for the Agenda for Sustainable Development (HLG) until 2030, consisting of member states, including regional and international UN agencies as observers.

5. In the field of biodiversity, the Republic of Kazakhstan has acceded to the main international documents, bringing the national legislation in line with their standards. A number of major strategic laws and programs have been adopted in the country; a number of structures for agriculture and energy have been created, which also consider biodiversity issues. At the legislative level, equal rights are guaranteed for men and women to access biological resources.

6. As part of the UNDP Kazakhstan project portfolio in the field of biodiversity conservation, numerous initiatives have been implemented aimed at improving the situation and life of the population as a whole. Among the beneficiaries of the projects are men and women.

7. The proposed financial models for projects that deserve undoubted interest and support need a deeper analysis in the context of national priorities and opportunities.

8. For example, the Eco-Damu microcredit program financed 83 business projects for the development of sustainable activities in the amount of 275.0 million tenge, of which 30 projects were headed by women, which is a pretty good indicator for rural areas. And as experience has shown, women as borrowers were responsible in terms of timely payment, all projects are sustainable.

4.19. National contribution of Kazakhstan towards achievement of Aichi Target 19.

The scientific potential of Kazakhstan in the field of biodiversity is represented by both the state and non-state sectors. Financing of scientific research is carried out both at the expense of the state order, and under grants, including foreign ones. Applied research is funded in accordance with the Strategic Plan of the Ministry of Agriculture of the Republic of Kazakhstan.

In Kazakhstan, the leading research institute engaged in basic and applied research in the field of forestry and protective afforestation is the Kazakh Research Institute of Forestry and Agroforestry. It was founded in 1957 and has 3 branches for conducting scientific research in various natural zones of Kazakhstan.

The relevance of the research is determined by the low forest cover of the territory of the republic and, as a result, the need to preserve the existing forests and their biological diversity, the rational use of forest resources, as well as an increase in forest cover.

The main scientific developments have been introduced into forestry production. About 50 acts on the introduction of scientific advances in production were received. The effect of the introduction is not only economic, associated with a reduction in the cost of individual operations, an increase in the survival rate of artificial plantations and accuracy of accounting but also environmental, aimed at preserving the gene pool and increasing the sustainability of forest ecosystems. In addition, research and development is used in the educational process of universities of forestry, design organizations, peasant households and farms.

The effectiveness of the implementation of projects of the MES RK and the availability of research materials with this approach is significantly improved. Since there are requirements for the publication of research results (scientific articles, monographs, etc.). Reporting materials are stored in the Institutes and the Library of the Republican Center for Scientific and Technical Information, therefore are available to users. This is important for obtaining reliable data on biodiversity at specific sites, certain areas, etc. In this regard, research data are widely used in the development of natural-science and feasibility studies for the creation or expansion of protected areas, the Chronicle of Nature, monitoring of biodiversity, etc.

Also significant research carried out on the monitoring of biodiversity. They are covered in section 2.11 of this report. It also presents the main difficulties and the necessary needs for research in Kazakhstan.

In accordance with the Law of the Republic of Kazakhstan of June 17, 2008 No. 43- IV “On ratification of the **Cartagena Protocol on Biosafety** to the Convention on Biological Diversity”, the Republic of Kazakhstan has undertaken to promote the provision of an adequate level of protection in the field of safe transmission, processing and use living modified organisms (LMOs) resulting from the use of modern biotechnology and which may have an adverse effect on the conservation and sustainable use of biological diversity taking also into account risks to human health and paying special attention to transboundary movements.

In accordance with the request of the Secretariat of the Convention on Biological Diversity, the National Center for Biotechnology (NCB) prepared the 2nd (2011) and 3rd (2015) National Reports of the Republic of Kazakhstan on the implementation of the Cartagena Protocol.

In the framework of the NTP Industrial Biotechnology for 2014-2016. In the NCB developed the technology of microclonal propagation of Rhodiola rosea. The technology aims to preserve the natural biodiversity of natural populations of valuable medicinal plants. Based on the Altai Botanical Garden laid experimental plantation of Rhodiola Rosea. As part of the grant project Research on the genetic and geographical diversity of natural populations of Rhodiola rosea *(Rhodiola rosea*). Kazakhstan using sequencing of the non-coding part of the genome (non-transcribed spacers and introns of genes) for 2015-2017 in order to identify the links of DNA polymorphism with the polymorphism of isoenzymes and other phenotypic traits, the genetic diversity of the Kazakhstani populations of Rhodiola Rosea has been studied. As a result, a DNA collection of geographically distant populations of rhodiola was formed.

In the framework of the project Molecular genotyping of the flora of the state national natural parks of Bayanaul and Burabay for 2015-2017 genotyping of endemic, rare, endangered and economically valuable plant species was carried out using universal DNA markers.

In order to facilitate the exchange of scientific, technical, environmental and legal information and experience regarding living modified organisms and genetically modified

objects, the corporate website of the NCB (www.biocenter.kz) contains a page with necessary information in the field of knowledge of the Cartagena Biosafety Protocol to Convention on Biological Diversity: normative documents, strategic plans for the protocol, guidelines on risk assessment of LMOs, informative brochures, an information database on GMOs in the world, as well as national contact points for PBC.

4.20. National contribution of Kazakhstan towards achievement of Aichi Target 20.

As part of BIOFIN in Kazakhstan, studies have been conducted to assess the financial needs for biodiversity conservation up to 2030, and the annual funding gap for biodiversity is more than 50% of the allocated budget[85]. To cover the existing financial deficit, experts of the BIOFIN project in Kazakhstan developed a Plan for mobilizing financial resources for biodiversity conservation, including the most promising financial solutions. Under the Resource Mobilization Plan, experts recommend implementing the following financial decisions: improving the potential of PAs to improve their financing, introducing carbon offsetting, improving financing of hunting farms, subsidizing breeding, supporting organic farming, tax incentives for developing ecotourism, introducing compensations for biodiversity loss, attracting foreign investment for the conservation and sustainable management of forest resources.

Testing of the compensation mechanism for biodiversity loss in the Ustyurt pilot territory is being conducted using the example of the Kansu gas field. Negotiations were held with the management of Kansu-Operating LLP and the Department of Natural Resources and Environmental Management of Mangystau Oblast and discussed the possibility of developing compensatory mechanisms for the loss of biodiversity in the Kansu site near the Ustyurt SNR.

To advance the implementation and further implementation of financial decisions, improvement of environmental legislation is required. The project team BIOFIN in the period for 2015-2017 developed new regulations and actively participated in the improvement of the current legislation in the field of flora and fauna. As a result of these efforts, the term “forest ecosystem services” and voluntary contributions for forest ecosystem services are included in the Forest Code of Kazakhstan as a financing mechanism for the forest sector. Voluntary contributions for unavoidable harm in the conduct of economic activities are enshrined in the Law "On PAs" as one of the new sources of funding for PAs. Also, the budget financing of PAs after the adopted amendments will be allocated in accordance with the PA Management Plan. This situation will significantly increase funding from the budget in accordance with the actual need of PAs. In general these legislative amendments will allow PAs and forestry institutions to attract additional funding from the private sector for the conservation, restoration of ecosystems and biodiversity. At present the BIOFIN project team continues to work on developing recommendations for improving the environmental legislation of Kazakhstan.

[85] Progress report on the implementation of the project "Building Transformative Policy and Financing Frameworks to Increase Investment in Biodiversity Management (BIOFIN)". UNDP in RK. 2017

Section V. Description of national contribution to the targets of the Global Strategy for Plant Conservation

In 2010 the Conference of the Parties to the Convention on Biological, in accordance with decision X\17, adopted an updated version of the Global Strategy for Plant Conservation for 2011-2020.

The GSPC has 5 main objectives and 16 targets:

- Plant diversity is well understood, documented and recognized.
- Plant diversity is urgently and effectively conserved
- Plant diversity is used in a sustainable and equitable manner
- Education and awareness about plant diversity, its role in sustainable livelihoods and importance to all life on earth is promoted
- The capacities and public engagement necessary to implement the Strategy have been developed

The strategy considers plants in terrestrial, inland water and marine environments. In addition, the Strategy addresses the three main levels of biodiversity recognized in the Convention, namely, plant genetic diversity, particular plant species and their communities, and their associated habitats and ecosystems.

Further the contribution of Kazakhstan in the period 2013-2017 described according to each target.

Target 1. Preparation of a widely accessible working list of known plants as a step towards the compilation of a complete inventory of world flora.

In Kazakhstan, there is an ongoing work to compile lists of flora. The fundamental work is the 9-volume publication "Flora of Kazakhstan" (1959-1969), as well as the "Key to vascular plants of Kazakhstan" in 2 volumes. Despite the fact that floristic works are constantly being conducted, the results on new types or areas of their distribution are published in separate articles and monographs, over the past 40 years, there were no general, updated report made. At the same time, data are constantly updated for individual areas and regions, but they are not systematized. In recent years, including period 2013-2017, lists of flora were published according to the biogeographical principle, including a comprehensive analysis of plant species, which were published in separate books. The contribution of the republic to the achievement of this target for 2013-2017 could be considered:

- Periodic (every 3 years) update of the "List of rare and endangered plant species", which is approved by the Government of the Republic of Kazakhstan.
- Extended 2nd edition of the Red Book –Plants, volume 2, (2015);
- Monographs: "Flora of the National Park "Burabay" (2015), "Flora of the National Park "Kolsai Kolderi" (2017), "Flora of the Ile Alatau Range" (2017);
- "Annotated list of species of plants of medical purpose of Kazakhstan", 2016.
- Catalogs of the flora of the botanical gardens of the Republic (Almaty, Mangistau, Altai) and the Issyk dendro-park.
- In scientific-research institutes and universities, collections of herbarium specimens are maintained and created;
- In arboretums, botanical gardens, tree nurseries, etc. there are live collections of plants are created, including the introduced species of the regional flora.
- For the first time, lists of microflora and algal flora of Kazakhstan were created.

Target 2. Preliminary assessment of the conservation status of all known plant species at the national, regional and international levels.

Kazakhstan has a complete assessment of rare and endangered plant species at the national level (Red Book of Kazakhstan) and has evaluated them according to the criteria of the International Union for Conservation of Nature (IUCN) for more than 1% of *in situ* species, including moss, algae and fungi. Every 5 years, the lists of flora of PAs are updated and supplemented – nature reserves, national parks and nature reservats. This requirement is enshrined in the Law of the Republic of Kazakhstan "On Specially Protected Nature Territories" when developing a Management Plan for PAs.

Target 3. Development of models and procedures for the conservation and sustainable use of plants based on scientific research and practical experience.

In Kazakhstan the main model of *in situ* plant conservation is the creation and expansion of a PAs network, where there is a constant ongoing research and monitoring of biodiversity including rare and endangered plant species. Particularly comprehensive work is carried out in PAs that have the status of legal entities: 10 nature reserves, 10 national parks, 2 regional parks and 5 nature reservats with a total area of 6,705,854, 46 hectares. Their territories cover almost all the variety of ecosystem types (steppe, desert, mountain (Altai, Northern and Western Tien Shan), as well as floodplain and aquatic ecosystems (algoflora). *Ex situ* diversity is conserved in 5 botanical gardens and 1 dendrological park. Here, based on scientific research, work is underway on the introduction of foreign plants and their introduction into gardening. Garden and park landscapes of cities and settlements, as well as personal plots, cottages, etc. constantly enriched with new ones, including exotic plants, imported from different countries. In recent years, there have been more efforts to create plantations of medicinal plants. There are enterprises for the processing of raw materials, export of some valuable medicinal plants (licorice, etc.) has been established. New models and procedures with experience of scientists and specialists in afforestation are being introduced when creating green zones (belts) around large cities. The most successful model is the green belt around Astana.

Target 4. At least 10 per cent 10 percent of each ecological region secured through effective management and restoration.

On the territory of Kazakhstan, large areas are occupied by unique ecosystems of forest-steppe and steppe, which are characteristic only for the Eurasian continent and remained in the best condition. Modern trends in the development of various sectors of the economy, mainly agriculture (livestock breeding, plant growing) show an increase in the area for these purposes. In these zones, natural ecosystems occupy at least 30% of the area. The largest areas of natural ecosystems are conserved in deserts that occupy about 40% of the area of the Republic. Here in recent years there has been an increase in land degradation and loss of natural vegetation due to overgrazing. The same problem is in mountain pastures. In the mountains, as a result of the developed system of PAs, there is still a balance in favor of poorly disturbed ecosystems. The development of protected areas is described in details in Section 2.11. of this report.

Target 5. At least 75 per cent of the most important areas for plant diversity is protected with effective management in place for conserving plants and their genetic diversity.

At least 60% of the species diversity is protected in the mountainous areas of the country in the protected areas, which occupy large areas in Kazakhstan (Altai, Northern and Western Tien Shan). In the steppe and desert zones, in spite of their smaller, total area of protected areas, at least 70% of plant species remain. These indicators remain, but subject to compliance with the regimes of protection, especially reserve regime. In the areas covered by intensive economic activity (arable lands, pastures), these figures are 2-3 times less. This is especially true for pastures, as pasture pressure are not observed. The adoption of the new law "On Pastures" (2016) may be improved by the Institute of Botany and Phyto-Introduction of the Ministry of Education and Science of the Republic of Kazakhstan. The work on identifying key botanical territories started in 2013, but due to the fact that they were not fixed by the Law, accessible

lands have degraded lands and depletion of flora.

Target 6. At least 30 per cent of production land in each sector managed sustainably, consistent with the conservation of plant diversity.

Regulation of production lands in accordance with the objectives of biodiversity conservation is observed only on lands of the State Forest Estate. Also, woodlands are mostly covered by PAs, therefore, the species composition of flora is maintained at the proper level. The composition of the typical flora in large areas of the deserts is also maintained. In the worst state are the steppes which were cultivated during the period of the development of virgin lands, when most of the plant species typical only for the Kazakh steppes were lost. Currently steppe plants suffer from overgrazing but since such areas are not significant - at least 20% of the species diversity remains. The main focus of agricultural enterprises is on the conservation of cultivated plants. In the landscape gardening of Kazakhstan conservation of species diversity is maintained at a high level, mainly due to the import of alien species including decorative ones. The implementation of this target today is one of the priorities in the field of biodiversity conservation. Its practical implementation consists of the development of draft state programs or the inclusion of an appropriate task into the existing programs and strategies.

Target 7. At least 60 per cent of known threatened plant species conserved in situ.

This target has something in common with the Target 6. In general on the territory of the Republican PAs outside of the reserves and national parks there are growing at least 60% threatened species. All these species are listed in the Red Book of Plants of Kazakhstan and in the List of rare and endangered species of flora approved by the Government of the Republic of Kazakhstan. Under the auspices of the Ministry of Education and Science of the Republic of Kazakhstan there are initiated projects for grants and programs aimed at assessing the status of rare and endangered species. In recent years such works are constantly performed by the Institutes of Botany and Phyto-Production and the Institute of Biology and Biotechnology of the MES RK. Some projects are aimed at restoring and expanding the range of rare species by creating commercial plantations, such as walnut plants (walnut, pistachio) as well as many ornamental plants of the natural flora.

Target 8. At least 60 per cent of threatened plant species is in ex-situ collections, preferably in the country of origin, and at least 10 percent available for recovery and restoration programs.

This target is being implemented at the level of forestry institutions, PAs and scientific organizations (botanical gardens, dendroparks, etc.). At least 10% of species of different categories are cultivated: for example Tien Shan spruce, Sivers apple tree, walnut, common pistachio, hawthorn species, etc. A large amount of such work is carried out in the Issyk State Dendrological Park, forest nurseries in all national parks and botanical gardens. Of particular note is the Altai Botanical Garden, where there are rare species of flora, including those from the genus of orchids, which are then returned into the nature (reintroduction). There is also a rich collection in the Mangyshlak Botanical Garden which is located in the most severe desert conditions of Mangyshlak. This garden makes a great contribution to the greening of the city of Aktau.

Target 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.

Basically, the gene pool of cultivated plants is protected (by research institutes in the field of genetics and selection). Aboriginal species of socio-economic importance (about 10-12%) are preserved in botanical gardens, dendrology parks, research institutes and research stations in the field of forestry and medicinal plants. A lot of attention is paid to plants which present a valuable

gene pool. For example, world science has proved that 57% of the genes in all cultivated apples of the world are from the wild Sivers apple, that comes from the territory of Kazakhstan. To preserve this unique gene pool, almost the entire area of Sivers apple has been covered by special protection in the protected areas (Ili-Alatau SNNP, Zhongar-Alatau SNNP, Almaty Reserve, Sairam – Ugam SNNP, Aksu-Zhabagly Nature Reserve, Tarbagatai SNNP). At the initiative of Kazakhstan, with the participation of genetics scientists from different countries, in 2017 the International Fund for the Conservation of Sivers apple was established. National and global strategy for the conservation of Sivers apple was developed. Currently, there is a work carried out on international level on such wild-growing species as Regel pear, common pistachio, walnut, as they create perspectives for creation of cultivated varieties.

The right of local and indigenous communities is realized in this matter at the level of participation in the creation of nurseries, gardens, as well as their protection in PAs.

Target 10. Effective management plans in place to prevent new biological invasions of at least 100 alien species and to manage important areas for plant diversity that are invaded.

To date there is almost no work done on alien species of flora in Kazakhstan. There is no list of alien species. There is also no general program at the state level. Alien species are monitored only by quarantine stations.

Target 11. No species of wild flora endangered by international trade.

Measures to combat illegal international trade in flora species are presented in documents to “the Convention on International Trade in Endangered Species of Wild Fauna and Flora”. Kazakhstan is a party to this Convention. One of the administrative bodies of CITES is the Ministry of Agriculture of Kazakhstan. The Convention approved the procedure for issuing permits for the import and export of specimens of species of wild fauna and flora, certificates for mobile exhibitions, re-export and introduction of marked specimens from the sea, which are subject to “the Convention on International Trade in Endangered Species of Wild Fauna and Flora". It is necessary to revise the economic mechanisms for regulating import/export of wild plant and animal species in terms of increasing fines for illegal import/export of wild plant and animal species, as well as increasing the share of wild species in gene collections and seed banks of relevant institutions.

Target 12. 30 per cent of wild harvested plant-based products sourced sustainably.

In Kazakhstan the market for food of natural plant origin is no more than 3%. The most effective way to reduce this indicator is to increase taxes on the use of plants. This is especially relates to the exported species of medicinal plants and products made from them (licorice, types of wormwood, hypericum, wort, majoram, and others).

Target 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.

Practically all methods of using plant resources in Kazakhstan are associated with traditional folk crafts mainly in the highlands of the Altai, Borovoye, South and South-Eastern Kazakhstan, to a greater extent with the participation of women and children (collecting plants, mushrooms, berries, nuts).

Target 14. The importance of plant diversity and the need for its conservation incorporated into communication, education and public awareness programmes.

In Kazakhstan there is a fairly extensive network of educational institutions that ensure the dissemination of information on plant diversity and their protection in the society. These are institutions of the natural reserve fund, young people’s stations, study groups, the media,

academic institutions, etc. The formal botanical education system, which is represented by classical disciplines, is less developed. A wider popularization of botanical knowledge in the mass media based on the already mentioned institutions is required.

Target 15. The number of trained people working with appropriate facilities sufficient according to national needs, to achieve the targets of this Strategy.

Specialties of botanical profile are widely represented in higher educational institutions of the country. It is necessary to introduce a specialty (or training course) “Protection of biodiversity” within the botanical and environmental specialties. It is problematic to attract specialized staff to work in rural areas, where biodiversity protection advocacy is less established than in urban areas.

Target 16. Institutions, networks and partnerships for plant conservation established or strengthened at national, regional and international levels to achieve the targets of this Strategy.

In Kazakhstan, there is no single centralized network in the field of plant conservation. In the Soviet period there was the Republican Botanical Society. Network of phytoprotective institutions based on local and thematic networks - the Ukrainian Botanical Community, the Council of Botanical Gardens and Arboretums of Ukraine, botanical institutions and departments, non-governmental “green” organizations, eminent scientists, civil servants, students. The overall coordination is carried out by the State Service for Nature Protection in the part that lies directly in the sphere of its duties according to the law. For more effective functioning of such a network it is necessary to establish a focal point.

Section VII. Updated information on the country`s biodiversity

Kazakhstan is the 9th largest country in the world with a territory of 2.72 million km^2 and has a unique set of landscape complexes (Annexes 18 and 19): from deserts to highlands and ecosystems of the inland seas. At the same time, dry and sub-humid lands occupy more than 75% of the country's territory.

By the end of 2017 the population of Kazakhstan was 18.3 million people, including 8.8 million men and 9.5 million women.

Fauna and flora of Kazakhstan.

There are 890 species of vertebrate animals in the republic, including 178 mammal species, birds - 500 (388 of them nest in Kazakhstan, others fly only for wintering or fly in spring and autumn), reptiles - 49, amphibians - 13, fish 147 and cyclostomes - 3. (A. Kovshar and others). Also about 100 thousand species of invertebrates live, including at least 50 thousand insect species. 128 species and subspecies of vertebrates and 96 species of invertebrates are listed in the Red Book of Kazakhstan. (Table 7.1.)

Table 7.1. Taxonomic indicators of the fauna of vertebrates of Kazakhstan

Classes of vertebrates	Number of taxa				
	order	family	Genera	Species	subspecies
1. Stone-eel (cyclostomatous)	1	1	3	3	-
2. Actinopterygian fishes	16	21	77	147	38
3. Amphibians	2	5	7	13	7
4. Reptiles	3	11	27	49	22
5. Birds	20	59	217	500	511
6. Mammals	8	32	90	178	239
Total	**50**	**129**	**418**	**890**	**817**

There are around 100 thousand species of invertebrates, including not less than 50 thousand insect species.

The list of rare and endangered species includes 224 animal species and subspecies, including 128 vertebrate species and subspecies and 96 invertebrate species.

Also about 100 thousand species of invertebrates live, including at least 50 thousand insect species. 128 species and subspecies of vertebrates and 96 species of invertebrates are listed in the Red Book of Kazakhstan.

110 species of fauna of Kazakhstan are included in the Annexes of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), including in Annex I - 20 species, in Annex II - 90 species.

In general, the **flora** is represented by 5754 species of higher plants. There is a high level of endemism, which is up to 14%. The list of rare and endangered species includes 387 plant species.

Botanical gardens play an important role in the conservation of the gene pool of plants. There are 5 of them in Kazakhstan: the chief, Altai, Ili, Zhezkazgan, Mangyshlak, with a total area of 424 hectares. They are created in different natural zones and have their own specialization.

The most representative collection of flora is in the Main Botanical Garden, which has

over 7,000 species, varieties and forms of plants, as well as a collection fund of woody plants - 895 taxa from 49 families and 129 genera. The Alpinaria exhibition has about 200 species of native plants and more than 100 species and varieties widely used in the culture of herbaceous perennials and miniature bushes. In the Altai Botanical Garden there are 3,600 species, forms, plant varieties, in the Mangyshlak Experimental Botanical Garden there are 936 plant taxa, including a collection of woody plants - 321 species belonging to 64 genera and 29 families, and so on.

As of 01.01.2018 **The State Forest Estate** (SFE) of Kazakhstan amounts to 29,843.3 thousand hectares or 10.9% of the territory of the Republic. Forest land covers 12903.5 thousand hectares or 43.2% of the total land area of the State Forest Estate, forest cover - 4.74%.

The forests in Kazakhstan are extremely uneven. The types of forest vegetation are determined by the diversity of natural areas (Annex 20)[86]. In the desert zone grow saxaul forests. The main part of the mountain forests is represented by dark-coniferous plantations of Altai, Dzungarian and Zailiysky Alatau. In the flat part of the steppe and forest-steppe zones birch-aspen knit forests, island pine forests, Irtysh Land ribbon forests grow. In the composition of forest lands in the occupied territory, saxauls are dominant - 49%, shrubs 24%, conifers - 14%, soft-leaved –12%, and 1% other breeds.

The status of the protected area network by the end of 2017

As of December 31, 2017, the system of specially protected natural areas of the Republic of Kazakhstan includes: 10 state nature reserves, 12 state national natural parks, 6 state nature reserves, 5 state botanical gardens, 5 state nature reserves, 50 state nature reserves, 26 state nature monuments, 2 state regional natural parks, 1 state dendrology park.

The total area of specially protected natural areas of state importance, as of December 31, 2017, is 24.9 million hectares (8.9%) of the country`s area (272.5 million hectares).

The area of PA without the status of a legal entity (state natural reserves, conservation areas) is 17.4 million hectares or 6.4%. The remaining PAs operate without land acquisition from land users but there are restrictions on economic activities.

In Kazakhstan the network of PAs is constantly expanding, work is underway to create new facilities and increase the area of existing, as well as the organization of international biosphere areas, globally significant wetlands, UNESCO World Natural and Cultural Heritage sites, UNESCO biosphere reserves.

The territories of the PAs of Kazakhstan are the standards of unique landscapes of forest-steppes and Eurasian steppes (Annexes 18 and 19), the deserts of Turan and Dzungaria, the Altai Mountains, the Northern and Western Tien Shan, unique hydromorphic sections of river valleys, deltaic plains, coastlines of the seas (the Caspian and Small Aral sea), large lakes (Balkhash, Alakol, Korgalzhin, Shalkar, Imantau, Burabai, Yazevoe, Rakhmanovskoe) and many others).

For all protected areas in general, there is a large variety of flora (more than 5,700 species), including rare and endemic plants (387) and animals (128 species and subspecies) listed in the Red Book of Kazakhstan. Some unique objects of flora and fauna have become world heritage and need special protection. Among the wild animals, in a first raw it is Snow leopard, saiga, subspecies of the mountain argali. Among the plants - the wild apple of Sivers, tulip species, relict spirea flower of Schrenk, ash tree (Charyn ash tree), European or common alder and many others. Most of them are covered by the protection of PAs of different status, but there are still objects that are not yet protected. Therefore, the development of a network of PAs is a prerequisite for biodiversity conservation.

[86] SFF Census as of 01/01/2018

Kazakhstan is a party of five priority international agreements directly operating in the field of biodiversity conservation and sustainable use: the Convention on Biological Diversity (CBD), the Convention Concerning the Protection of the World Cultural and Natural Heritage, the Convention on the Conservation of Migratory Species of Wild Animals (CMS or Bonn), the Ramsar Convention on Wetlands of International Importance (or Ramsar), the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES); and the United Nations Convention to Combat Desertification (UNCCD).

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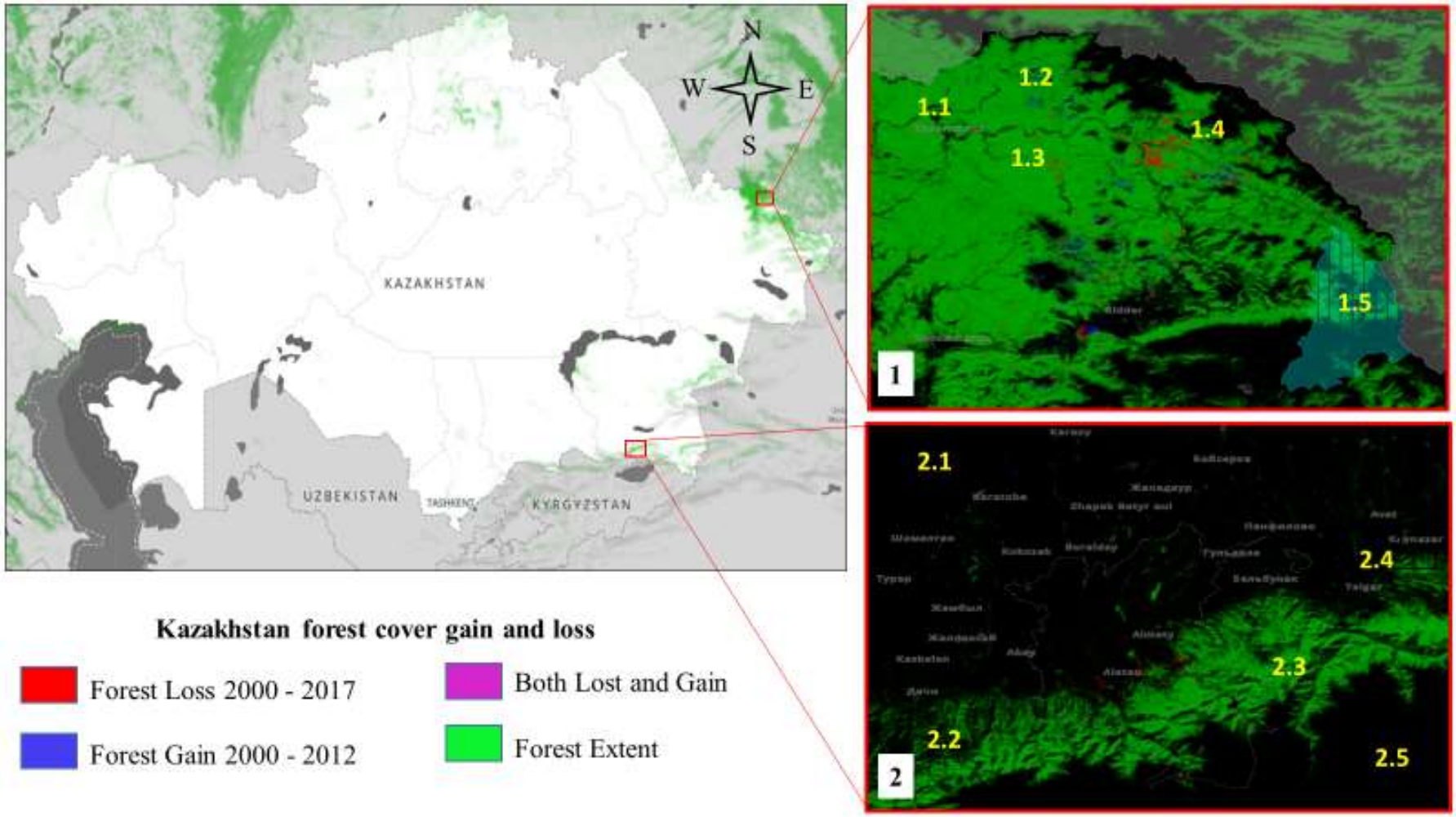
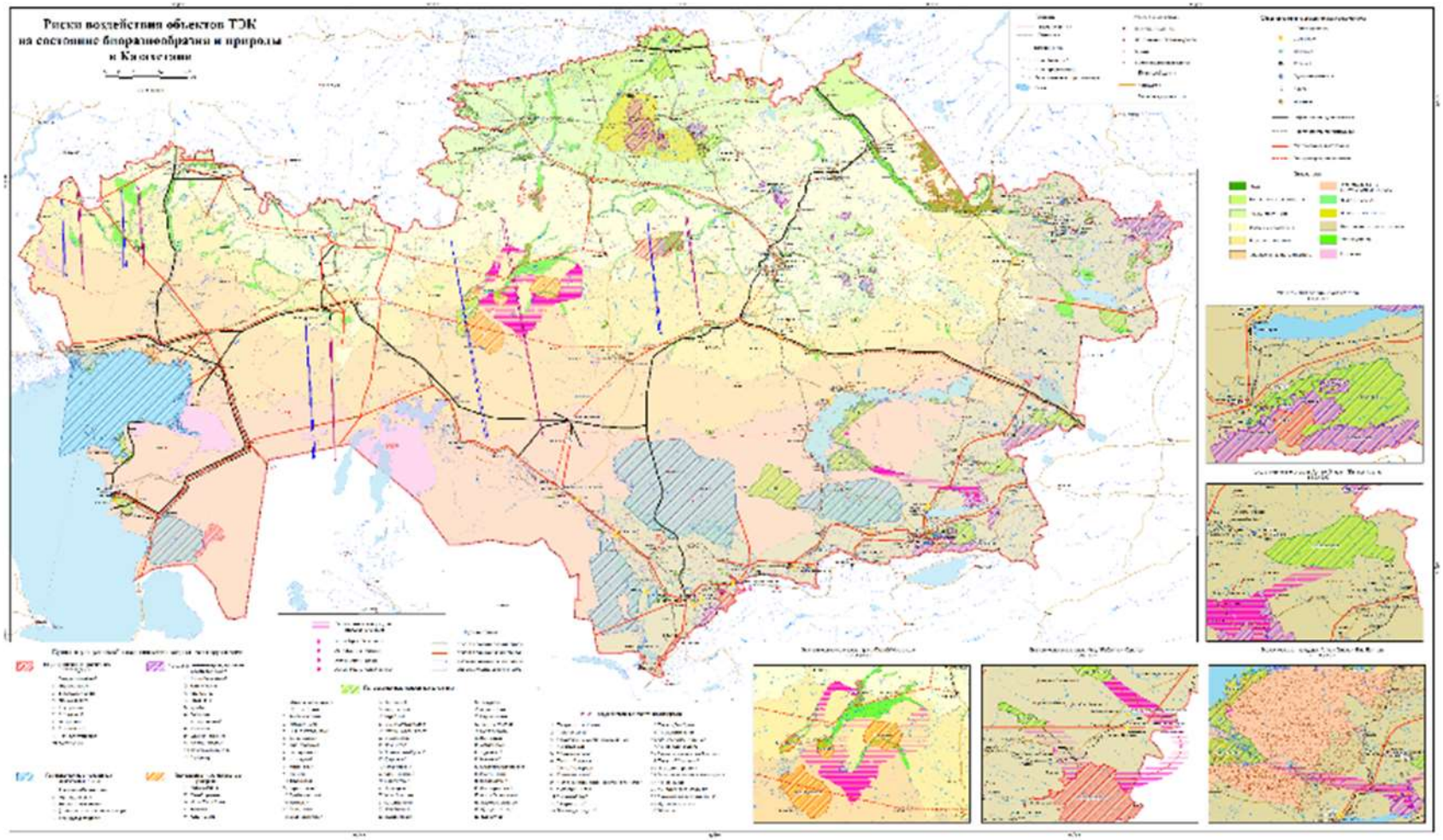
ANNEXES

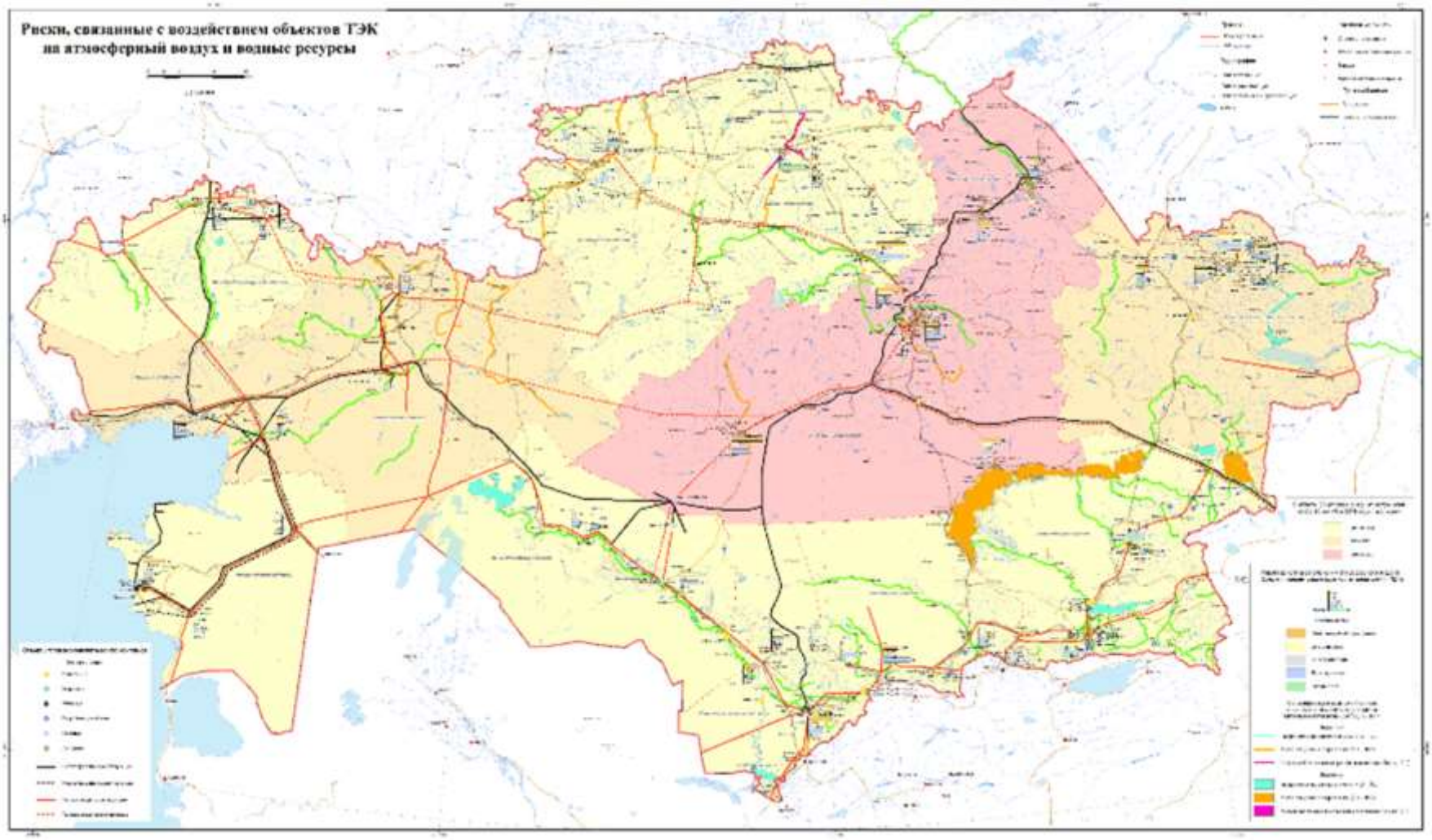
Annex 1. Map of the Forest Cover in Kazakhstan



Annex 2. Map of the influence of fuel and energy facilities on the state of biodiversity and nature

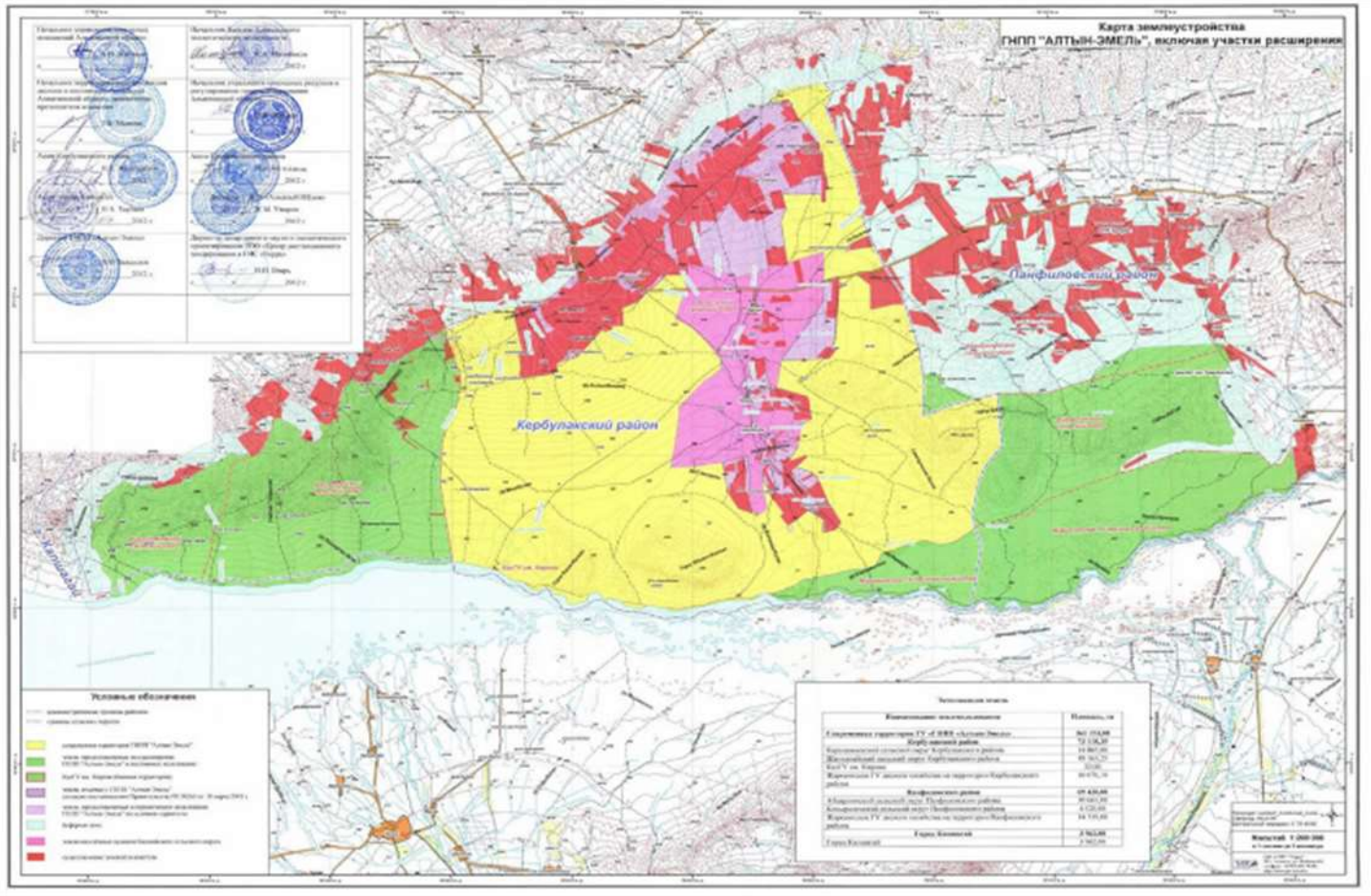


Annex 3. Map of the risks arising from the influence of fuel and energy facilities on air and water resources

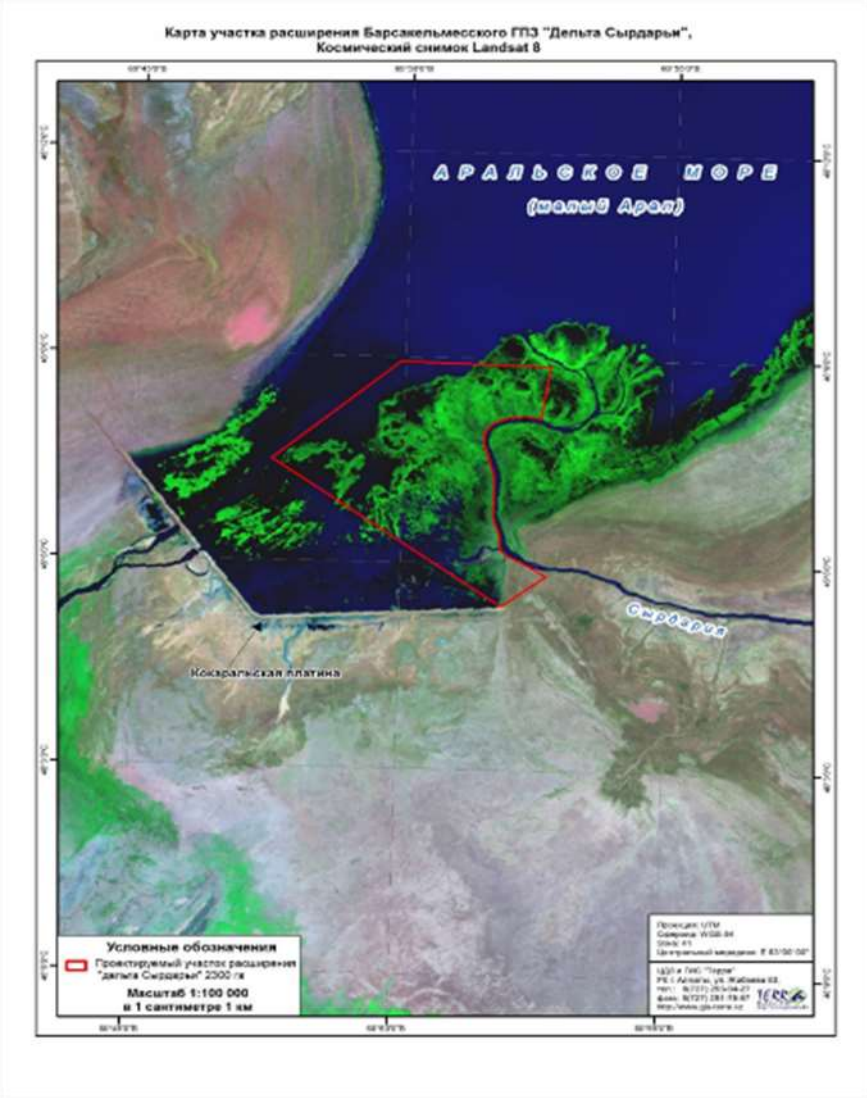


Annex 4. Map of the Altyn-Yemel SNNR expansion

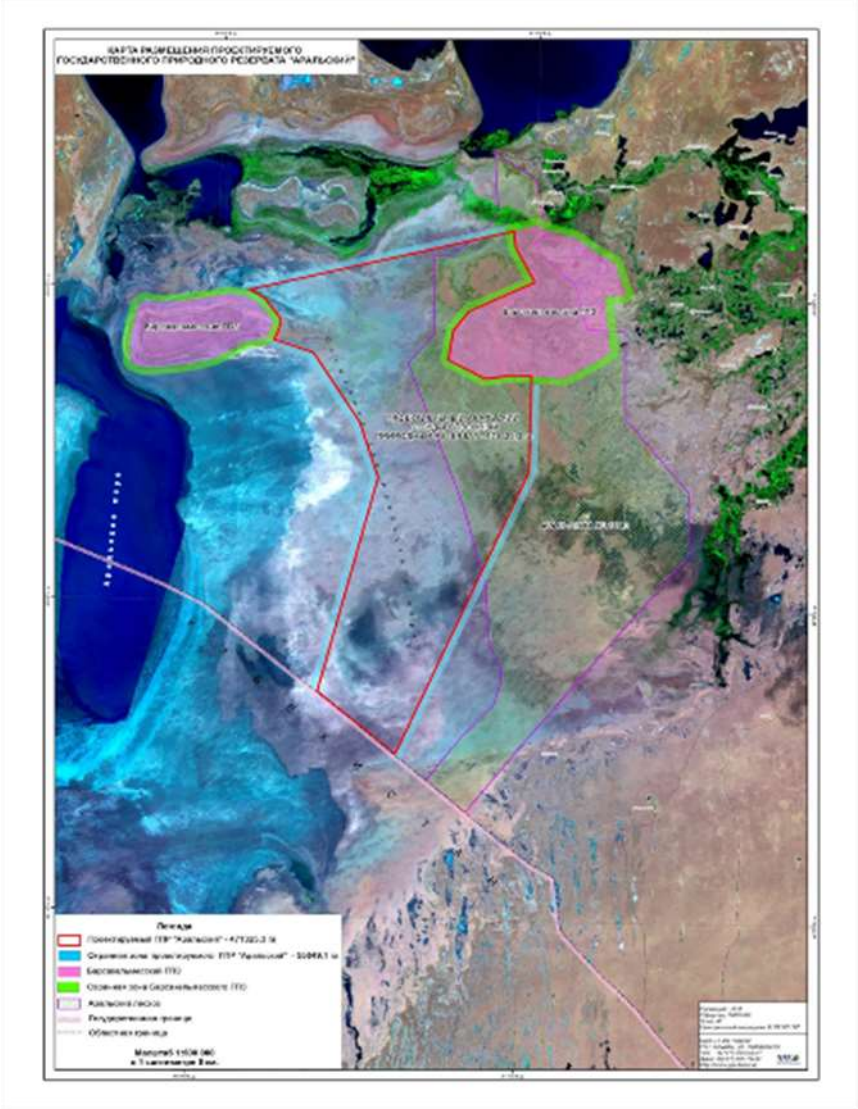
yellow - existing territory, green - areas of expansion, blue along the perimeter - borders of a protected zone of the park, red - other land use, lilac and dark lilac-land of settlements



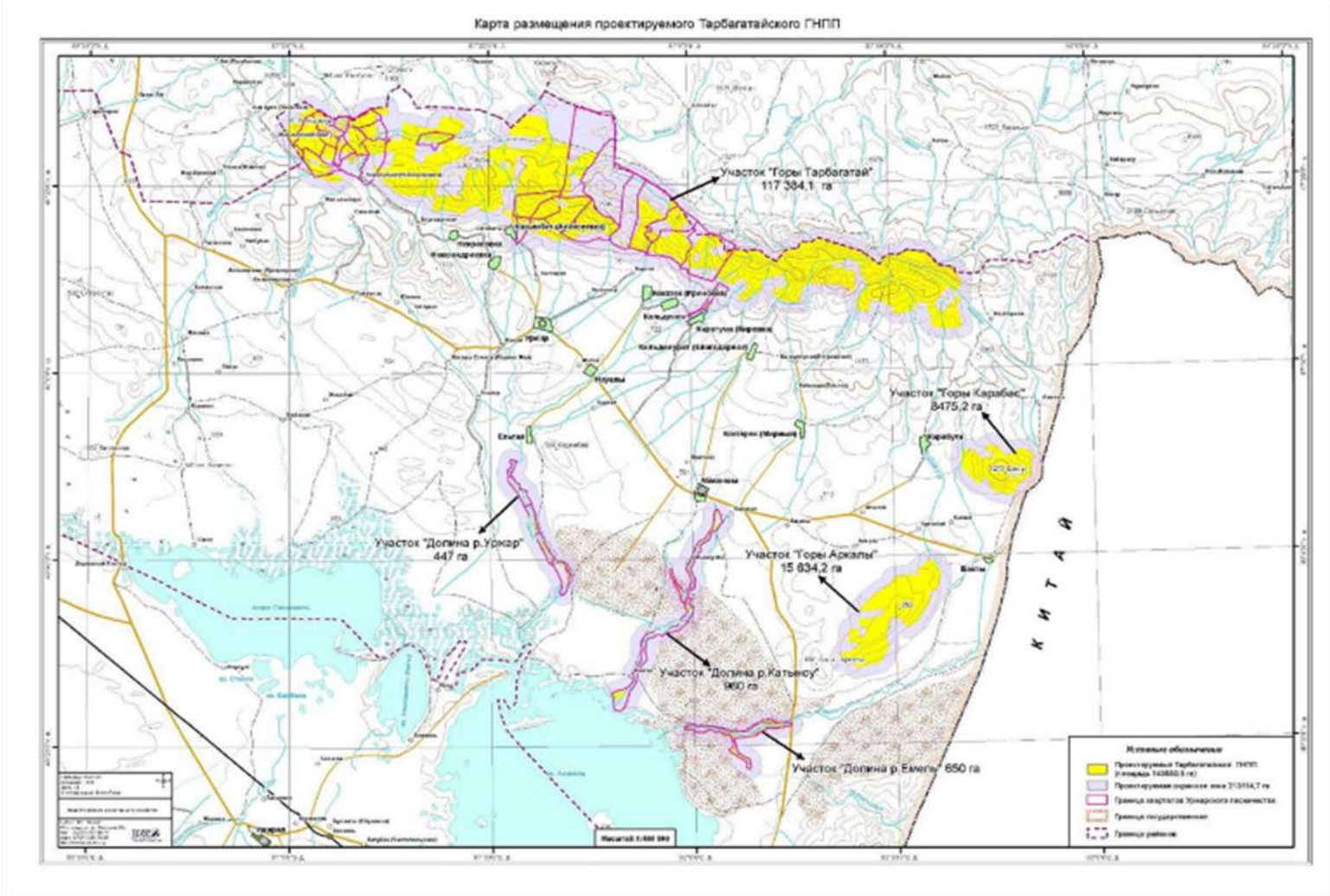
Annex 5. Map of the Barsakelmes SNR expansion, at Syrdarya river delta



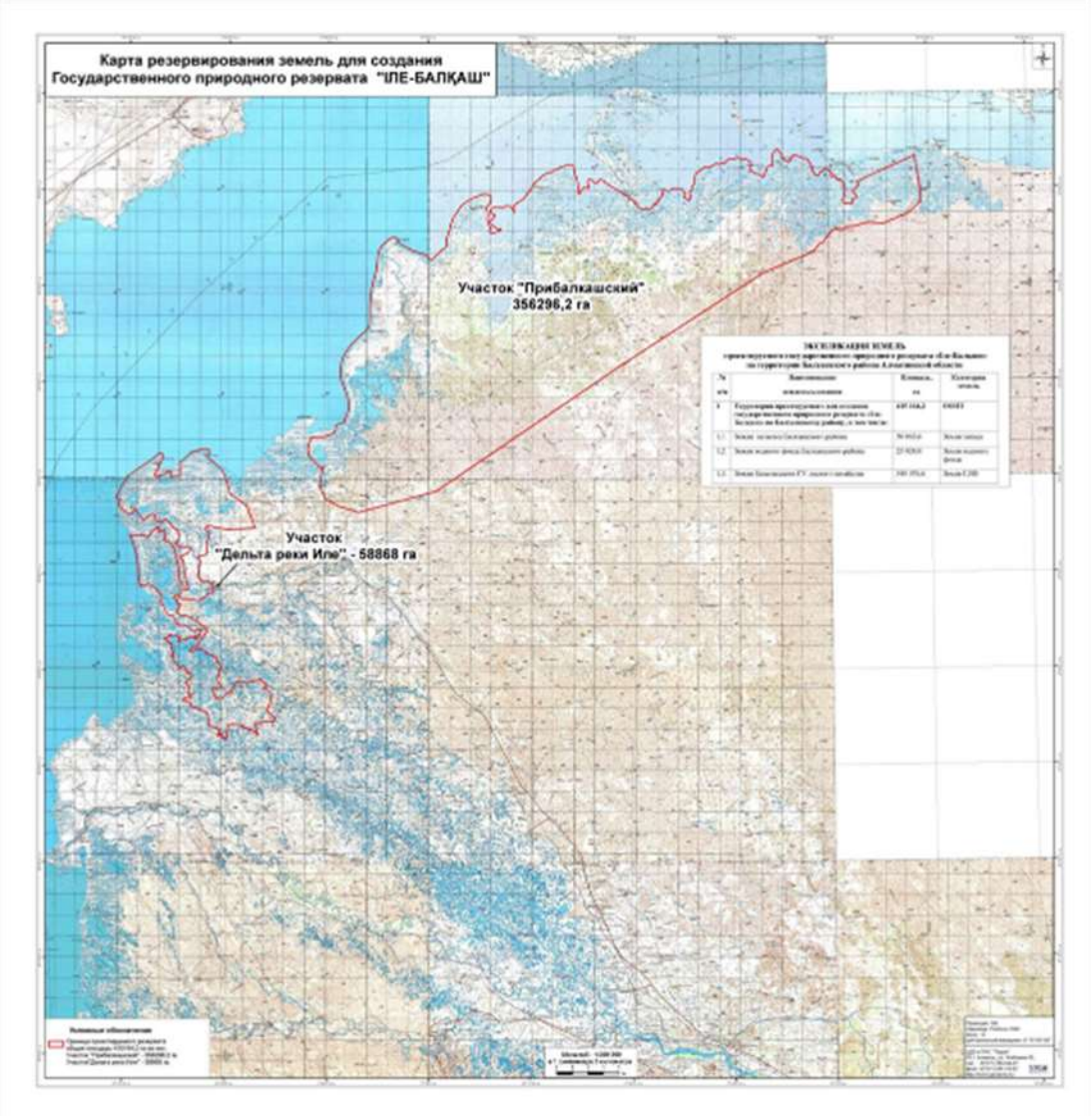
Annex 6. Map of the designed SNR Aral location on the dried bottom of the Aral Sea



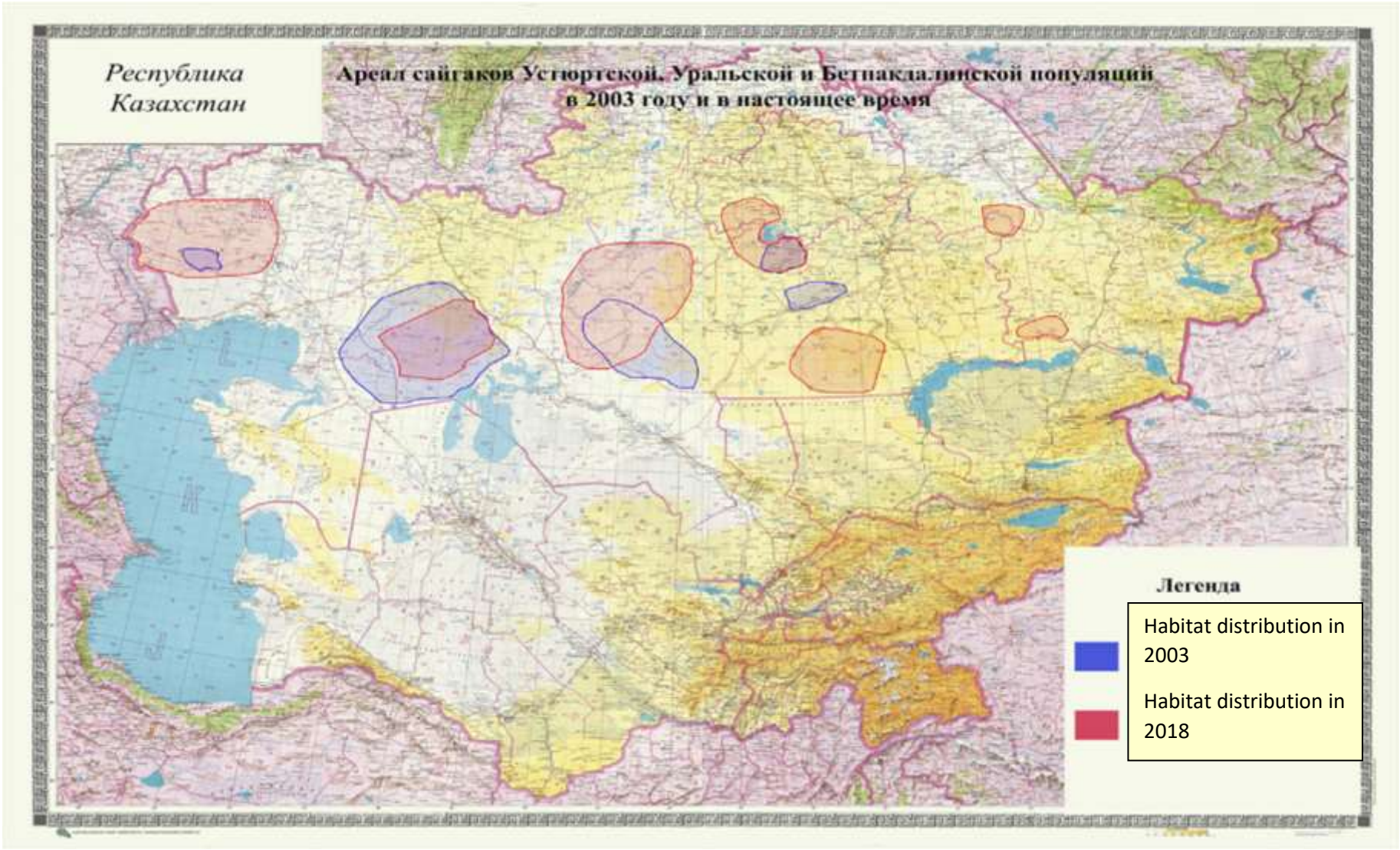
Annex 7. Map of the sites location at the territory of the Tarbagatai SNNP



Annex 8. Map of the territory of Ili-Balkash SNR

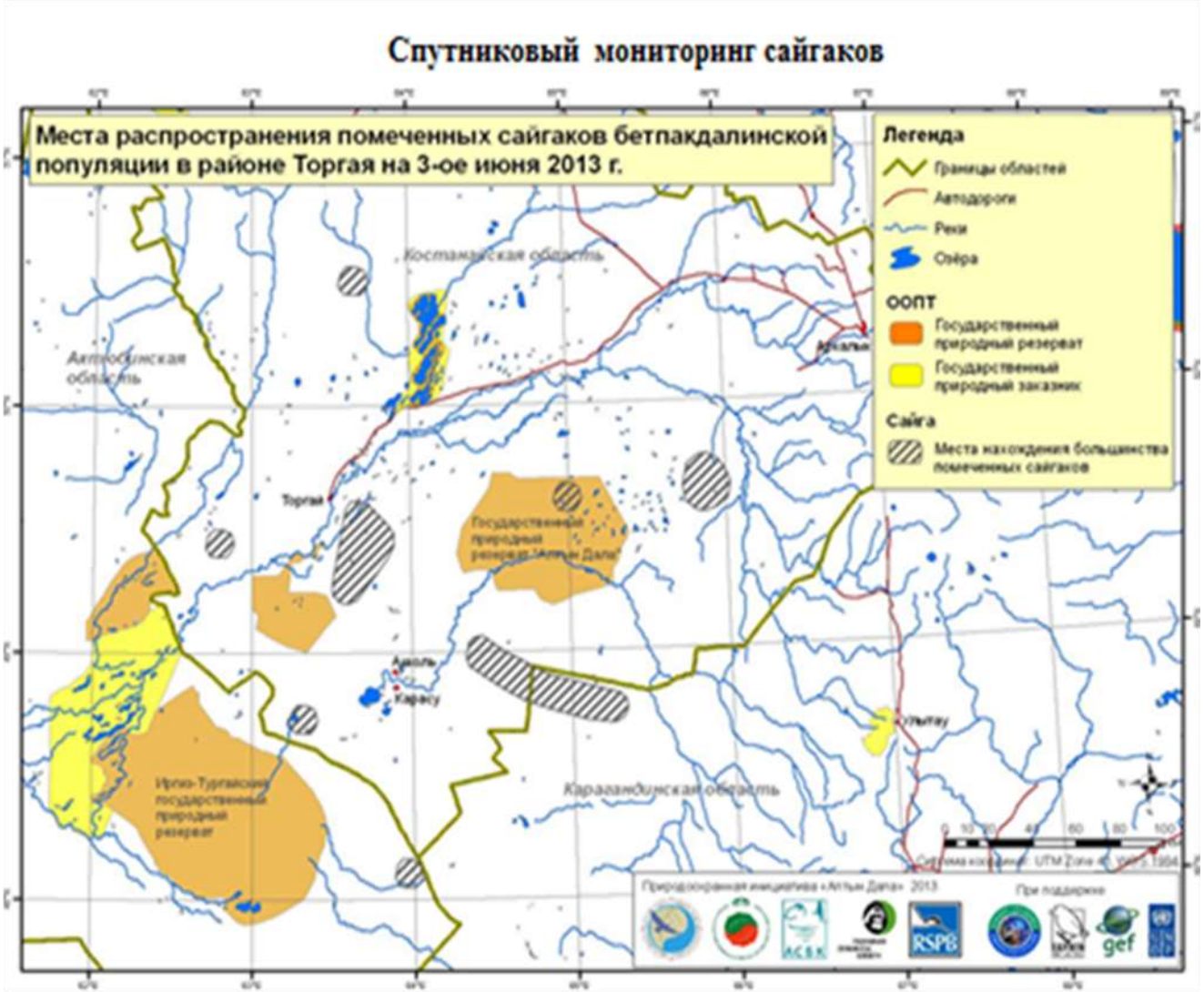


Annex 9. Map of changes in the saiga habitat distribution in Kazakhstan



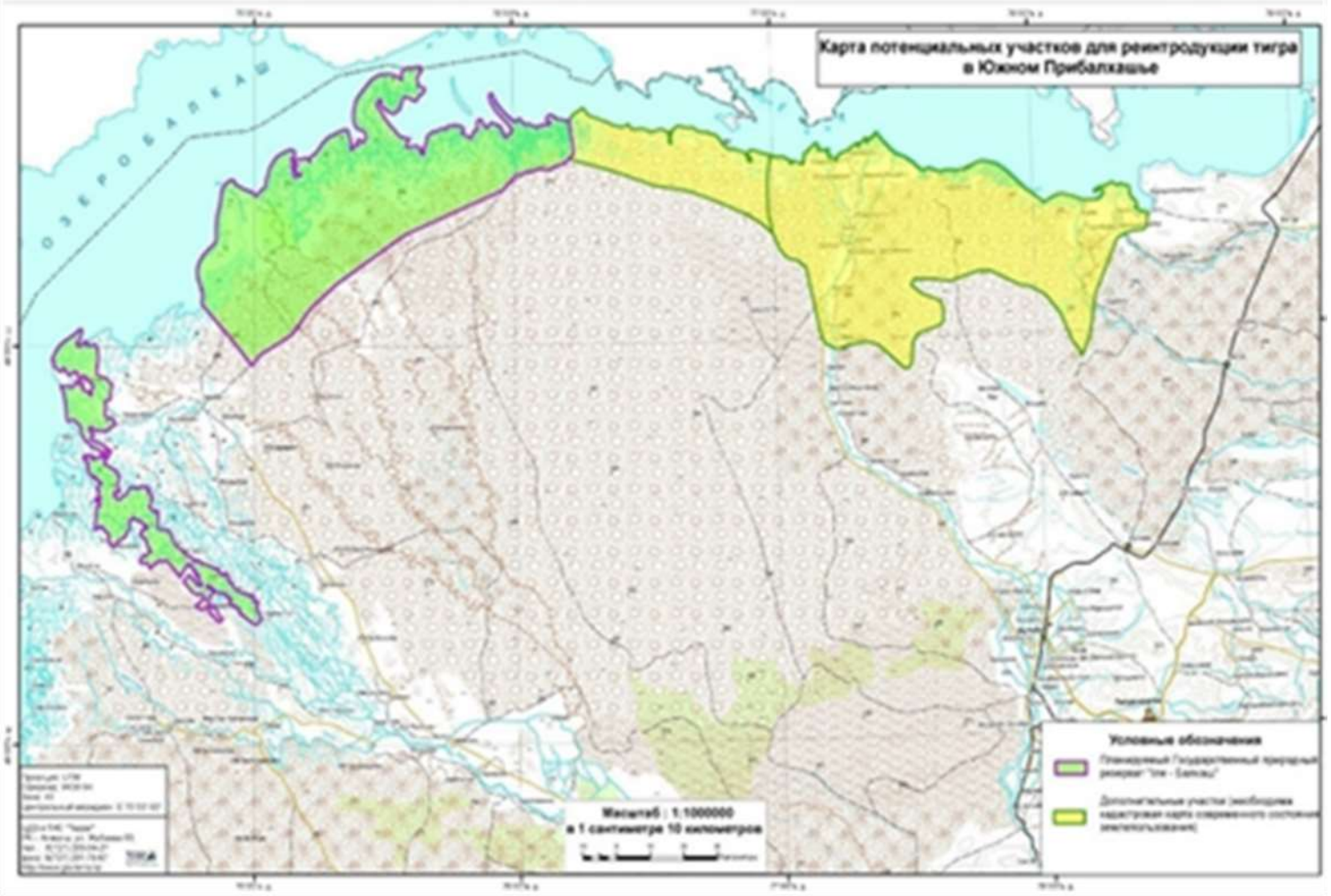
Annex 10a. Maps from satellite monitoring of saigas

Annex 10b. Maps from satellite monitoring of saigas

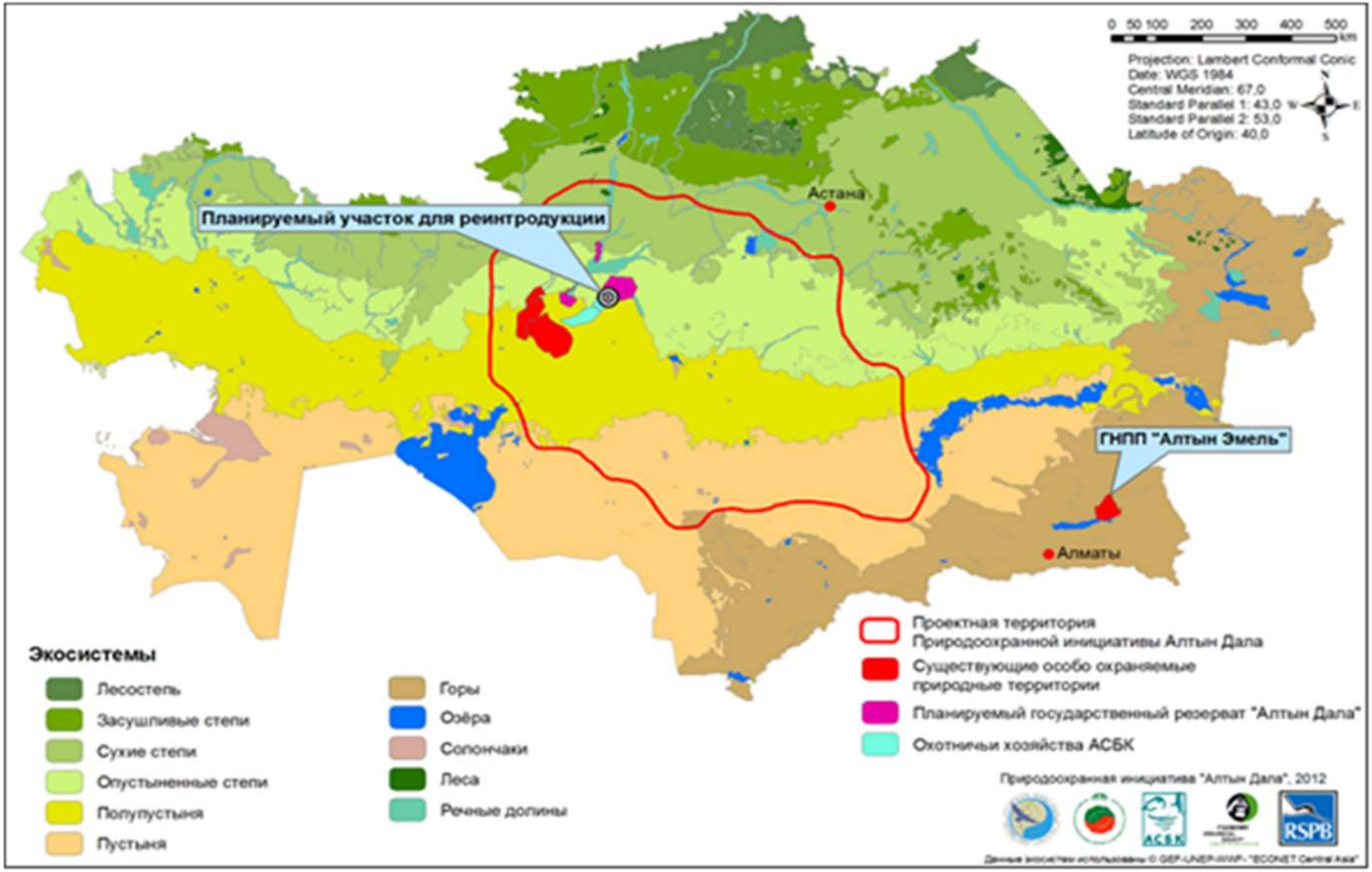


Annex 11. Areas of hunting species of animals distribution

Annex 12. Projected region of tiger reintroduction in Kazakhstan – Ili-Balkash



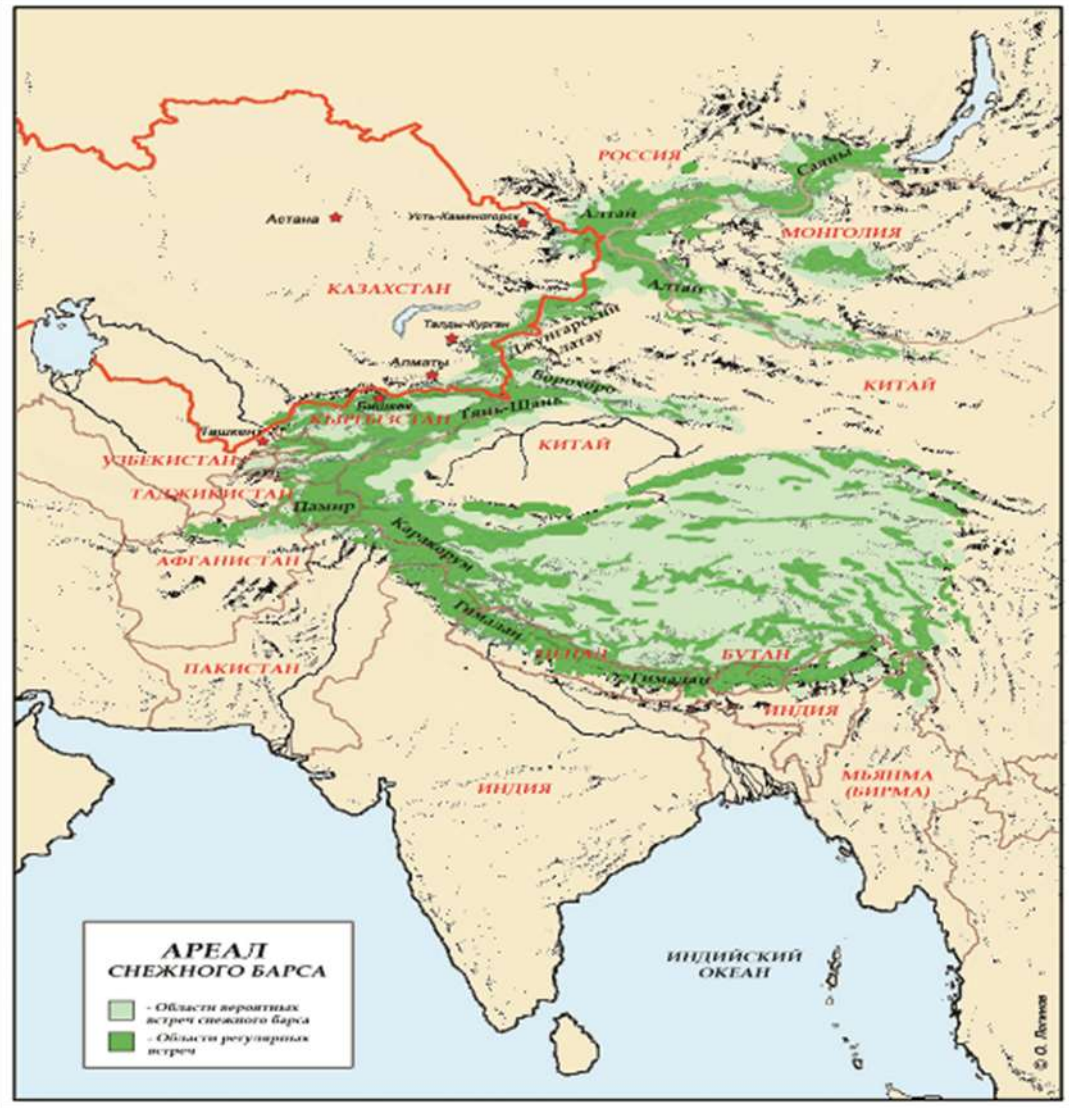
Annex 13a. Maps of reintroduction of the Kulan and Przhevalsky horse in Kazakhstan



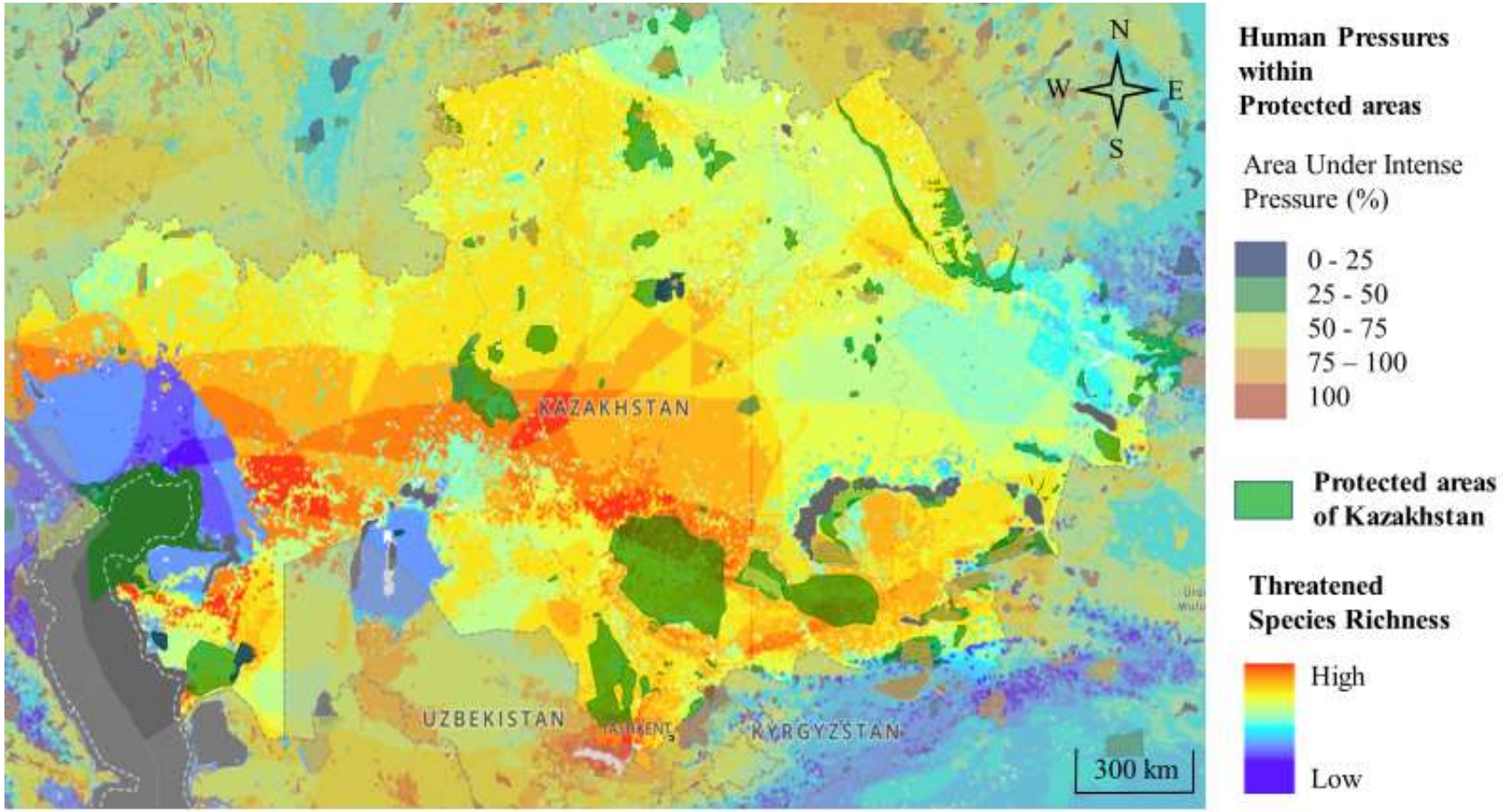
Annex 13b. Maps of reintroduction of the Kulan and Przhevalsky horse in Kazakhstan

Past habitat in Kazakhstan

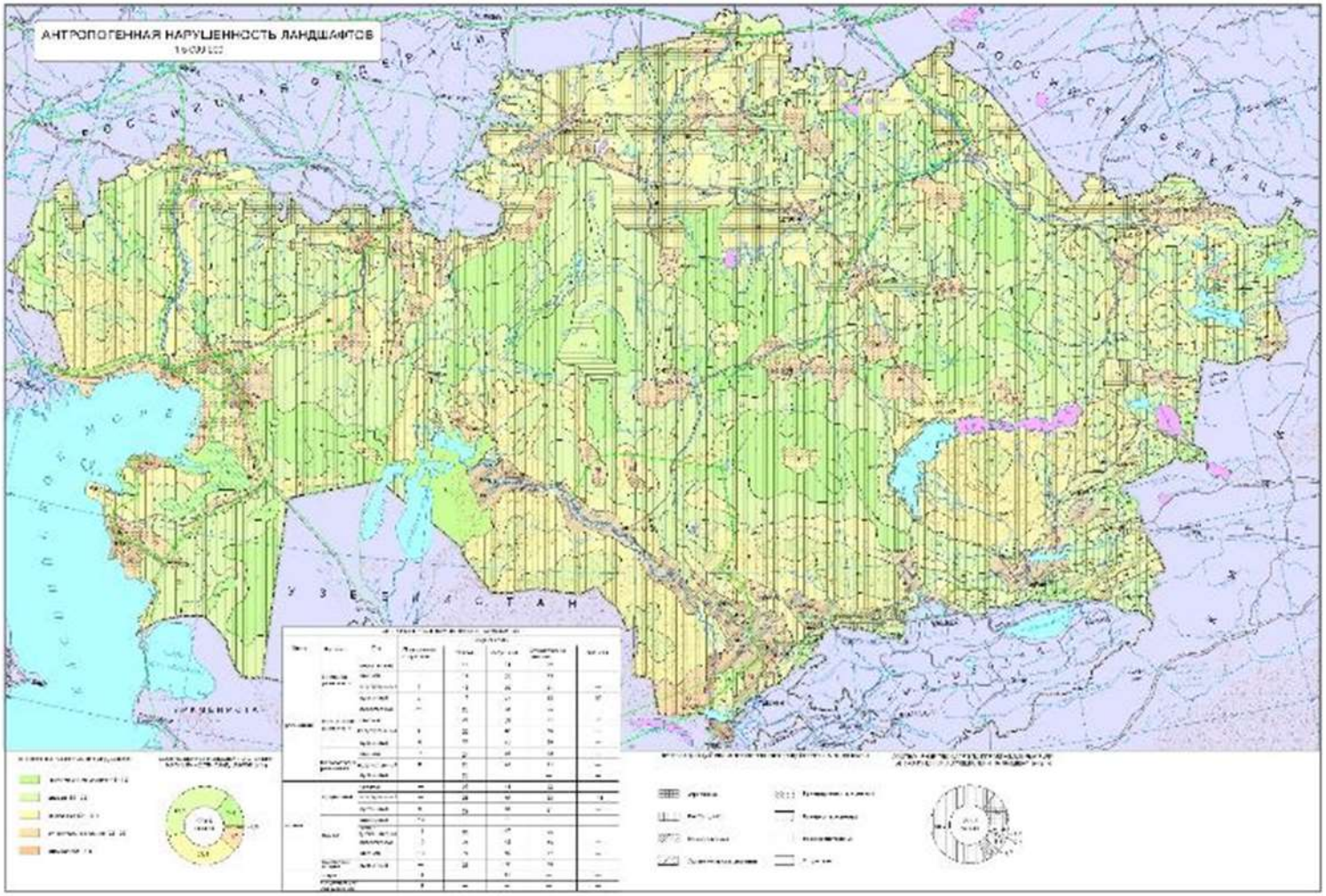
Annex 14. Map of the snow leopard habitat



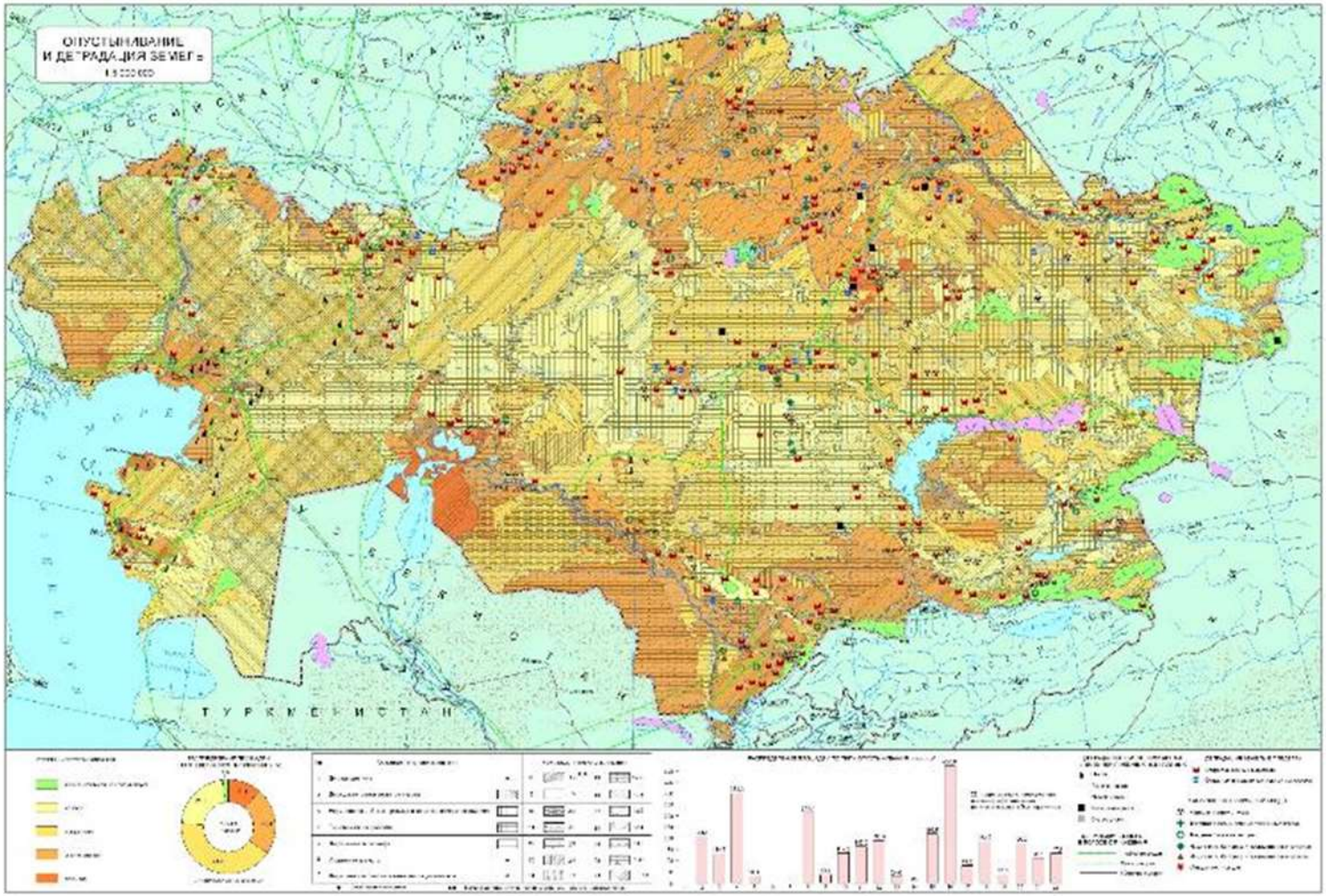
Annex 15. Map of anthropogenic threats to species of animals of Kazakhstan



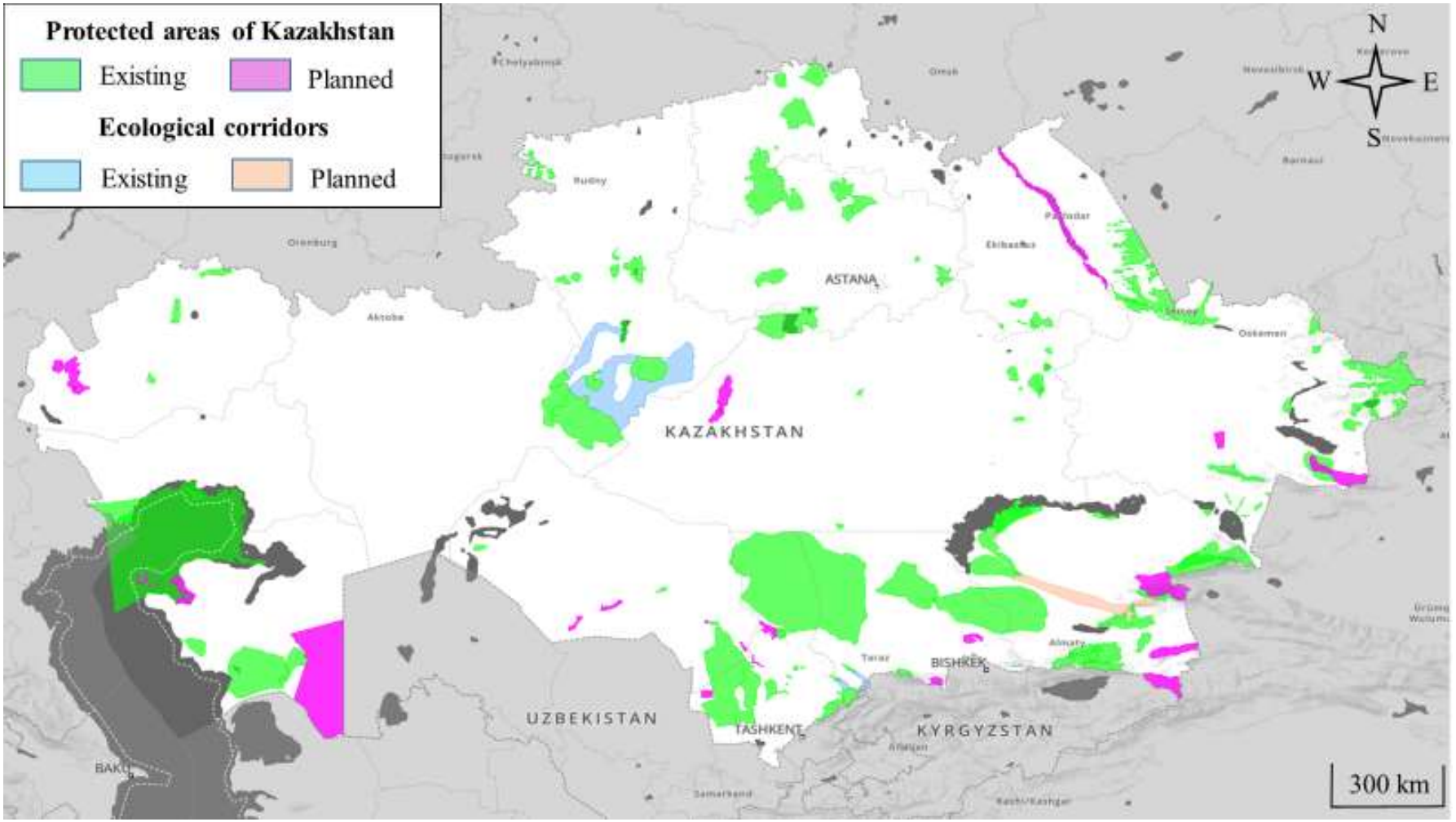
Annex 16. Map of anthropogenic disturbance of landscapes of Kazakhstan



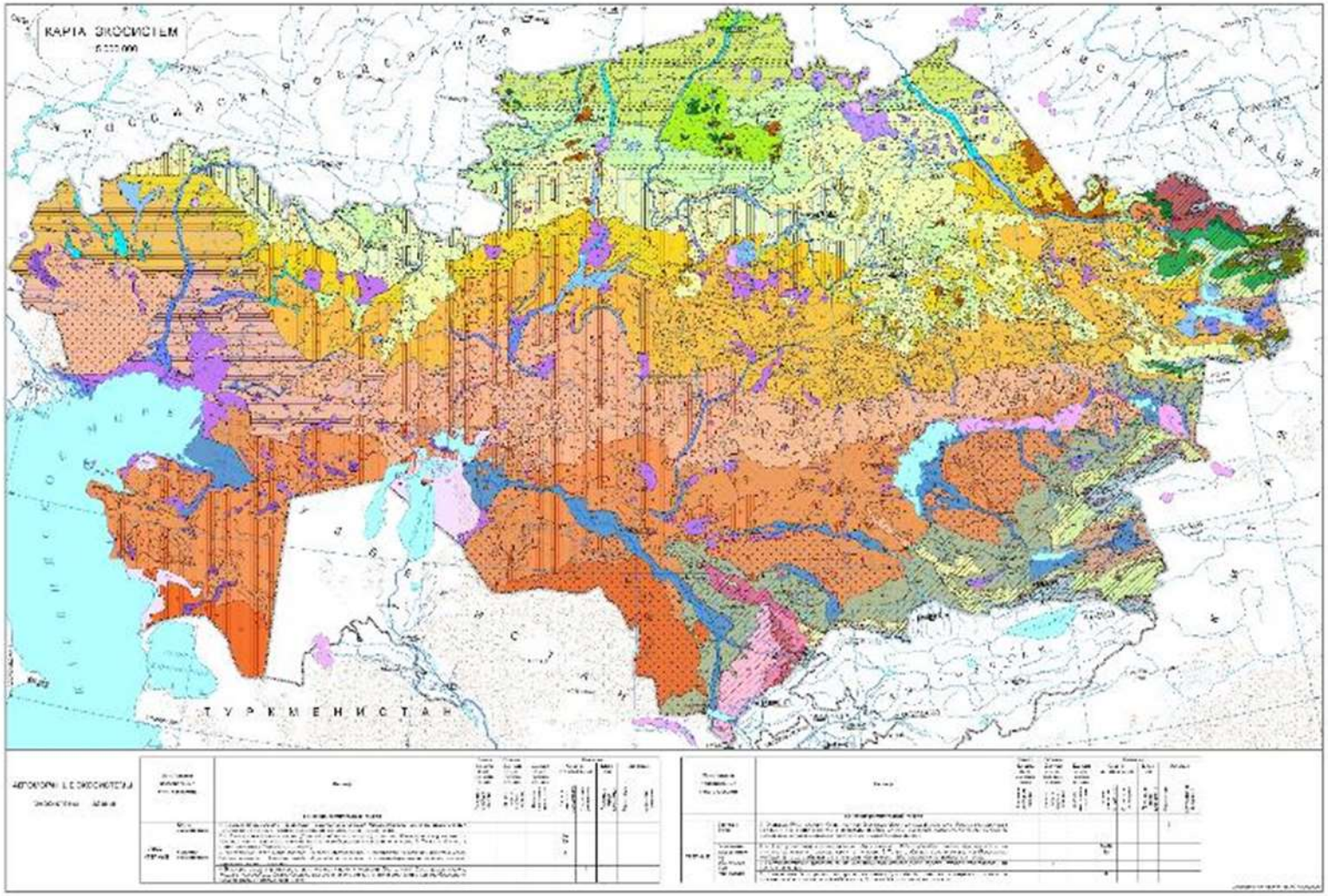
Annex 17. Map of desertification and land degradation in Kazakhstan



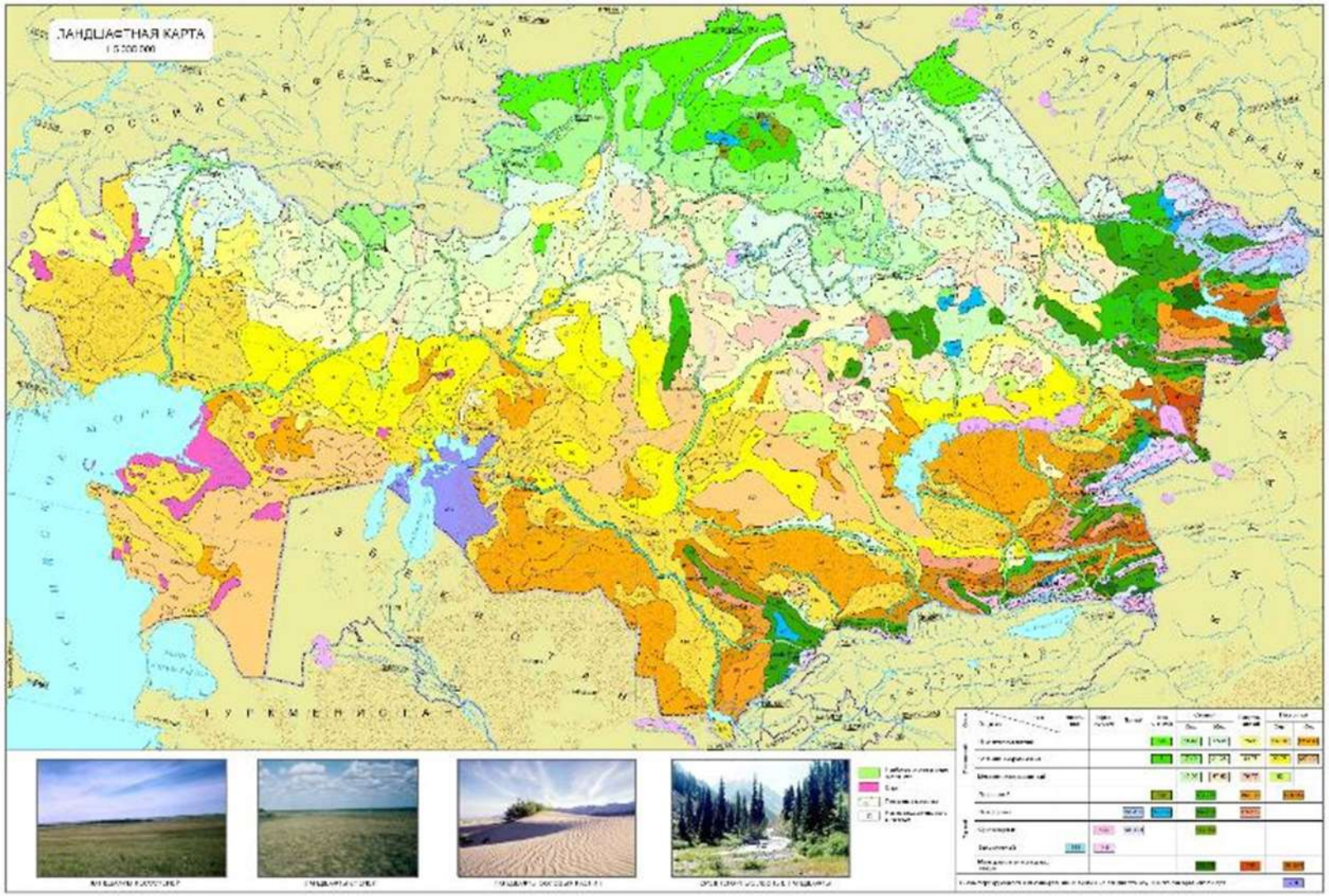
Annex 18. Map of existing and planned PAs in Kazakhstan



Annex 19. Map of ecosystems in Kazakhstan



Annex 20. Map of landscapes in Kazakhstan



Annex 21. Map of forest estate in Kazakhstan