Forestry Development and Best Practices of Forest Management in Kazakhstan

Asia-Pacific Network for Sustainable Forest Management and Rehabilitation

China Forestry Publishing House

图书在版编目（CIP）数据

哈萨克斯坦共和国林业发展和森林管理最佳实践报告 = Forestry Development and Best Practices of Forest Management in Kazakhstan : 英文 / 亚太森林恢复与可持续管理组织（APFNet）组织编写 ; 龙超等编 . -- 北京 : 中国林业出版社 , 2018.2
（大中亚区域林业发展报告丛书）
ISBN 978-7-5038-9463-3
Ⅰ . ①哈… Ⅱ . ①亚… ②龙… Ⅲ . ①林业经济—经济发展—研究报告—哈萨克—英文②森林资源管理—研究报告—哈萨克—英文 Ⅳ . ① F336.162

中国版本图书馆 CIP 数据核字 (2018) 第 047258 号

审图号：GS（2018）503 号

Editors: LONG Chao KONG Zhe PENG Peng XIAO Jun SUN Weina

Editors-in-charge: LIU Kaiyun ZHANG Jian
Library of Congress Cataloging in Publishing Data
Forestry Development and Best Practices of Forest Management in Kazakhstan/Edited by Asia-Pacific Network for Sustainable Forest Management and Rehabilitation (APFNet). Beijing: China Forestry Publishing House, 2018.2
（Forestry Development and Best Practices of Forest Management in Greater Central Asia）
ISBN 978-7-5038-9463-3
Ⅰ . ① K… Ⅱ . ① A… ② LONG… Ⅲ . ① Forestry economy — Economic development — Research Report — Kazakh — English ② Forest resource management — Research Report — Kazakh — English Ⅳ . ① F336.162
China CIP（2018）No.047258
Figure number：GS（2018）503

First Published in the P. R. China in March 2018 by China Forestry Publishing House
No.7, Liuhaihutong, Xicheng District, Beijing 100009
Printed and bound in Beijing, China
E-mail: Lucky70021@sina.com
TEL：86-10-83143520
Price: CNY 48.00

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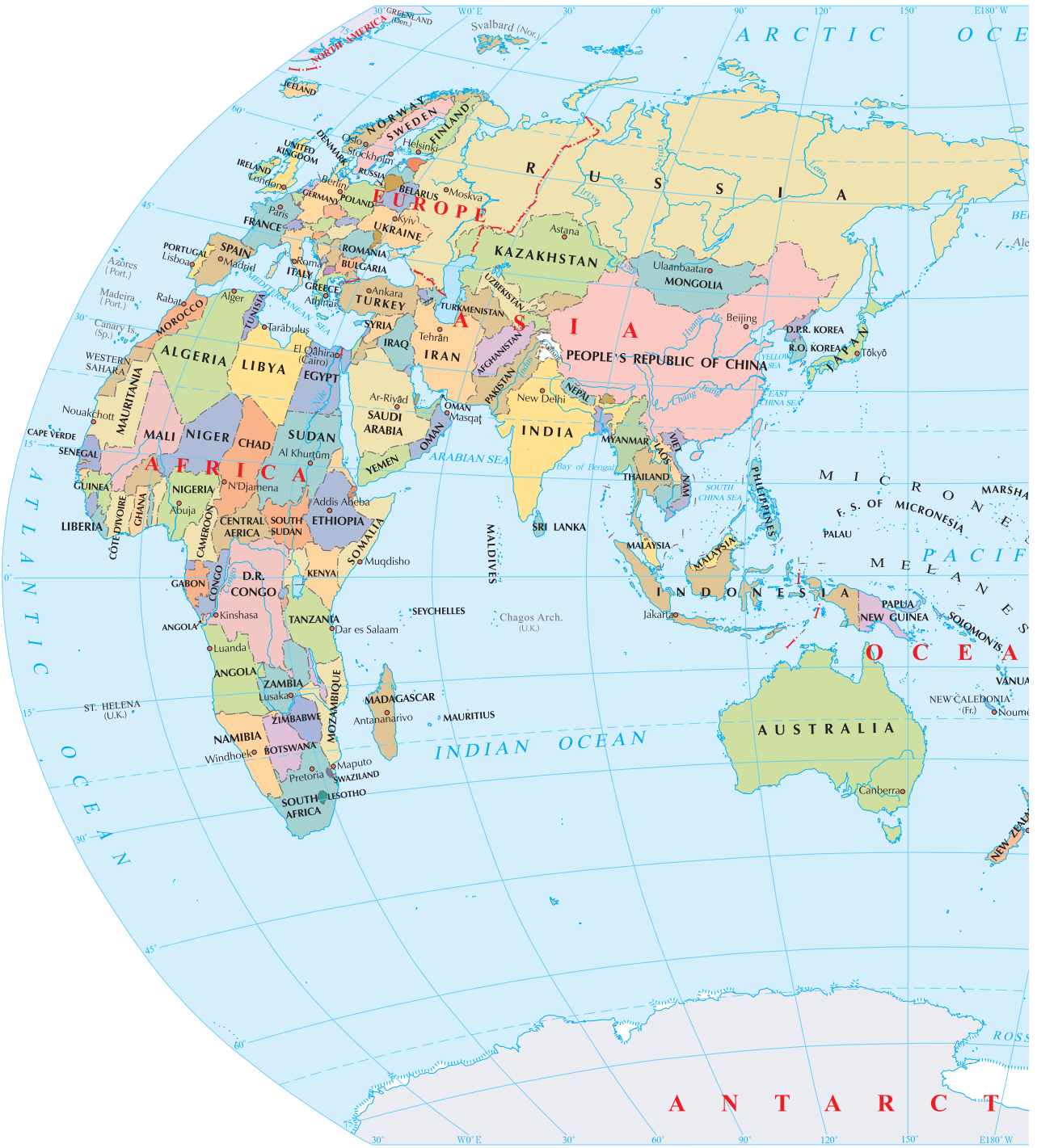

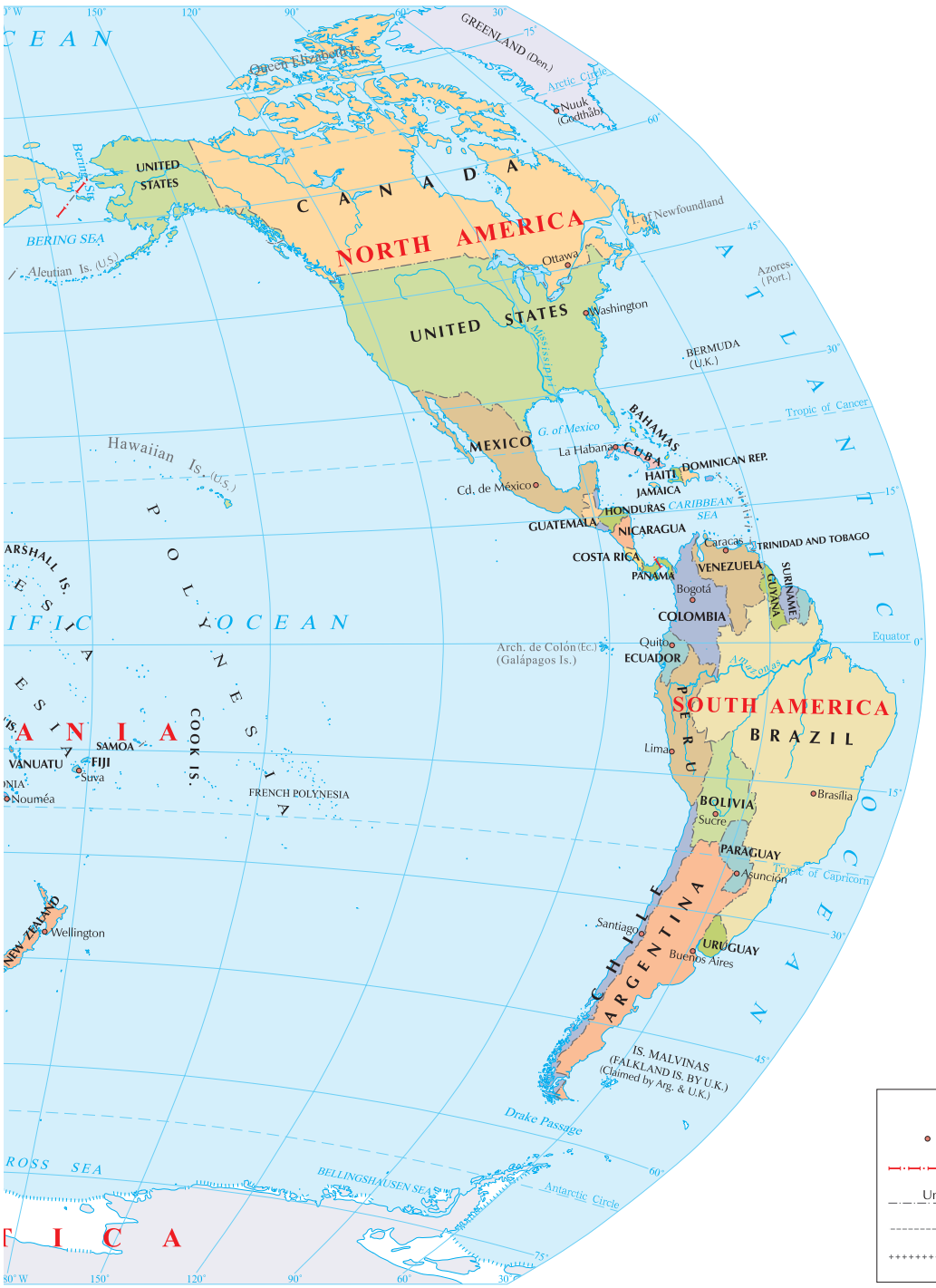
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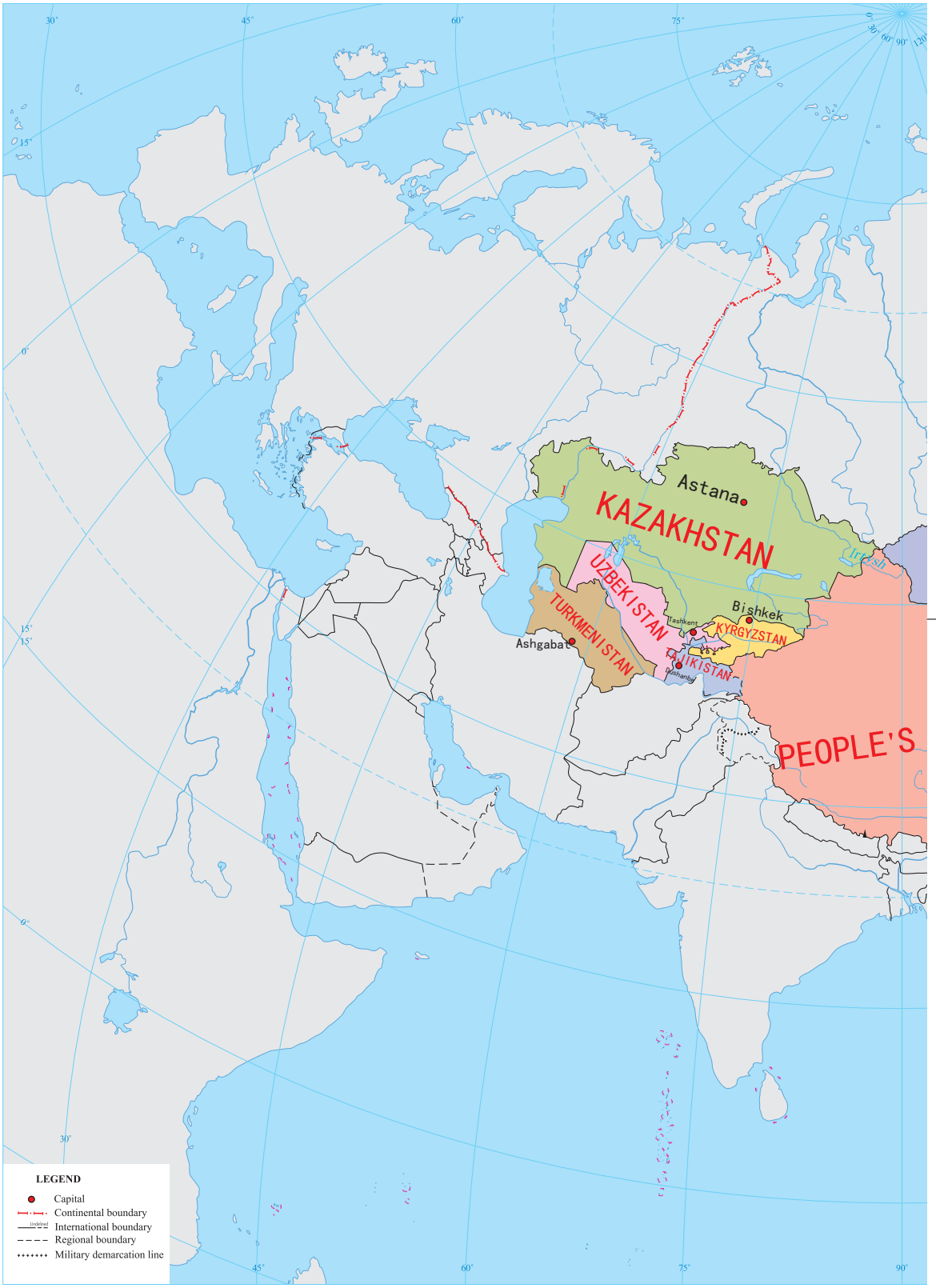
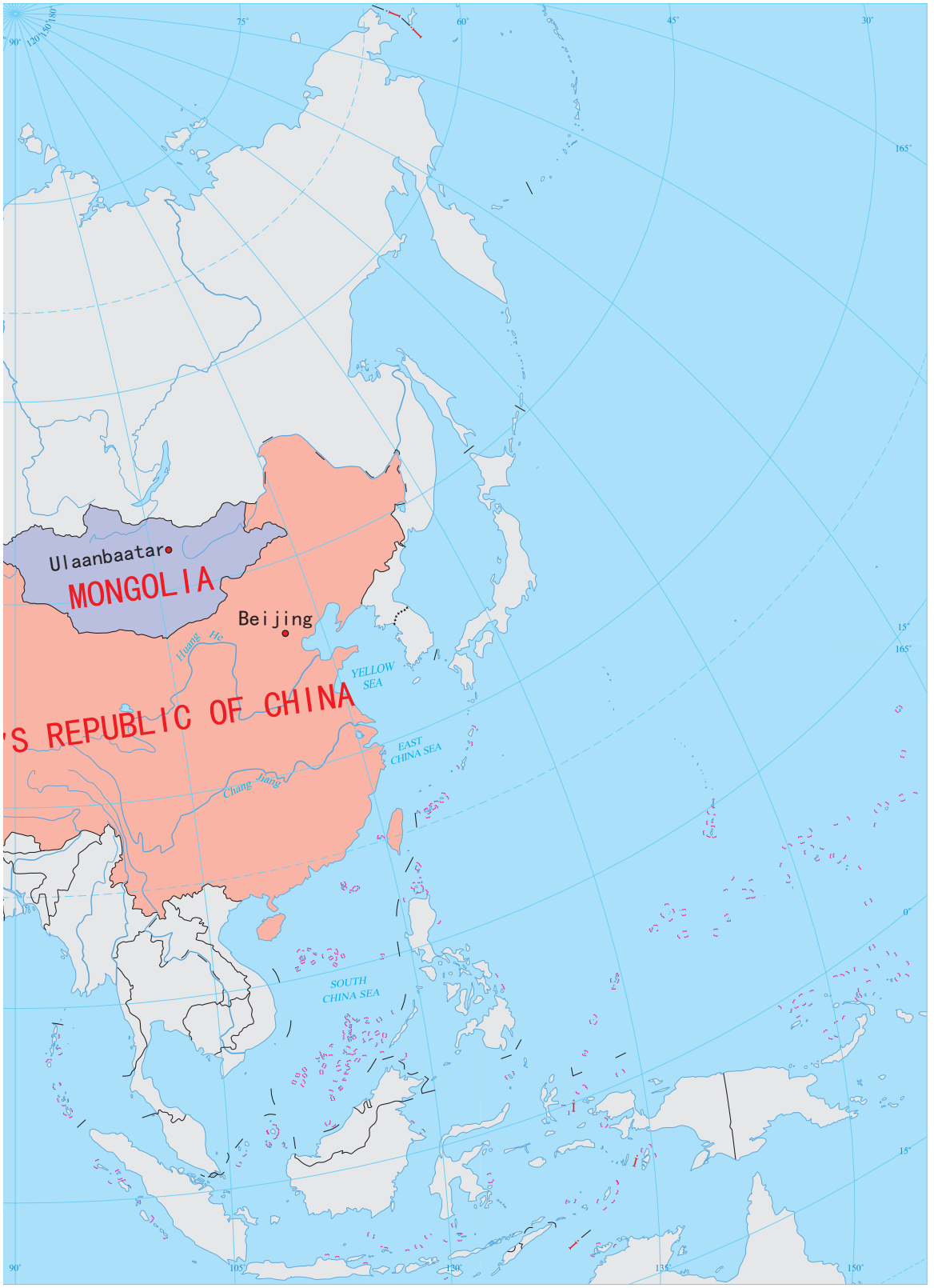
International boundary
Regional boundary
Military demarcation line

Map of the Asia

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Foreword

Strong social, economic and cultural connections exist among economies across Central and Northern Europe, Central Asia, the Middle East, North Africa and Greater Central Asia (GCA). The GCA region, in the widest sense, encompasses Kazakhstan, Tajikistan, Uzbekistan, Turkmenistan, Kyrgyzstan, Mongolia and western China and harbors unique biodiversity. Various species of fauna and flora mingle with endemic species not found elsewhere.

Forests in this region are vital natural resources that provide important environmental services including climate regulation, soil protection, clean water supply and many more. They also play a leading role in socio-economic development, supplying people with food, fuel, medicinal plants and recreational areas. Meanwhile, forests are suffering the effects of increasingly severe land degradation and desertification due to a host of natural and human factors. The most significant of these factors include overgrazing, land clearing for agricultural use, illegal logging and poaching, firewood collection, excessive water consumption, and insufficient financial and technical support.

Economies in GCA are actively involved in international and regional commitments focused on climate change adaptation, biodiversity conservation and desertification control. However, a comprehensive overview of the history, status and outlook of forestry development in GCA has been lacking.

Given this, the Asia-Pacific Network for Sustainable Forest Management and Rehabilitation (APFNet) identified the GCA region as one of its seven geographical priority areas for strategic interventions. Desk research and field surveys have been conducted since 2014 with the financial support of the Department of Science and Technology (DST) of the State Forest Administration of China (SFA), the active involvement of officials from different forest authorities, as well as consultants from international organizations, which has culminated in a series of six books being published.

This book, one of the six, gives a holistic overview of the current state of forests and forestry, the contribution of forests to economic development, forestry policies and legislation, and forestry education and research, in Kazakhstan. In particular, sustainable forest management best practices in relation to soil and water conservation, desertification control, forest fire and disease prevention, biodiversity conservation and rehabilitation of degraded forests etc., are covered in-depth.

We hope that this book will be of value to foresters, from policy makers to grass root practitioners and those working in forest authorities, academia, international organizations and civil society organizations who have an interest in forestry development in Kazakhstan.

APFNet Executive Director

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Abbreviations

APFNet	Asia-Pacific Network for Sustainable Forest Management and Rehabilitation
CBD	Convention on Biological Diversity
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
GEF	Global Environment Facility
IUCN	International Union for Conservation of Nature
KAZRIFA	Kazakh Research Institute of Forestry and Agroforestry
LLP	Limited Liability Partnership
PFE	Private Forest Entity
RAMSAR	Ramsar Convention
SPNAs	Specially-Protected Natural Areas
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Program
USAID	United States Agency for International Development
WB	World Bank

Chapter 1 Current state of forests and forestry

1.1 General information of the economy

The Republic of Kazakhstan is located in the center of the Eurasian continent, with a population of over 17,000,000 people. Its land area ranks the ninth in the world.

Its length is 1,600 km from north to south and 3,000 km from west to east. Its total area is 2.72 million km^2, which occupies the central and southern latitudes of the temperate zone of 55°26′ N to 40°59′ N and from 46°05′ E to 87°03′ E.

The economy is distant from the ocean, and faces lack of rainfall and sudden variations of temperatures in summer and winter (the average temperature in January is within the range from -19 °C in the north to -2 °C in the south; the average temperature in July is within the range from 19 °C in the north and up to 28 °C in the south). Landscape heterogeneity determines as its sharply continental climate. In Kazakhstan, there are nine natural areas, most of which are deserts and semi-deserts (58%), grasslands (26%), and mountain landscapes (12%).

In Kazakhstan, the total area of the land fund is 272 million ha. Main areas of rain-fed agriculture are located in the north of the steppe and forest steppe zones in the black earth and chestnut soils. Getting here crop yields are due to the high risk and adverse climatic conditions (seasonal variations of temperature and precipitation deficits). The main crop is seeded wheat, which grows rapidly, matures early, and is relatively drought resistant. The average yield is about 14-16 kg / ha, while it is not stable over the years and varies by region. The forecast crop yields are approximately calculated based on soil moisture, with a high degree of uncertainty of precipitation that will fall during the entire season. The development of rain-fed agriculture in the southern border has been associated with the policy of the Soviet authorities yet to achieve maximum production rather than profits. Grains were planted to reduce dependence on import. Cultivation of wheat was subsidized by the state, but in these circumstances, the effectiveness of subsidies was low enough. During the transition period, the area of cultivated arable land, including the southern parts of the steppe zone, has shrunk dramatically due to their lack of profitability. However, experiments conducted on the demonstration plots of United States Agency for International Development (USAID) / United Nations Development Programme(UNDP) project “enhancing the stability of the wheat production sector in Kazakhstan in adaptation to climate change for food security in Central Asia” have shown that new technologies such as zero tillage can reduce the investment, save soil moisture and humus content, and increase yields. Currently, the area of the use of dry lands increases. However, at the present time, because of the small land area as well as lack of funds for the purchase of machinery and fertilizers, in order to reduce the degradation of non-irrigated arable land, most farms do not use crop rotation. The main factors that lead to instability of yields and limit the economic viability of rain-fed agriculture, in addition to the lack of soil fertility, are climatic.

Irrigated agriculture is widespread in the southern regions of Kazakhstan. The main crops are rice, cotton, wheat, potatoes, sugar beets and vegetables. In the late Soviet period, irrigated land for cultivation peaked but declined sharply during the transition period. During 2010-2014, the irrigated area has decreased by 18%. There are various reasons for such a significant reduction. On the one hand, the restructuring of collective farms has led to the formation of smaller structures of rural producers, most of which turned out to be financially unsound. As a result of disrupted organizational and economic mechanism of the use of irrigated land, the issues of soil fertility and payment for electricity on the water supply were significantly worsened. On the other hand, irrigation and drainage system collapsed due to ill-defined responsibilities for new users and the lack of investment in their operation and maintenance. The deterioration of irrigation and drainage has led to waterlogging and salinization of these areas, and reduced soil fertility and crop yields. So, for the period since 1990, cereal yields have fallen by almost 48%, sugar beet by 52%, cotton by 39%, potatoes by 26% and vegetables by 34%. Water use efficiency is low. Only 50%-70% of water to irrigate the selected lands ultimately comes to crop loss due to inter-farm (10%-25%) and intra-farm (20%-30%) irrigation networks. In recent years, some United Nations Development Programme (UNDP) / Global Environment Facility (GEF) projects are being implemented to restore and improve the reclamation of irrigated lands in the South Kazakhstan, Almaty, Mangistau, Kyzylorda and some other regions of the economy.

Livestock has traditionally been based in Kazakhstan on a mobile grazing over large distances, depending on the season. Winter pastures are located in sandy deserts where snow falls slightly, and undulating terrain allows the farmers to keep the availability of natural hay and shrubs, thereby providing an additional feed. The pastures in summer are located either in mountain areas or in the steppe zones, which have been highly productive, but in winter are covered with snow. During migrations, shepherds stayed at lambing. Many of the virgin lands of the summer pastures of the steppe zone have been plowed crops in semi-arid and arid areas and carried out irrigation. For the purpose of rational use of rangelands diminished in the economy, the order of migration of cattle has been set by the government: a short distance is within the territory of one of the farms, and the long distance is between the different ecological zones. Using the most remote pastures has increased the number of sheep to 36 million. Widely-used sowing forage grasses in the pasture areas are the cultivation of fodder crops and hay. However, an extremely high number of livestock and poor rangeland management conditions have led to the degradation of 24 million ha of pastures (13.2% of all pastures). After Kazakhstan gained independence, in connection with the construction of a difficult period in the economy's new political and economic sectors, livestock of all kinds of cattle has declined and the use of distant pastures became unprofitable. Designated watering and other distant areas of pasture infrastructure ceased to be served and fallen into disrepair. In recent years, the economic situation has got improved, and the number of cattle began to recover. However, small number of cattle still grazed mainly around the villages or farms that continued to lead to local degradation of the land.

In accordance with the Constitution of the Republic of Kazakhstan (1995), the forests of the

State Forest Fund (SFF) are state property, entrusted the management to the state forestry authorities. The main reserves are valuable coniferous wood in eastern Kazakhstan, which has been logged for many years. Traditionally, forest dwellers and shepherds grazing livestock in areas of desert saxaul forests used wood as a fuel, and unregulated grazing on the slopes, in the desert and riparian forests, illegal logging, as well as large forest fires contributed to the degradation of forests. In order to restore valuable coniferous and saxaul desert forests, the Government of the Republic of Kazakhstan has introduced a moratorium on the felling of forests in 10 years (completed in respect of coniferous forest at the end of 2013). A moratorium on all kinds of cuttings in saxaul extended until the end of 2018. The use of forest resources other than timber also includes hunting, collection of forest fruits, berries, nuts, mushrooms, etc. Restoring forests is carried out mainly in clearings and burnt areas. It is envisaged expansion of the scope of reforestation.

1.2 Current situation of forest resources

The variety of its landscapes and climates determines the wide range of diversity of flora and fauna, as well as the forest vegetation types. In the desert zones are grown saxaul forests, along river, riparian and floodplain, in the mountains are coniferous forests, in the plains of the steppe and forest steppe zones are birch and aspen forested forests, island and tape forests. At the same time, in Kazakhstan forests are extremely unevenly distributed.

All the forests in Kazakhstan are announced as safety ones, and are also a natural reserve with 86% of the biological diversities of the economy and play an important role in maintaining the ecological and socio-economic stability of the regions and certain groups of the population.

The total land area of the SFF (forest and non-forest lands intended for needs of forestry) is 29.3 million ha and occupies 10.7% of the economy, and those covered by forest area are 12.6 million ha. All the associations of forest types determine the national average of 4.6% (taking into account only the high forest is about 1.1%). At the same time, in some regions, it ranges from 0.1% to 16%. It should be noted that over the past five years, in general, there was a steady tendency of growth of the area of the SFF. Since 2010, the area of the SFF has increased to 1,508,500 ha, and the area of forests has increased to 369,000 ha. The forestry economy was increased by 0.1%.

Out of the area covered by forest, 50% is the saxaul forests, 24% shrub planting which is located in the desert and steppe zones, 13% the most valuable conifer plantations, 12% deciduous and 1% hardwood. All of them are relict ecosystems, characterized by low resistance and vulnerability to natural and man-made influences.

The main forest-forming species include pine-Scots pine (Pinus silvestris), Schrenk spruce (Picea Schrenkiana), Siberian spruce (Picea obovata), Siberian fir (Abies sibirica),

Siberian larch (Larix sibirica), Cedar (Pinus sibirica), juniper (arsha) Zeravshan (Juniperus serawschanica); deciduous-downy birch (Betula pubescens) and hung (Betula pendula) (all more than 14 species), aspen (Populus tremula), black alder (Alnus glutinosa), black poplar (Populus nigra), lavrolistny (Populus laurifolia), etc. (just more than 16 species), turanga heterophyllous (Populus diversifolia), willow aquifolium (Salix acutifolia); hardwood - English oak (Quercus robur), elm (Ulmus laevis), peristovetvisty elm (Ulmus pinnato-ramosa), oleaster (Elaeagnus angustifolia); saxaul black (Haloxylon aphyllum), saxaul white (Haloxylon persicum); shrubs - juniper Siberian (Juniperus sibirica), juniperus Sabina (Juniperus sabina), meadowsweet aquifolium (Spiraea acutifolia), willow aquifolium (Salix acutifolia), white willow (Salix alba), willow Siberian (Salix sibirica), willow Junggar (Salix songarica), wild rose (Rosa canina) (more than 20 species), Siberian pea shrub (Caragana arborescens), and species in the deserts - Calligonum (Calligonum), tamarisk (Tamarix), ching silver (Halimodendron halodendron) and sand acacia (Ammodendron argenteum).

Total timber reserves of the main forest-forming species in the economy is 412,250,000 m^3. The largest stock of wood is pine stands accounting for 61.9% (255,230,000 m^3, including 108,030,000 m^3 pine), deciduous occupies 33.7% (138,760,000 m^3, including 88,330,000 m^3 birch) and Saxaul share does not exceed 3.6% (the average stock of wood is 2.4 m^3 per 1 ha). Due to the extremely uneven spread of forests on the territory of the economy, the main supplies of wood accounting for 83.1% (342,600,000 m^3) are concentrated in the mountain forests and the forest-steppe zone in the south-east, east and north of the economy.

Forests of the economy are strongly influenced by forest fires, forest pests, diseases and illegal logging.

Over the past 10 years, the territory of the SFF was about 6,000 ha. The wildfires which have taken place in an area of 119,000 ha have influenced 233,000 ha of forest land, and the damages from the fires amounted to 2.8 billion KZT tenge over the period.

In 2015, the territory of the SFF of Kazakhstan registered 476 cases of forest fires in an area of 9,600 ha. The damage from the forest fires amounted to 119 million KZT tenge. In comparison with 2010, in 2015, the number of fires decreased by 26%, and the area and the damage caused by the forest fires declined by 17% and 65%.

60 percent of the forest fires is caused by anthropogenic factors, and 40 percent by natural factors. Major anthropogenic factors refer to uncontrollable, agricultural burns, and natural factors generally refer to “dry” storms, from which the most affected are the relic tape of Irtysh pine forests.

Outbreaks of forest pests at the beginning of 2016 were recorded in an area of 180,000 ha. The main of them were in east Kazakhstan (53%), Pavlodar (16%) and Almaty (10%). Fight with dangerous centers of pests and diseases is carried by forestry organizations annually.

Significant damage to forestry is caused by illegal logging. According to the economy forest owners, over the past 10 years, the wood from illegal logging was cut down more than

400,000 m^3, with the damage amounting to 1.6 billion KZT tenge. A portion of the damages has been recovered in court.

1.3 Land use status

Forest Fund of the Republic of Kazakhstan consists of public and private forest funds. The SFF consists of:

- The forests of natural and artificial origin (including forest and non-forest lands) on lands of Specially Protected Natural Territories (SPNT).
- The forests of natural and artificial origin, which are not covered with forest vegetation of land and provided for the needs of forestry on lands of the SFF.
- The protective plantings on railways and roads of international and republican significance, canals, main pipelines and other line structures of ten meters in width and over an area of over 0.05 ha.

The Republic of Kazakhstan has a two-tier system of forest management of the SFF: the republican (national) level and the local (regional) level.

At the national level, the forests are managed by the Government of the Republic of Kazakhstan through its authorized central executive body - the Ministry of Agriculture of the Republic of Kazakhstan. Direct control, economy control and supervision of the forests throughout the state are carried out by a specialized republican body - the Committee of Forestry and Wildlife, which is a part of the Ministry of Agriculture and its territorial departments. All the issues of land use of the SFF are within the competence of national authorities.

At the regional level, control is executed by the local executive bodies – regional Akimats through their subordinate management of natural resources and environmental management and forestry institutions.

To date, 78% of the SFF is reserved for the executive bodies of the regions, 21% (mainly, it is SPNA) is managed by the Committee of Forestry and Wildlife of the Ministry of Agriculture of the Republic of Kazakhstan (CFW of the MoA of the RoK), and about 1% is under the jurisdiction of other ministries and departments.

The main task of government agencies and forestry organizations in the economy is to ensure increasing the resource and ecological potential of forests through the implementation of the system of science-based logging, reforestation, improvement of their species composition, establishment and effective use of permanent seed on selection and genetic basis, reclamation, forest tending (including thinning and sanitary cutting), the construction of roads for forestry purposes, prevention of forest fires and the foci of pests and diseases and other forestry activities.

The entire area of the SFF is covered by the ground protection. To eliminate forest fires, 168 Forest Fire Stations (FFS) have been created and equipped with fire engines and tractors with towbar. 30% of the economy forests are carried out the aerial surveillance of forests.

Private forest is a relatively new ownership in Kazakhstan. The Private Forest Fund (PFF) is the artificial forests, agro forestry plantations and plantation crops for special purposes with the width of ten meters or more and the area of 0.05 ha created at the expense of individuals and non-governmental entities in the lands given to them private ownership or long-term land use in accordance with the legislation of the Republic of Kazakhstan, with the purpose of afforestation. The lands of the PFF are currently up to 682 ha covered by the forest plots here yet, and are mainly represented by private nurseries.

The SFF refers to the objects of economy property and is in the republic ownership.

Possession, use and disposal of areas of the PFF are carried out by Private Forest Owners (PFO).

1.4 Afforestation and reforestation

President of the Republic of Kazakhstan in the long-term Strategy “Kazakhstan-2050” and in the number of annual addresses to the Nation identified among the priorities of the economy is increasing of green spaces, linking it primarily with the environmental rehabilitation of the economy.

In the period from 2010 to 2015, reforestation and afforestation in the Republic of Kazakhstan were carried out in an area of 283,200 ha, including planting forests of 114,300 ha and planting saxaul of 124.6 ha in the southern regions of the economy, and promoted the natural regeneration of the forest within an area of 44,300 ha.

The volume of work on reforestation and afforestation in 2015 increased by 17% compared to 2010. The maximum amount of 80,500 ha was recorded in 2014.

Reproduction of forest resources is focused on the use of natural and artificial methods of reforestation. In the context of sharply continental climate and humidity deficiency, the top priority is to provide a method of plantations reforestation. To date, the economy of artificial planting is 950,000 ha or about 7.5% of forested lands.

Particular attention is paid to the restoration of the relic tape of Irtysh pine forests covering an area of 883,100 ha. As a part of the GEF / WB project on “forest conservation and reforestation in the Republic”, three forest nurseries are put into operation, including a forest seed center, which is equipped with the latest equipment for the cultivation of planting material with closed root system capacity of 3 million pieces per year, which will increase the annual reforestation in tape pine forests to 9,500 ha.

On the dried bottom of the Aral Sea in 2008, planting and sowing of saxaul have been carried on a total area of 56,500 ha, including the planting with an area of 47,100 ha.

In accordance with the request of the President, the Government is working on the creation of green areas of the capital of the Republic, a number of regional centers and other settlements. The most extensive work is being done on the creation of green areas around the city of Astana, which were launched in 1997. Over the years, the area of green space here was more than 70,000 ha, and by 2020 it will be increased to 100,000 ha.

An one-time event "Republic Day of Forest Planting" is carried out throughout the economy every year, and is attended by environmental agencies, economy forest owners, national and private companies and organizations, and youth organizations. 1,000,000 trees and shrubs have been planted for landscaping settlements.

According to the data of the forestry fund on 1 January 2016, the area of forest culture fund for the economy was 6,190 ha, including logging (154,000 ha), burning and other dead spaces (418,000 ha), clearing (2,041,000 ha), and sparse forests (3,577,000 ha). In this regard, one of the main tasks of forests is an event of reforestation of previous years of Gorelnik without the renewed felling, the area of which is 4.5% of the forested lands.

155 permanent forest nurseries with a total area of 4,364 ha are possible to grow more than 200 million species annually. Pieces of standard seedlings of different species can ensure forest culture activities for planting on the lands of the SFF. The actual volume of production of planting material for the economy is on average about 162 million pieces, of which the standard is about to 75 million pieces.

Forming forest seed base on the basis of breeding and genetics is represented by 1,231 plus-trees, 2,000 ha of plus-plantations, permanent forest seed plots and seed orchards in an area of over 3,400 ha. At the same time, the yield of the permanent forest seeds is only 30%.

It formed a network of breeding and genetics facilities on a total area of 77,700 ha.

1.5 Urban forestry

In the Republic of Kazakhstan, the urban forests and forest parks include natural and artificial plantations that are grown within the boundaries of urban settlements, operating mainly hygienic and recreational functions, and are part of the SFF. This category is intended for health, recreation, history, culture, tourism and sports purposes, as well as the preservation of favorable environment. In the urban forests and forest parks, a ban is set for felling and other cuttings, resin tapping, secondary forest materials and tree sap for grazing, fishing harvesting of non-timber forest products and other kinds of forest utilizations that are not compatible with the purposes of these forests. The total area of urban forests in Kazakhstan is 49,200 ha, including the area covered by forest (18,100 ha).

1.6 Community-based forestry

In Kazakhstan, approach of community-based forestry management is not used. At the same time, the possibility of its piloting based on the experience of the Kyrgyz Republic is under consideration. It was assumed that a pilot area for testing and evaluating the possibility of using this form of forest management with taking into account the mental peculiarities of the rural population of the economy could be done at some parts of the desert (saxaul) forests in the south. The main barrier to the implementation of this pilot project is lack of necessary funding and relevant rules and regulations in the current forest legislation.

1.7 Production, consumption and trade of forest products

The legislation of the Republic of Kazakhstan identified 8 species of forest management on the territory of the SFF, such as:

- Logging.
- Harvesting of resin, tree sap.
- Procurement of secondary forest resources (barks, branches, stumps, roots, leaves and buds).
- Secondary forest use (mowing, grazing, maral breeding, fur farming, placing beehives and apiaries, horticulture, melon and cultivation of other crops, harvesting and collection of medicinal plants and technical raw materials, wild fruits, nuts, mushrooms, berries and other foods, moss, forest litter and fallen leaves, reeds).
- Use of areas of the SFF for needs of hunting.
- Use of areas of the economy forest fund for research purposes.
- Use of areas of the economy forest fund for health, recreation, history, culture, tourism and sports purposes.
- Use of areas of the SFF for cultivation of planting material of trees and shrubs and plantation forests for special purposes.

The procedure of forest management is regulated by the authorized body in strict accordance with the legislation of the Republic of Kazakhstan and forest materials.

Forest management in the territory of the SFF refers to the economy monopoly, and the economy forest management organization carried out at intervals of 10-15 years (revision period) in a single system, in accordance with the approved normative legal acts, with the use of aerial photography and satellite imagery materials.

The management plan provides a comprehensive assessment of forest management and use of the SFF for the previous revision period, the volume of developed forestry measures and the main provisions of the organization and forest management for the next revision period.

The plantations for harvesting are elbowed on the basis of an approved forest management

plan. Thus, according to the category of the SFF, the cutting management is executed on the basis of the cutting ages for tree species: coniferous tree species from 121 to 160 years (larch from 141 to 180 years, cedar from 201 to 280 years), hardwood from 41 to 80 years, and shrubs from 9 to 12 years. Annually, the authorized body shall determine the volume of felling (forest fund), intermediate use, and other cuttings on the main forest-forming species. The main forest management in the economy is set up for the following species, such as pine, spruce, fir, larch, birch, aspen, poplar, willow tree, black saxaul, and elm, maple and ash in some areas.

It should be noted that the potential of forested land to operate land accounts for only 38%. Many of the lands covered by forests (about 62%) are excluded from the calculation of final felling in accordance with the environmental requirements and the requirements of the forest legislation. To use the tree species listed in the Red Book of Kazakhstan, you need special permission of the Government.

In order to prevent degradation of coniferous and saxaul plantations and strengthen the protection of forests from illegal logging, the CFW of the MoA of the RoK puts moratorium (ban) on all types of cuttings (except cleaning liquid litter) in some parts of the tape hog of the Irtysh and saxaul plantations in the south of the economy until 31 December, 2018.

Forest management (mainly logging activities) is carried out through transferring forest resources in the areas of state forests for long-term use based on the results of forest tenders (the winner of tenders). Tenders are organized by the local regional executive authorities under the supervision of the national authorized body on forests. The long-term forest management contract concluded with the winners of tenders (legal entities and individuals) included provisions obliging them to carry out the forest-related work within the allocated forest area and subject to the appropriate annual fee to the state budget. The term of forest resources delivery in a long-term forest management of wood lasts from 10 to 49 years.

Tenders are also carried out with a particular focus on the organization of the following types of forest, such as harvesting of resin and tree sap envisages allocation of forest resources to the user for a period of 10 to 15 years; use of areas of the SFF for needs of hunting is allowed for the period of 10 to 49 years; use of areas of the SFF for culture, health, recreation, tourism and sports purposes is provided for a period of 10 to 49 years.

At present, the long-term forest management of forest resources is rewarded to legal entities and individual persons covering over 1.8 million ha, including for wood production needs at an area of over 1 million ha.

The actual amount of timber (except saxaul) for the main use was around 302,000 m^3 in 2015, representing about 15% of the approved annual allowable cut. Most underutilized volumes accounted for deciduous wood, due to lack of material and technical basis of forest users, lack of adequate refining capacity and effective technologies for processing hardwood.

Trade in forest products is not within the competence of forest authorities in the economy, as it is under the responsibility of the business community. Enterprises subsectors are in private or corporate ownership. It is mainly involved in small and medium business of the economy, financed by private funds, as well as domestic and foreign investments.

Forest agencies are only granted with the right related to paid services to the population, which include the sale of fuel wood from thinning and sanitary cuttings for heating and other purposes, as well as forest planting material. Earnings from the sale of paid service are credited to the special account of forest institutions and used to meet the needs of forest management as an additional income-generation source according to the procedures set up by the legislation of the economy.

Land issues have undergone significant changes during the transition period, and the proportion of land in private ownership increased. Despite the changes introduced in the land law and imposed legal documents of different status, economy policy was still not sufficiently focused on land productivity. Due to the lack of the necessary preparatory work, such as assessment and planning, the urgent adoption of the reforms led to organizational, legislative and environmental issues.

The prerequisites for the sustainable use of land resources is that the land in Kazakhstan is enough to meet domestic demand for agricultural products, and in addition, provide economically significant export potential. Total capacity of arable land per hectare on average during 2003-2004 amounted to 10,051 KZT tenge, which was 60.3% higher than that during 1995-1998. The share of livestock production changed in the structure of agricultural products (44.1% in 1995, 39% in 2001, 44.1% in 2003).

Reducing poverty in rural areas is largely dependent on the agricultural sector. After the deep crisis of the nineties, significant progress has been achieved up to now. The total volume of agricultural products in 2004 amounted to 6,947 million KZT tenge. The total volume of agricultural products (with normalized prices) during 2003-2004 was 31% higher than that during 1995-1998. However, despite the strong growth within the sector, it dropped by 7.8% in the total GDP. This is a significant drop. In Soviet times, its agricultural production was a quarter of the national economy. This trend was typical for the developed economies, where the relative weight of agriculture fell. The main GDP growth factor was the rapid growth of oil and other raw materials.

The structure of the business changed in the last ten years. In 1995, large-sized companies produced 53% of all agricultural products, then their share of production dropped to 22.6% in 2003. In 2003, the (average) farms produced 27% of agricultural products and small-sized farms 50.4%. The grain production was dominated by medium-sized farms (43%) and large-sized companies (33%), while livestock production in the main role was played by small-sized family farms.

Despite the fact that investment in agriculture increased in recent years, they are still too small to significantly upgrade the means of production (from 1.3% to 1.5% of all investments).

The share of processed agricultural products in the total volume of agricultural products is growing. The trade balance of foreign trade of agricultural processed/unprocessed foods is positive (21% in 2004), and the foods with significant level of import are fruits (41%), oil and sugar (about 100%). Subsidies per hectare of arable land are $ 14.6. (For comparison, Canada $ 83,412, EU $ 1,112).

The threat of the forests can be both natural and anthropogenic factors, as well as the instability of the forest management system. The former should include natural forest fires, pests and diseases, floods and landslides, the consequences of global warming (reduction in moisture content of forest land, changes in the conditions of growth of individual forest species, and others). The latter should include construction of roads and tourist infrastructure, expansion of agricultural land use and discharge of river flows for agriculture and the development of mineral resources, etc. Also, as a note, it is the frequent structural changes of forest management bodies of the system, the lack of long-term forest policy and the lack of stability of the legislation.

Among the groups, above-mentioned threats should be highlighted as several facrors:

- Alteration of forests and growing conditions - the causes of both natural and anthropogenic influences. Thus, in the Trans-Ili Alatau mountains in the last 100-150 years, the lower limit of the spruce belt has risen by about 200 m, in the mountains of Zhongar Alatau fir - 100 m. In the mountains of the Talas Alatau on the watershed of the rivers Aksu and Mashat, apple-hawthorn and some places of juniper ecosystem lost completely. The average rate of reduction of the area of forest fruit in Zhongar Alatau is up to 0.6%, in the Trans-Ili Alatau, up to 1% per year. In the desert area along the river flows almost lost riparian and floodplain forests and severely degraded saxaul forests.
- Spread of alien species - this problem in Kazakhstan has not yet become the subject of priority research. However, it exists and demands more attention. In particular, research in the framework of the United Nations Development Programme (UNDP) / Global Environment Facility (GEF) Project “in situ conservation of mountain agro-biodiversity in Kazakhstan” (implemented by the IESD) only in the fruit forests of the mountains of Trans-Ili and Zhongar Alatau found in the area 24 alien species of woody plants (English oak, White birch, maple, box elder, and others.) which have the potential to transform and displace native wild fruit forest communities.
- Pollution - caused by emissions of harmful substances by industrial complexes, harmful chemical industries, food processing plants, farm animals, road, placing numerous unauthorized landfills of municipal solid waste (including forest areas). For example, in South Kazakhstan region, dust waste, cement and phosphate industries, near the city of Shymkent, are transferred to the relic mountain forests of Aksu-Zhabagly Nature Reserve.
- Development of mineral resources, natural disasters, over-exploitation of forest resources - a device quarries for extraction of common minerals for local economies, large forest fires and pests lesions, leading to partial or complete loss of forest vegetation and change of species, poaching logging, leading to degradation or total loss of forest areas.

- Expansion of agricultural activities in the forests - overgrazing in forest pastures, causing degradation of natural vegetation, ease of trees and shrubs (especially in arid forests), plowing forested areas under crops, gardens and other.

Chapter 2 Contribution of forests to economic development

2.1 Economic and environmental significance of forests and woodlands

The economy's forests have an important resource and other useful capabilities, such as:

- Forest resources. Timber resources, oleoresin and wood sap, secondary forest resources, wild fruits, nuts, mushrooms, berries, medicinal plants and technical raw materials of vegetable and other products of plant and animal origin, which are accumulated and harvested in the forests.
- Useful properties of forests. Ecologically and socially significant functions that are typical for them to be in the growing economy (release of oxygen, carbon sequestration, soil protection from water and wind erosion, transfer of surface runoff in subsurface, balneological, climate-regulating, and others).

According to the state forest inventory in Kazakhstan at the beginning of 2013, the total value of resources and useful properties of the economy's state-owned forests is 66,971,799,800,000 KZT tenge, from which:

- The cost of timber resources in the areas of the SFF indicated based on standard rates of payment for timber sold on the vine is 386,968,500,000 KZT tenge (0.6%).
- The cost of other useful forest products amounts to 5,848 million KZT tenge (0.001%).
- The cost of land plots of the SFF indicated using the current rates of payment for land use amounts to 352,620,700,000 KZT tenge (0.5%).
- The environmental cost to health protective functions of forests is 66,231,625,800,000 KZT tenge (98.9%).

According to the forest assessment in Kazakhstan, forests are of great importance as a source of "public goods". The predominant areas are the following categories of forests, forests mainly operating field and soil protection function (79.0%), and the forests in the specially protected areas (12.8%). Furthermore, there are categories of forests, which fulfill other important protective functions: anti-erosion forests (3.6%), the water shed–protective forest along the banks of rivers, lakes, reservoirs and other water bodies (2.7%) of scientific importance, especially valuable forest areas, forest fruit plantations, state protective forest strips, urban forests and forest parks, green areas of settlements and therapeutic institutions (1.1%) ,etc.

However, in the assessment of the economic role of Kazakhstan's forests, these above functions are not taken into account. The only contribution of natural forests into the economy's GDP is considered and estimated within the range of 0.01%-0.02%.

The forest sector of Kazakhstan after gaining sovereignty of the economy was faced with a number of environmental, social, and economic problems. It is developing the processes of deforestation, reducing the productivity of forest plantations as a result of unsustainable forest use on natural forests for industrial infrastructure, major forest fires of past years and

the growing impact of climate change. Extremely acute in the difficult period of transition, the economy has encountered a problem of underfunding forest management and forest science and a significant reduction of volumes of reforestation and forest management activities. There was the loss of a part of nursery areas and infrastructures, stopped updating of technical base, destruction of forest management and forest management planning, and an outflow to other sectors of the experts.

Structural reforms and changes in forest management system, and improvement of the legislative framework of the industry contribute to overcoming some of these problems. Decentralization and separation of powers between the national and regional branches were implemented. It changed the use of forest resources, for example, forestry and some other types of forest use are allocated to users in the long-term forest management on a competitive basis. Along with the economy development, there is also a need to create a private forest sector and take some legislative measures on the economy support for the PFOs.

However, the problems of transition in the system of forest management are not completely overcome, and require governments and partners to help them completely overcome such problems and further develop the industry.

2.2 Financing and investment in forests and forestry

Forest Code of the Republic of Kazakhstan stipulated the following sources of funding for covering forest management costs in the SFF:

- Budget (State Budget).
- Funds from the paid services and the implementation of forest products facilities.
- Forest users' financial means.
- Voluntary contributions and donations from individuals and legal entities.
- Other sources not prohibited by the legislation of the Republic of Kazakhstan.

The main and most stable source of funding is the state budget, which must be strictly regulated and directed to:

- Forest management, the state registration of the forest fund, state forest cadaster and forest monitoring.
- Aviation work on protection of forests against fire, pests and diseases.
- Research, design and development work in the field of protection and use of forest fund, reforestation and afforestation.
- Forest breeding and seed production, including the formation of permanent seed, seeds of forest certification.
- Monitoring and control of forest pest.
- Training and skills development for the forestry and hunting.

- Production of permits for forest management.
- Activities in the areas of the SFF, which are functionally managed by the authorized body, local executive bodies of oblasts, cities of republican status, capital and other economy bodies on protection of forests against fires, unauthorized felling and other violations of the forest legislation of the Republic of Kazakhstan, the protection of forests from pests and diseases, reforestation and afforestation, construction and maintenance of forest roads, suppression of forests fire, forestry engineering, thinning and sanitary felling, allotment and taxation of cutting areas, capital investment in the protection, preservation, reforestation and afforestation.
- Reimbursement for the tab and cultivation of plantations of fast-growing trees and shrubs, on the creation and development of private forest nurseries.

In 2015, forestry has been allocated from the economy budget of 15,920,226,900 KZT tenge, the development of the budget amounted to 15,894,903,600 KZT tenge or 99.8%. In 2016, funding for the Committee was 15,715,778,000 KZT tenge.

The second important source of financing is own funds of forest institutions formed by them in the special accounts for implementing the following types of paid services:

- The cultivation of planting material for landscaping settlements and collection of forest seeds, creation of greenery, protective, plantations and other plantations, conducting practical training for students.
- Sale of goods and products from the processing of wood, obtained by carrying out intermediate cuttings, and other cuttings, including firewood for the population needs, as well as productions of by-forest-products and provision of services for the processing of wood.
- Provision of transport services to the public for carriage of goods within the territories of forest institutions.
- Implementation of reforestation on the lands of the SFF, transferred to long-term forest management for timber production, in accordance with the agreement concluded with forest managers.

The volume of these funds each year is more than 1,110,000,000,000 KZT tenge. In accordance with the budget legislation of the Republic of Kazakhstan, such funds may be strictly used for the purposes related to the protection, conservation, reforestation and afforestation and secondary forest use.

Another real source of funding grants is allocated, as a rule, by international institutions for the implementation of projects related to forest and biodiversity conservation. The order grants (grants related) have also provided for an additional contribution of a certain percentage of the national budget to the implementation of such projects. The amount of grant depends on the availability of ongoing projects in the economy.

2.3 Forests, livelihoods and poverty

In Kazakhstan, about 2.5 million people live in or nearby the forests. About 300,000 people are directly dependent on the forestry sector. They use the forest areas for harvesting of food products and livestock forage, and source of building materials, fuel wood as well as for business, leisure, recreation, etc.

State forest owners (forest institution) provide local population with wood harvested from their intermediate felling and other cuttings. In addition, the firewood is provided free of charge at the expense of cleaning clutter.

Part of the rural population is allowed for using portions of the SFF based on the forest special permits (forest tickets) for such purposes as grazing personal cattle, placing stationary and mobile bee apiary, growing vegetables, melons, potatoes and orchards, and using farms in Maralovodcheskoe.

Since most of the forest institutions are located in rural areas or in isolated forest villages, they represent the only available employers of local residents through employment in forest nurseries, forest cultures, seasonal forest fire watchmen and others.

The search for effective approaches and tools for the integration of local communities with forestry authorities is one of the main tasks of social and economic analysis, so it is necessary to conduct such an analysis in Kazakhstan.

Chapter 3 Forestry policy and legislation

3.1 Forest policy and institutional framework

Forestry is one of the branches of modern hybrid economy of Kazakhstan and is guided by the strategic documents of the economy's development.

Adopted in recent years, the most important strategic documents are as follows:

- Strategy "Kazakhstan-2050" being a new policy of established economy (declared by the President of the Republic of Kazakhstan and leader of the nation Nursultan Nazarbayev on December 15, 2012 with the message of the people of Kazakhstan).
- Concept of Kazakhstan joining the top of 30 most developed economies of the world, approved by Presidential Decree of 01.13.2014, No.732.
- Concept of the transition of the Republic of Kazakhstan to the "green economy", approved by Decree of the President of Kazakhstan of 05.30.2013, No. 577.
- Concept on innovation development of Kazakhstan till 2020, approved by Presidential Decree of 04.06.2013, No. 579.
- Strategic Plan of Development of Kazakhstan till 2020, approved by Presidential Decree of 01.02.2010, No. 922.
- Predictive scheme for spatial development of the economy till 2020, approved by Presidential Decree of 21.07.2011, No. 118.
- Program for the development of agro-industrial complex in the Republic of Kazakhstan for 2013-2020 years "Agribusiness-2020" that determines the most important strategic directions and policy framework for the development of sectors of the economy.

The Government of the Republic of Kazakhstan over the years has approved a number of sectoral medium-term programs, which were determined by the individual target setting and activities for each of 3-5 years development periods.

Special long-term forest policy in the economy is not yet accepted that, due to the numerous reorganizations of the national bodies of forest management in recent years.

In this regard, a land relation of Kazakhstan is a very interesting and topical issue. The object of land relations is all the lands within the territory of the Republic of Kazakhstan, including the individual plots of land, regardless of the fact that they are located and the legal basis of the individual subjects, and the right to land and land shares. Legislative acts are published in the Republic of Kazakhstan in order to establish the grounds, conditions and limits of creation, change and termination of ownership of land and land use rights, the procedure for exercising the rights and responsibilities of land owners and land users, land use regulation in order to ensure rational use and land protection, soil fertility, protection of land rights of individuals, legal entities and the economy, creation and development of real economy market, the rule of law in the sphere of land relations. Today, the Land Code is amended and introduced a moratorium on the rent of land in Kazakhstan until 2021.

The adopted legal framework ensures the implementation of the strategic directions in the field of forestry policy. The main legislative acts defining the activities of the forest sector are the Forest Code of the RK, the Land Code of the RK, the Water Code of the RK, the Budget and Tax Code of RK, the Criminal Code and the Code of the Republic of Kazakhstan on administrative violations of the Law "*On SPNA*" and "*On protection, reproduction and use of wildlife*". The development of these laws by the Government of Kazakhstan and the authorized body in the field of forestry adopted more than 100 regulations by defining the rules, procedures and guidelines for the implementation of individual areas and activities of forest management bodies and forest users. Copies of these regulatory acts are available on a public Internet site of the national legal information (http://adilet.zan.kz (in Kazakh) or http://adilet.zan.kz/rus).

In line with the overall reform of the economy's management system, the industry's major institutional changes were implemented, namely, as a result of decentralization policy, forestry institutions were transferred directly under the jurisdiction of akimats of regions. It implemented the principle of differentiation of forest management to control functions and features of the felling and processing of received wood (the latter were transferred to the business community), ordered function of conducting the economy control and supervision of forests, introduced the concept and the procedure for the establishment of the PFF approved as measures to support PFOs and managers, ruled reimbursement for bookmark and cultivation of plantations of fast-growing trees and shrubs, in the creation and development of private forest nurseries, formed an inventory of forest resources, in order to preserve the forests of coniferous and saxaul, introduced a 10-year moratorium on their cabin, which allowed the whole to stabilize the security and status of these plants (saxaul forests moratorium extended until the end of 2018), revised upwards the age of felling, first introduced the system of organization and holding of tenders for the provision of forest resources on the lands of the SFF for long-term forest management, developed and approved a list of rules and the fight against dangerous pests and diseases, with the exception of quarantine species, mostly restored network of forest nurseries and provided steady growth in reforestation, increased the number of objects of breeding and seed production and selection and genetic purpose, received seed zoning, reinforced control measures and significantly reduced the area of forest fires. It was amended accordingly in the field of forest relations in the current Forest Code and related to the legislative acts of the Republic of Kazakhstan, as well as a set of by laws.

It formed a new institutional structure of the forestry sector:

- At the national level by the Committee of Forestry and Wildlife Ministry of Agriculture of the Republic of Kazakhstan and its subordinate 14 oblast territorial inspections. Kazakh Republican Forest Seed Agency is entrusted with oversight functions to assess the quality of forest seeds and approve licensing breeding, seed, breeding and genetic objects. There are also Kazakh Forest Inventory Enterprise, National Forest Breeding Center with a network of regional branches, and Kazakh base of aviation forest protection and maintenance of forestry.

- At the regional level by 123 forest institutions (forestry enterprises) with services and offices for the protection, care and reproduction of forests, including the FFSs and forest nurseries.

A non-profit joint-stock company "National Agricultural Research and Education Center" of Ministry of Agriculture of Kazakhstan provides scientific support for forestry, which has a special "Kazakh Research Institute of Forestry and Agroforestry."

3.2 Short-term and long-term planning for forestry development

Forestry Plan is based on the economy planning systems approved by the President of the Republic of Kazakhstan. It includes 3 levels of documents: (i) documents defining the long-term vision for the economy's development with key priorities and guidelines (policies and strategic development plans of Kazakhstan, projected schemes, etc.). (ii) documents defining the strategy for development of the sphere/sector (medium-term forecasts of socio-economic development, public and government programs). (iii) the documents governing the achievement of the documents of economy planning systems of the first and second levels (medium-term strategic plans of government agencies, development programs and other areas). For each level of target, indicators of documents are developed.

Currently existing programs for the development of forestry industry are not perfect. The government is developing programs for the forest sector of the economy of Kazakhstan till 2030.

When budget is planned and prepared, the budget proposal for the forestry sector is taken as the basic indicators of the medium-term Strategic Plan of the MoA of the RoK on 2014-2018 years. Key indicators of the results of the plan for 2014-2015 include the area of reforestation and afforestation, the average area of forest fire and the average amount of cases of illegal logging.

The main activities to achieve the specified performance are as follows: conducting forest management activities, ensuring receipt of planting material with improved hereditary qualities, providing expertise quality of forest seeds, assessment of forest health, the formation, registration and certification of seed base objects and their contents, conducting forestry engineering, carrying aircraft patrolling in the territory of the SFF of the Republic, and implementing the fire-fighting arrangement of the territory of the forest fund.

During 2016-2018, the strategic plan indicators will be adjusted. It identifies the following priority areas, such as forest management in the territory of the SFF, aviation work on protection of forest resources, reforestation and afforestation, artificial breeding of flora objects and forest design. The target indicator of forestry is set as "forested area of land."

The budget request is made on the basis of quantitative and financial information on the

resources required to support the volume of expenditures of the republican and local budgets. It also takes into account the cost of a permanent nature related to the performance of public functions, authority, maintenance of economy structures, the provision of public services (according to the current roster of services), implementation of the necessary measures, as well as capital spending and spending on new initiatives.

The basis for the planning of activity of forestry public institutions and ESPN with the status of a legal entity (public forest owners) are forest management projects of public forest holdings, which have passed the environmental review and approved by the CFW of the Ministry of Agriculture of the Republic of Kazakhstan.

Based on the approval of the financial budget and the main indicators of activities to be funded as well as performance and volumes to be provided from its own funds, the costs of forest enterprises and protected natural areas with the status of a legal entity shall be notified to forestry organizations. The Committee of Forestry and Wildlife Ministry of Agriculture of the Republic of Kazakhstan (the national budget) and the oblast akimat (regional budget), as well as the financial control bodies are responsible for the control over the spending of these budget funds.

3.3 The history and future of forestry development

During the existence of the Soviet Union, the economy policy in relation to forestry, along with the basic functions for the protection, restoration and sustainable use of forests, provided for ensuring raw material needs of the forest and wood industry and agriculture support. This part of forest land has been secured in the long-term forest management as the forest raw material base (mainly in the East Kazakhstan of the region) for the timber sector, some (mainly in the south of the economy) for pasture collective and economy farms. The total volume of merchantable wood harvested in the economy did not meet the needs of the economy. Therefore, the Russian Federation provides that 80%-85% of wood harvested annually by timber bases is specially assigned to a number of ministries of the Republic.

With independence and the building of a market economy, the economy held a large-scale privatization of economy property, which has changed the structure of production. Privatization also affected the forestry sector. Former processing plants and workshops of forestry have been allocated to independent economic structure and later privatized or closed. This forestry lost an important source of self-financing, and the rural population in the placements of these shops lost their jobs. The forests and lands of the SFF in accordance with the Constitution of the Republic of Kazakhstan were economy-owned, and most of collective forests and leased forest lands were returned to forestry. Change of the tasks of forestry resulted in the loss of functions of the forest. When its management has been strengthened, it losts some control and monitoring functions.

At a later stage of the reform when decentralization of forest management was carried out, the forest management functions and forestry have been transferred from the authorized republican government body in the field of forestry (while the CFW) to regional executive bodies, akimats (local executive authorities). The basic component of forest management is currently the national forestry agency under the jurisdiction of akimats of regions.

The overall management and implementation of the economy control and supervision of the forests in the economy were entrusted to the CFW of the Ministry of Agriculture of the Republic of Kazakhstan and its territorial departments. The Committee is also entrusted with the formation of the normative legal base of forestry. The functions and competence of all forest management levels are regulated by the current legislation.

According to the attitude to ownership of forest resources, the legislation introduced rules for the formation of addition to public and private forest lands and private forest system.

In connection with the adoption of the "Agenda for the XXI Century" and the Forest Principles (Rio de Janeiro, 1992), the Millennium Summit (New York, 2000) and the World Summit on Sustainable Development (Johannesburg, 2002), the government of the Republic of Kazakhstan has paid more attention to issues of sustainable development of the economy, particularly in the forestry sector, to the restoration of sustainability of forest ecosystems, the possibility of self-regulation and sustainable use of forest resources.

With the strengthening of the national economy, the government increased its support for the forest industry and public funding. It is possible to start a technical update of the Park Forest, and rebuild almost lost nursery base to ensure annual growth of reforestation. However, compared with the allocations in the forestry of the "Soviet" period, these funds cannot be considered sufficient. Still, one of the lowest funds in the economy is the level of wages of forest workers, and their social security.

In the future, policy objectives of forestry development in the longer term (up to 2050) must be updated or revised with a focus on:

- Forest conservation for future generations and a further increase in the forest cover of the economy.
- Improving the sustainability of forest ecosystems to climate change and other adverse effects.
- Increasing research and innovation as the basis for the technological development of the industry.
- Wide intersectoral cooperation and the development of public-private partnerships.
- Increasing use of mechanisms for public participation and involvement of all stakeholders in the management, including the use at the gender dimension.
- Development and management of private forests.
- Active participation of the industry in raising the level of food and biological safety and strengthening the national economy.

- Institutional development and human resource development sectors.
- Implementation of regular monitoring, evaluation and adjustment of the forest policy in view of new challenges and opportunities of the industry.

Chapter 4 Best practices for sustainable forest management

Taking into account the exceptional importance of protective functions of forests in Kazakhstan, it is advisable to continue maintaining these functions for the following purposes.

4.1 Soil and water conservation

The economy's land degradation and water scarcity are important direction of afforestation and reforestation in the catchment areas of mountainous areas and water protection forest strips along rivers and other inland bodies of water to restore and strengthen the protection of riparian and floodplain forests of the economy. It is also necessary to revive the phyto forestry melioration on the mountain slopes in the "Soviet" period for the purpose of protecting soil against washout and water mountain streams from pollution. Approximate volumes of forest plantations along the hydrographic network were previously assessed for an area of about 400,000 ha. Survey on catchment areas of water bodies was intended on a total area of 7.7 million ha. Volumes of these activities should be clarified. Sites of afforestation in the first stage may be a catchment area of river basins of the Black Irtysh and Ural.

4.2 Desertification control

Currently, the desertification combating is actively being conducted in the Aral Sea area in the economy, where with the help of plant afforestation the drained areas of the bottom is being fixed by sands that reduce the spread of dust and salt offsets. The work was carried out by planting and sowing of saxaul.

Over the past years, the almost total water for the irrigation of cotton crops came from the river Amu Darya (the main source of water of the Aral Sea). Since the beginning of 1960, the Aral Sea level decreased by more than 20 meters, and water salinity has been tripled. Wind removal of salts and falling water tables have led to a sharp deterioration of the climate, salinization and soil degradation in the vast region with a population of 30 million people.

In connection with the establishment of Kokaral bridge between North and South Aral Sea in 2005, situation in the Kazakh part of the Small Aral Sea has slightly been improved, and the water level was significantly increased (up to 42 m). In general, there is a small downward trend in the average salinity, restored micro biotic, and reborn fishing (fish production volume in 2015 amounted to more than 8,000 KZT tenge). However, the afforestation activities on the dried seabed in combination with the restoration of the Kazakh part of the sea will help to improve the ecological environment, people's living standards and economic development of the region.

4.3 Protection and restoration of degraded agricultural land

An important area is reconstruction and development of field-protective afforestation and pasture systems. In previous years (the second half of the 1 century), forestry industry at the expense of the state budget on the agricultural lands created complete systems of shelter belts and protective plantations on grasslands (green umbrella) in an area of about 350,000 ha. After introduction of private ownership of agricultural land, these protective plantations with arable lands have been transferred to new owners. Accounting and silvicultural care of these plantations, as well as the creation of new plantations are not currently underway, due to lack of funds from the owners. At the same time, because containment of snow reduces moisture evaporation of soil and transpiration of plants, the yield of these plants gets increased in the conditions of Kazakhstan, for example, grain crops increased by 2.6-3.2 dt/ha, vegetables, potatoes, fodder plants, fruit and berries by 24%-32% (M. E. Vasiliev Forest reclamation and yield of Almaty: Kaynar, 1980).

The estimated area need for the establishment of shelter belts is 900,000 ha, and pasture plants of 200,000 ha.

Currently it is considered for an integrated approach of the creation of a system of protective plantings on agricultural lands of the Republic, which means gradual formation of the agro-forestry landscapes of the territories. To this end, the Kazakh Research Institute of Forestry and Agro-forestry prepared corresponding scientific base, for example, improved principles of agro-forestry zoning, allocated the 26 new agro-forestry districts and 15 sub-districts in the forest-steppe, steppe and semi-desert areas, offered a list of breeds and technology creation and maintenance of shelter belts, investigated the role of forest belts in a change of the water regime of the fields under their protection, defined standard yield increase from the ameliorating influence of forest belts for the main groups of cultures, natural areas and ages of protective plantations.

4.4 Salinization contorl

The Aral Sea was one of the four largest inland waters in the world. However, due to excessive withdrawal of water from rivers for irrigation and also because of the weak management of the whole basin, the water resource was decreased, and less than a third of its former size.

Intensive use of vast irrigated lands in 1950s led to a reduction in the level of water flow from the Syr Darya and Amu Darya rivers. The main factor in the balance of water in the Aral Sea basin was the construction of the Karakum Canal, which removes about 50% of the waters of the Amu Darya. Other water loss was due to the removal of the huge volume of water from the Syr Darya into the desert depressions to avoid flooding of agricultural and urban areas. Another factor was the change in the dynamics of the flow of the Syr Darya from the natural

high tide water in the summer, due to melting snow in the high mountains to the highest tide in the winter, due to the release of water from the Toktogul Reservoir to generate electricity. The most critical area of emergency relief is the lakes system of Aydar Arnasay in Uzbekistan, which is now filled with water as much as possible, thus causing damage to infrastructure and creating problems for the drainage of irrigated land.

Drop in sea level led to the division of the sea in the small northern part and most southern part, which is divided into small eastern and western parts of the deepwater area. The northern part of the Aral Sea has a positive water balance and steadily keeps level at 38 m above sea level, which is about 17 m below the level of the 1950s. Construction of the dam between the northern and southern parts will increase the level of water in the northern part of the sea up to 42 m. The southern part is mainly fed by water from the northern part, while the inflow of water from the Amu Darya is limited to a small surface water. The recent closure of the dam will lead to a rapid decrease in the sea level in the southern part. After a few years, excess water can be directed to the southern part of the Aral Sea, which will reduce the drying speed.

The imbalance between water supply and evaporation led to an increase in salinity of 10 to 46 grams per liter. The fish are now found only in the northern part of the Aral Sea, while the southern part of aquatic biodiversity is limited to some salt-tolerant organisms. The vast territory of the former seabed became dry (38,500 km² of 66,500 km² between 1960 and 2003). While the territory of the former bed began to dry up in the 70s and 80s, it already has a good vegetation cover, and one part of the floor has become dry and was covered by perennials. Large areas are covered with sand, saltmarshes (salt marshes) and salt crust. Due to the expansion of transport and the wind leaching, sand particles have contained a small amount of soluble salts. On the contrary, silt particles are typically highly saline, especially where groundwater is close to the surface. The sandy ground is naturally relatively quickly overgrown perennials. Moving sands in some places are covered with highly saline soils, preventing further erosion of salt dust and creating better conditions for the germination of plants.

Falling sea levels affect the level of underground water and erosion of the Syr Darya river basin. This leads to the drying-up of wetlands located in the delta of the river. While there is no evidence, it is often referred to high concentrations of pesticides in sedimentary rock at the bottom of the Aral Sea. Nevertheless, very toxic salt deposits them. The calculations which determine the annual amount of salt dust from the dried bottom of the Aral Sea are very different from each other. The most common figure is 450,000 tons. This dust is distributed over a large area, making it difficult to measure the impact caused by their settling, and reliable data are unlikely to exist. It is unlikely that the salt dust causes a significant damage on a large scale, since it is widely distributed, and therefore reduces its concentration, and also takes into account other contributing factors.

In order to reduce wind erosion and the consequent air pollution of salt dust from the drying bed, the protective plantations must be created on the dried bottom of the Aral

Sea. A preferred plant for reforestation is Haloxylon, which can grow at low salt content of substrates, and that is available in terms of seed collection, propagation and planting technology. Planting saxaul has the significant impact on reducing salt dust that arises from the dried bottom of the Aral Sea, which will improve the health of the local population in the affected areas and reduce the salinity of agricultural land to enhance the land productivity. Plantings in the general vicinity of the settlements with the advent of natural species can be contributed to the timber, control of mobile dunes and pasture improvement.

Currently, one of the most effective measures to curb sand and salt storms is implementing plant forest amelioration on the dried bottom of the Aral Sea. Thanks to the actions of plant forest amelioration on the dried bottom in 1980s, the forestry institutions in Kyzylorda region have been allowed to create saxaul plantations in an area of 54,000 ha.

In 2015, the Office of Natural Resources and Regulation of Wildlife Management of Kyzylorda Oblast has done saxaul planting in an area of 4,000 ha and landing in an area of 1,000 ha where survival rate was 46%.

Also during the period from 2008 to 2014, through the WB / GEF Project on “conservation of forests and increase of forest cover in the Republic”, the agroforestry plantations have been created on the dried bottom of the Aral Sea in an area of 56,500 ha.

In 2013, commissioned forest nursery complex with research station in Kazalinsk area had an area of 32 ha, with an annual output of up to 4 million units of saxaul seedlings. The research station is set with modern equipment for seed analysis and other research. Such nursery will provide annual increase of plantations in the dried bottom of the Aral Sea.

4.5 Forest fires and pest control

Forest fires are the most destructive to the forests of the economy. Forest fires are most often exposed to the most valuable conifer plantations. The most severely affected by forest fires is the relic tape of Irtysh pine forests, where over the past 20 years, the fires have destroyed more than 150,000 ha of forests (32% of the area covered by forest belt hog). Thanks to the economy measures since 2003, the forest belt hog of Irtysh in an area of 939,300 ha was transferred to the status of specially protected natural areas (established state forest natural reserves “Families Ormany” and “Ertis Ormany”). Here in the framework of the WB / GEF Project on a pilot, it has been installed an optical-sensor system for detecting forest fires Firt Watch on 9 fire observation towers and thunderstorms system (lightening detection), and has built 8 well-equipped FFSs and 11 fire observation towers. For the purposes of reforestation and restoration of burnt-timber from previous years, a modern complex of lining-out nursery was put into operation. Currently, it is generally provided by fire safety and carried out extensive work on reforestation.

The economy embarked on carrying out large-scale forest fire prevention device on the basis of specific projects. However, this work has been extremely slow due to the lack of budget allocations.

To strengthen the monitoring of forest fires and improve quenching efficiency of fire foci in the future, it is planned to increase the area and the multiplicity of missions of Aerial Forest Fire Center, considering the creation of an industry park of forest fire aircraft to monitor the use of satellite remote sensing systems.

Additionally pests and diseases cause significant damage to forests. The priority measure to combat forest pests is the application of integrated methods, including the use of entomophags and biologicals. For these purposes, there is a draft construction within the nature reserve of "Semey Ormany" as an experimental biological laboratory of breeding entomophags which is expected to be realized in the coming years. In the future, the economy needs a network of biological laboratories oriented to the needs of the regional forestry authorities.

Certain complexity is conducting a monitoring of the foci of pests and diseases. A sectoral forest protection service which existed in the economy from the "Soviet" period is now lost; therefore, there is an acute shortage of specialists of this profile. Currently sulky question of restoring such service took place, but so far it was only at the discussion stage.

4.6 Biodiversity conservation

Forests in Kazakhstan are normal natural frame for living conditions and the preservation of many species of plants and animals. Suffice it to say that more than 80% of plant species and 75% of animal species are to a certain extent associated with forests.

In the modern flora of Kazakhstan, there are 68 species of trees, 266 species of shrubs, 433 species of bushes, 2,598 species of perennials and 849 species of annual grasses. Characterized by a high level of endemism (14%), as a part of the forest vegetation, endemic species are 24.

For some types of forest vegetation (Scots pine, Siberian fir, larch, etc.), the territory of Kazakhstan is the southern boundary of their natural range, for others (spruce Schrenk, some species of juniper, hackberry, walnut, pistachio, etc.), the most northern one which leads to the presence in their natural populations of breeding for genetic properties (hardiness, cold resistance, resistance to other factors, and others).

A special group of wild species is related to biodiversity. Some of them are the ancestors of some agricultural varieties (Sievers apple - Malus sieversii (Ledeb) M. Roem, apricot - Armeniaca vulgaris Lam et al), of global importance to humanity, other relatives already have been used in the selection or were potentially relevant for breeding in the future. Recent

studies of foreign scientists found that genes of wild Sievers apple have virtually all modern effective commercial varieties of this crop.

Kazakhstan has 10 kinds of currants (Ribes spp.) and sea gooseberries (Glossularia spp.), which may contribute to the increased use of crops in horticulture. Wild sea buckthorn (Hippophae rhamnoides) gave rise to the 15 cultivars, including cultivars without thorns.

Promising genetic resources include walnut (Júglans régia), pistachio (Pistacia vera L.), an ordinary almond (Amygdalus communis L.), pear regel (Pyrus regelii Rehder) and wine grapes (Vitis vinifera L.).

To save the forest vegetation diversity in the forests of Kazakhstan highlighted the category of forests, which establishes a special regime of forest management, such as:

- Forests of SPNA (12 national forests parks, 10 nature reserves, 5 natural reserves, etc. 6,415,500 ha).
- Forests of scientific value (500 ha).
- Especially valuable forest areas (13,200 ha).
- Forest fruit plantations (7,300 ha).

Scroll to the network selection and genetic facilities on a total area of 77,700 ha, of which 50% (76,500 ha) are forest genetic reserves. At these facilities preserved natural gene pool of Scots pine and Siberian larch, birch, spruce, Siberian and Schrenk, black saxaul, English oak, Siberian Fir, Siberian larch, walnut, Sievers apple and apricot.

To maintain and enhance the facilities of breeding and seed production, the breeding and genetic base in the forestry system of the Republic established a national forest breeding center.

4.7 Rehabilitation of degraded forests

Belt Irtysh pine forests belong to the unique natural forest complexes of Kazakhstan, whose preservation, no doubt, is one of the most important tasks of the economy's forestry.

Belt forests are an integral part of the steppe landscapes and an important component of the biosphere. The main distinguishing features of these elections are a poor composition of tree species and the lower completeness, as well as the lack in places of the most developed undergrowth, indicating a low capacity of renewable forests. This makes the tape of pine forests easily vulnerable as a result of all sorts of adverse natural and anthropogenic influences. There are frequent forest fires and outbreaks of mass reproduction of a number of conifer-chewing insects, as well as some epiphytoties of forest diseases.

The conservation of biological diversity in forests is considered as a priority in connection with the relic tape of Irtysh pine forests in 2003, and some economy forest natural reserves

have been established: “Ertic Ormany” of Pavlodar region and “Families Ormany” of East Kazakhstan region.

To grow in extreme climate conditions of aridity, the belt forests are periodically subjected to numerous large fires, thereby destroying all the biological diversity of these elections. In recent years, the forest fires have broken out in the relic tape of Irtysh pine forests with an area of over 100,000 ha for many times. So, in the period of 1997-2006, the territory of the relic tape of Irtysh pine forests as a result of major fires has been destroyed about 160,000 ha of old-growth forest for which recovery takes a long time.

In addition to fire, the great harm to the pine forests was inflicted from predatory unauthorized felling, in which tens of thousands of cubic meters of felled plants with the best growth and productivity are significantly reducing valuable genetic quality of the wood and creating a clutter of forest residues.

The forestry workers must make a lot of effort for the conservation of these forests, due to the difficulties of growing conditions. It is even more difficult to conduct work here, due to artificial regeneration and afforestation. Currently, it is maintained as artificial and natural regeneration of burned areas. Since the creation, the reproduction of the territory of such reserves has been carried out in an area of over 57,000 ha.

One of the main components of the project on “conservation of forests and increasing forest cover in the Republic” was implemented in the period from 2008 to 2014, which was the development and preservation of the tape hog of Irtysh.

A framework of “complex forest nursery and forest seed stations” is a project on Swedish technology, which should solve the problems of accelerated recovery of the unique relic forest. The total cost for the acquisition and installation of equipment amounted to 1,257,000 KZT tenge.

There are no similar complexes on the territory of Central Asia.

The uniqueness of the forest complex is here managed to grow 2-3 times faster than the standard planting material of pine with closed root system, which can be planted in spring and autumn, in order to speed up recovery times of the burnt.

The introduction of Swedish technology can shorten the cultivation of planting material twice. Also, through the use of new technologies, the duration of the silviculture gets increased. The use of this technology completely eliminates the damage to the root system and provides 100% survival of seedlings at planting.

The production capacity of the complex will allow the forest to grow plants material throughout the year in an amount of about 3 million pieces, which can be planted in spring and autumn. In the future, the seedlings will be used for planting of forest plantations in forest nature reserves of “Families Ormany” and “Ertis Ormany”.

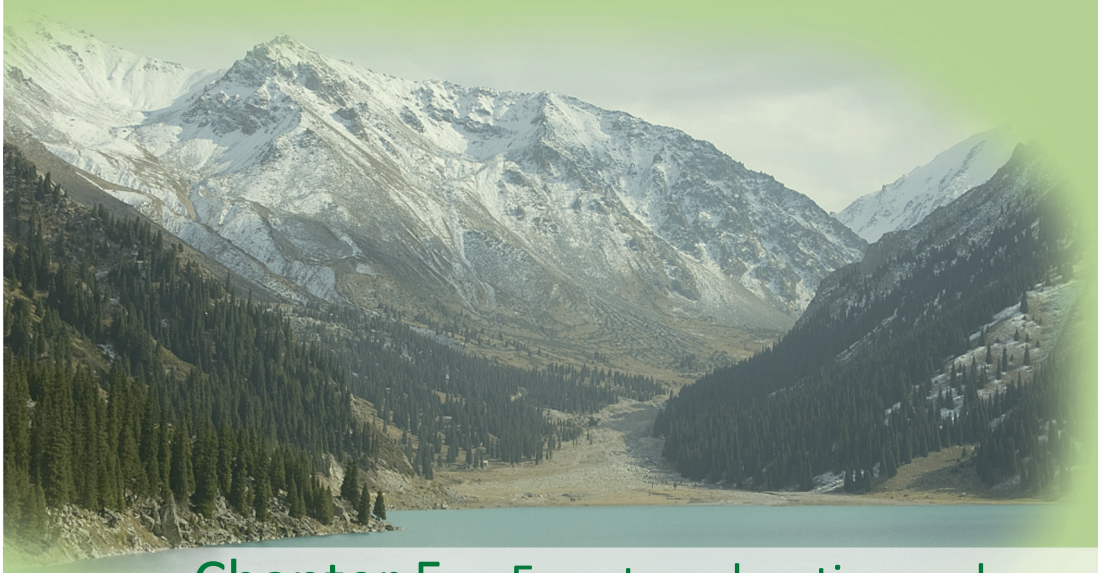
4.8 Comprehensive utilization of forest resources and non-timber forest products

According to Article 3 of the *Forest Code of the Republic of Kazakhstan*, one of the principles of forest legislation is a multipurpose use of forests. As mentioned above, the Kazakh legislation provides 8 kinds of forest management on the territory of the SFF. At the same time, forest management right is granted separately for each type of use (logging, incidental use, etc.) Separate permits (harvesting permits or forest ticket). In granting forest resources in areas of the SFF for long-term forest management, forest tender for such rights is also done only on one type of use. After getting the right for long-term forest management (for example, on felling), the user can, if necessary, receive an annual resolution on the implementation of different kinds of forest management (for example, to carry out mowing or grazing cattle, the implementation of eco-tourism, etc.) in the order of short-term use. This procedure is to ensure a more accurate account of the state forest management and collection of the appropriate fees for each type of forest management in the national budget.

At the same time, the issue of the integrated use of forest resources could be considered to transfer of the long-term forest management of all forest resources (structural subdivision of forest institutions), as on this structure are the necessary materials of forest management in the calculations of possible forest. This will require the development of a special mechanism for integrated forest management and make the appropriate standards in forestry legislation.

With a view to the preservation of forests, the government of Kazakhstan has banned the export of all kinds of timber outside the economy and felling in coniferous and saxaul plantations on the lands of the economy forest fund. According to *New Forest Code of the Republic of Kazakhstan* and newly-launched program “Zhasyl el”, the government will constantly work on urban greening and other settlements and a green belt around Astana.

At present, the forest industry is underdeveloped and focuses on primary processing of industrial wood to maximize the use of small-scale wood and artificial creation of industrial plantations for extruded construction products.



Chapter 5 Forestry education and research

5.1 Forestry education

Mold forest education in Kazakhstan dates back to 1898, when the city of Omsk in the tract Borovoe (now Shchuchinsk Akmola region) was transferred to the lower forest school and prepared forest conductors. In 1924, the school was reorganized into Bohr Forest College, and later into the College of Environment and Forestry.

The second forest school was opened in Leninogorsk (now Ridder of the East Kazakhstan region) in 1948. It was transformed into Leninogorsky Forest College in 1954, and then into Leninogorsk Forest College in 1995. Through the merger with Leninogorsk Mining College in 1997, it was reorganized into Ridder Agro-Technical College.

Specialized higher forestry education was first organized in 1948, when a part of the Kazakh Agricultural Institute (Almaty) Forestry Faculty was opened.

Thus, the tradition and experience of forestry education in Kazakhstan have more than 100-year-old practice.

Currently, 35 schools in the economy have a license to train specialists for the forestry and hunting, including 8 public higher education institutions, 24 secondary specialized educational institutions and 3 vocational schools. It should be noted that some of these institutions are characterized by a weak logistical and educational base. Their educational programs on special disciplines do not always meet today's requirements, which are reflected in the quality of training. In a number of higher education institutions that implement educational programs and forest hunting management and planning, only 1 to 10 students at times are on the course.

Today, the existing system of training specialists in forestry requires optimization and concentration on the basis of universities and colleges that have modern material and educational base, as well as a highly qualified teaching staff.

In accordance with the decision of the President of the economy, the free education will be introduced in colleges of Kazakhstan in 2017. In the higher education, trainings are practiced by the grant, free of charge and the paid. Over the past 8 years, it has been allocated 975 economy grants for the higher education for Forestry and Hunting. Grants are awarded to entrants who have received the required number of points in the framework of the Unified National Test for admission. Students are prepared for the field of "forest resources and forestry" and "hunting study and fur farming." At the request of the student's education in forestry, they may be obtained abroad in the CIS and far abroad. The procedure for admission to these schools is determined in each such economy.

Forest research in Kazakhstan is represented by a number of research institutes and higher educational institutions of the Ministry of Education and Science and the Ministry of

Agriculture of the Republic of Kazakhstan, as well as the research departments of economic environment agencies.

The leading scientific forest center is the Kazakh Research Institute of Forestry and Agroforestry (KazRIFA) as a part of non-profit joint-stock company "National Agricultural Research and Education Center" of the MoA of RoK. Over the past 20 years, it should be noted that KazRIFA has developed and registered 9 varieties of pine trees for forest growing, provided recommendations and technical papers on the technology of cultivation of a landing material of basic forest-forming species for the implementation of phyto forestry improvement in the areas of dry Aral Sea bed, worked in the field of protecting forests from fires and against pests and diseases, harvesting and other technologies.

It should be noted the creation of the Republican forest breeding center of two biotech laboratories (Shuchinsk and Almaty), specializing in the development and use of technologies of clonal micropropagation of woody species of birch, aspen and Sievers apple.

5.2 Technical capacity of forestry agencies

The main structures of forestry in the economy, as indicated above, are republican organizations (forest structure and SNPA of economy's status) within the jurisdiction of the CFW of the MoA of RoK and the regional organizations (forest agencies and protected areas of regional status), subordinate to the oblast akimat. At the same time, it plays the main role in the conservation, protection, reproduction and use of forests owned by forest agencies and non-economy forest owners.

Logistics of forest institutions is carried out by regional executive bodies at the expense of the local (regional) budgets and special funds of these institutions. However, the levels of budgets are not associated with the same economy and regional economic development. It depends on the level of budget financing of forest institutions, and the economy of their material and technical base. At present, due to lack of funding, agencies with many forest equipment and special equipment do not meet the norms and standards approved by the Ministry of Agriculture of the Republic of Kazakhstan. In some areas, this has led to serious imbalances in their development, thereby reducing the effectiveness of their complex major actions aimed at the preservation of forest ecosystems, and the scope of work on reforestation and afforestation.

As of January 1, 2014, 11,080 workers have been employed in the forestry sector and protected areas, including 7,650 persons (69%) in forest institutions and 3,430 persons (31%) in environmental agencies (PAs). The most numerous category of employees is an economy forest guard.

Analysis of the professional education of forest workers and environmental protection agencies shows that the number of specialists with specialized education is only 33%: 10% with higher education and 23% with specialized secondary education. The number of employees with higher education in a non-core function is 13%.

Only few experts graduated from forestry universities are reluctant to work in the industry and are employed in the forestry system. The reasons include lack of wages, low social support, housing problems, poor technical equipment of workplaces and isolation from cultural centers.

For operating professionals, there are no training system as a basis for professional and career growth. The “Soviet” period of industry training institutes acted in the industry, which have been abolished. Currently, the question of restoring the industry training system for managers and specialists of the forest/forestry sector is back on the agenda.

Problem of frames is relevant for forest research. There is an outflow of young scientists, which is mainly due to the insufficient level of wages, outdated material and technical base for research.

5.3 Capacity-building, information systems and research institutions on sustainable land management

Research institutes and associations are affiliated structures of relevant national government agencies. They carry out research in some priority areas, and are generally attracted to participate in the training of public and industry programs and justify management decisions and proposals. In addition to the economy forest and economic environment agencies engaged in the management of public forests and protected areas on the right of permanent land use, the bulk of the land users are private companies / individuals who use land on the basis of private ownership, as well as the lease contracts or temporary land use (paid or unpaid).

5.3.1 Capacity-building for sustainable land management

In Kazakhstan, there are a high percentage of specialists with higher and secondary special education, who work in public administration or business entities, and trained scientists. More than 30 universities of the economy are preparing specialists in various areas of environmental protection. However, there is a shortage of specialists with higher professional education in the field of soil science and landscape science.

Governance structures at all levels and their leaders are not sufficiently knowledgeable about the issues and the ongoing processes of desertification, which affect the balance of their decisions.

In agriculture, in connection with the division of pre-existing collective farms into small farms and therefore the outflow of professionals involved in the planning and organization of agro-technical and zoo-technical work, there was a reduction of personnel potential level. Many farmers do not have special education or are not trained in modern methods and technologies of agriculture and land use. This situation aggravates underdevelopment of the agricultural consulting system.

Compared with other sectors, low growth in investment in fixed assets in agriculture does not provide the opportunity to update its material and technical base. In this regard, it does not meet modern requirements of the majority of the park farms. There is a significant deterioration and failure of the irrigation and drainage systems, which leads to the deterioration of irrigated lands. There is a high depreciation of the existing water supply systems, significantly limiting access of the rural population to safe drinking water.

In the agrarian research organizations, average age of scientific staff is high, and a few of them are fluent in foreign languages. Moreover, worn laboratory equipment adversely affects the quality and effectiveness of the research.

SLM Program① will promote the development of capacities in the field of land management. It will contribute to:

- The development and implementation with the participation of the Ministry of Education and Science in the Ministry of Agriculture courses, and improvement of the training of farmers on the basis of mainly agricultural higher and secondary educational institutions. It will provide for an annual allocation with a special quota for state educational grants for the purpose of training farmers.
- The development of the agricultural consulting system for farmers and specialists of state bodies in the sphere of land relations. In accordance with the state program of agri-economy for the period 2003-2005, the Ministry of Agriculture created a 100 % state participation of “Kazagromarketing”, whose task is to market the development of information and advisory services in rural areas. Open 14 regional offices and 161 information and consulting centers of the joint-company, and work closely with local authorities and large agribusiness. This program will contribute to greater access to these services for the majority of farmers and other agricultural formations and control structures, as well as the expansion of the list provided in the service sector.
- Increasing the capacity of agrarian and land relations research organizations, and meeting the agricultural producers’ demands for scientific achievements and their introduction into agricultural production. In particular, the demand is based on the lack of awareness of rural producers on scientific advances and innovative technologies. The program will contribute to the growth of this awareness through a series of publications, seminars and trainings. It will also promote the development of effective economic mechanism to support the development of science on the part of private entities, in particular by using the experience

① Central Asian Countries Initiative for Land Management (CACILM) National Framework prepared by the National Working Group of the CCD of the Republic of Kazakhstan, 2015.

of some countries with the developed economies of dismissal on the part of the science of certain tax payments and other measures;

- Support and institutional strengthening of the cooperatives, land and water users associations through the promotion of the development of the necessary legal framework, the implementation of special programs and projects.

5.3.2 Information system on SLM

Kazakhstan has created a monitoring system and the inventory of land resources, the composition and order of the above mentioned program. Previously, these systems have been focused on the Soviet model of governance, in which the earth was the exclusive object of public property missing its civilian and market turnover, and it is not seen as property. It is currently under restructuring of these systems to meet the needs of a market economy. They will ensure that public authorities, owners and users of land needed and objective information about the state of the land, taking place on these changes and forecasting future development of these changes. The goal is to ensure their compliance with international standards.

The CACILM program will contribute to:

- The renewal of the entire stock of information base, which was formed in the period from 1954 to 1987.
- The creation of good-quality planning and cartographic material on the entire land fund.
- The introduction of modern technologies of remote collection, processing and dissemination of information to expand geographical area network of stationary monitoring stations for monitoring and training.
- The expansion of work on the land management.

However, this work should not be excessive and economically unjustified. To fully survey and collect data on a wide range of indicators should be subject only to use (fixed) land. the unused land should be on a list of indicators, whose preparations are possible with the help of remote sensing methods.

In particular, the CACILM program will promote:

- The establishment of the jurisdiction of the Agency for Land Management of the Public Land and Unified Monitoring System (ALMPLUMS) based on GIS technologies. This system would include a system of departmental monitoring of lands managed by other government agencies, as well as industrial monitoring system implemented by business entities. ALMPLUMS data will be transferred and served as the basis of the Unified State System of Monitoring of the Environment and Natural Resources (USSMENS), which is run by the Ministry of Energy and annually updated data generated by the server at the UN.
- Organization of training, retraining, employment in ALMPLUMS systems, State Land Cadastre, USSMENS, land management services, mapping, photo charting and photo delineation, land management and law.
- Implementation of the structures engaged in land management monitoring and inventory

of modern equipment for the observation and surveys using space information, the production of geodetic and cartographic work, new products and manufacturing techniques of digital and electronic thematic maps.

- Monitoring equipment and inventory units required by mobile laboratories for the collection and processing of information, as well as the expansion of the laboratory monitoring of land base.
- Improving the scientific and methodological basics of multipurpose cadastre corresponding to the market economy.
- Creation of automated information system of the state land cadastre and land monitoring, which will carry out the storage, analysis, dissemination (communication) of information, accountability, and access to its concerns.

Responsible for the program are the Land Resources Management Agency, Ministry of Agriculture and Ministry of Energy.

Chapter 6 Forestry projects and initiatives

Significant contribution to the development of the industry has had a realization of a number of international projects in recent years. Of these, the most important are the WB / GEF Project "Conservation of forests and increase of forest cover territory of the economy" and the UNDP / GEF Project "in situ conservation of mountain agro-biodiversity in Kazakhstan".

WB / GEF Project "Conservation of forests and increasing forest cover in the republic" was implemented by IESD during 2007-2014 in two project sites: relic belt hog of Irtysh, saxaul plantations of the southern region of the economy and the dried bottom of the Aral Sea.

The total project cost is $ 63.8 million, including the contribution of the national budget ($ 28.8 million), loan from the International Bank for Reconstruction and Development ($ 30 million), and grant from the Global Environment Fund ($ 5 million).

The main outcomes of the project are the following:

- Creation of forest plantations in the relic tape of Irtysh pine forests in an area of 41,000 ha, and plantations and agroforestry on the dried bottom of the Aral Sea in an area of 61,000 ha.
- Construction of 3 forest nurseries with a total area of 83 ha and a capacity of 27.6 million pieces of planting material annually, including a complex of forest seed growing of planting material with closed root system (container nursery) with a capacity of 3 million pieces per year.
- Introduction of a pilot zone of Irtysh information system to combat forest fires, including the optical-sensor system detecting forest fires Fire Watch on 8 fire observation towers and high-definition thunderstorms system (lightning detection).
- Construction and equipping of 8 FFSs and 11 fire observation towers.
- Development of mechanisms for the rational use of saxaul forests as grazing land, phyto forestry improvement portions of the dried bottom of the Aral Sea in order to combat desertification, reduce the spread of dust and salt offsets.
- Implementation of the program of competitive grants, providing technical and financial support, such as:
  (i) creating 13 private forest nurseries on a total area of 133.6 ha.
  (ii) bookmarking 3 orchards with a total area of 27 ha and plantations of fast-growing tree species in an area of 50 ha.
  (iii) creating production laboratory of forest biotechnology and equipping it with modern equipment, and strengthening the material-technical base of 2 more laboratories that perform work on clonal micropropagation of woody species.
  (iv) creating 5 eco-tourist routes and the opening of the 9 guest houses.
  (v) 43 information and training workshops and the creation of an animated film about the need for respect for the forest.
  (vi) number of research projects and the development of 10 scientific recommendations for forestry.

(vii) Based on the results of the program review, released "the results of implementation of the program of competitive grants aimed at the creation of a private forest and innovation in the field of forestry".

- Acquisitions of state forest owners for the project area are 221 units of special vehicles and tractors, 100 units of equipment trailer, 97 radio stations and receivers and 1,700 fire equipment units.

During the period of implementation, the Project has invited different kinds of work staff about 8,000 people.

Currently, it has been considered for implementation of the second phase of the project.

UNDP / GEF Project "in situ conservation of mountain agro-biodiversity in Kazakhstan" was implemented during 2006-2011 in the two pilot areas in the Almaty region of Kazakhstan.

Cost of the project: the contribution of the GEF of $ 3,022,967, including direct financing ($ 2,770,000), and the Government of the Republic of Kazakhstan ($ 19,546,910 (in-kind contribution)).

Project goal: Conservation of globally significant agro-biodiversity in Kazakhstan on the example of mountain of wild fruit forests of the Northern Tien Shan. The project focuses on the implementation of measures for the conservation and management of wild crop relatives on the basis of the ecosystem approach, the use of improved institutional, technical, financial and legal framework, alternative economic activities that benefit the local population and reduce the pressure on wild fruit forests, and the increase of awareness of institutions at all levels for the need to preserve and value agro-biodiversity mountain.

The main outcomes of the project are as follows:

- An inventory of mountain of wild fruit forests in the project area. It was found that the area of the spread of wild apple is 14,000 ha (vs 5,500 ha of inventory in 1994), and Apricot 900 ha (vs 300 ha of inventory in 1994).
- Allocation and economy certification is 7 genetic reserves of Sievers apple and apricot in an area of about 560 ha. This status provides for these special objects of protection and use mode.
- Developing and providing a method for more precise control of the genetic purity of natural genotypes of apple and apricot for reforestation based on PCR analysis. Carrying out more than 520 laboratory tests of genotypes, as well as the selective genetic evaluation trees of wild apple in the Trans-Ili Alatau and Zhongar. The methodology and results of the project on genetic studies of wild apple trees published in the September Issue of the authoritative magazine "Current Opinion in Biotechnology" by S. Dolgikh, A. Mishenko "Molecular-genetic Estimation of Intra specific Diversity of Malus Sieversii and Armeniaca Vulgaris in Kazakhstan", published in occasion of the European Congress on Biotechnology (September 28-October 1, 2011 Istanbul, Turkey).
- Preparation of recommendations for the preservation of the archives of clones (living collections) historically formed during the evolution of the genetic diversity of Sivers apple

and apricot (approved by the Scientific and Technical Council for Forestry and Hunting Committee).

- Preparation of technical documentation for the creation of archive clones / live collection of intraspecific diversity of wild apple and apricot in an area of 7 ha, whose construction is planned on the territory of Ile-Alatau National Park.
- Developing (the first time) the technology of growing Sievers apple planting material of root cuttings, Sivers apple and apricot from green cuttings, as well as ways to promote the natural regeneration of wild apple.
- Publication of the laboratory rules for clonal micropropagation of wild apple, which is currently used in the selection of the National Forestry Centre of Forestry of the CFW of the MoA of RoK.
- Creation in Zhongar Alatau National Park in an area of 356,022 ha.
- Carrying out sanitary felling and thinning in a number of areas of wild fruit forests in Zhongar Alatau, with the purpose of cleaning infected apple trees as well as competitive alien trees species in an area of 65.5 ha.
- Editing the monograph “modern methods and international experience in the conservation of the gene pool of wild plants (for example, wild fruit)” with the participation of famous scientists in the USA, the UK, as well as leading scientific organizations in Russia and Kazakhstan. In world practice, it was the first time to sum up the experience of conservation of wild fruit species.
- Organizing and holding the two international scientific conferences (2007 and 2012). On the conservation of wild fruit forests in Kazakhstan, members have worked out detailed recommendations for the state authorized body in the field of forestry.
- The organization in the framework of improving governance in the Ile-Alatau and Zhongar-Alatau national parks departments to manage the mountain of agro-biodiversity with a population of 4 specialists, as well as advisory councils under the administrations of these parks with public participation.
- Strengthening SPNA management capacity of project sites:
  (i) for the 6 managers of protected areas and forest management bodies organized familiarization travel to Austria to study the experience of the national parks of the economy.
  (ii) for the 2 employees of Zhongar-Alatau National Park provided a grant for the completion of higher professional education and qualification on “Bachelor of forestry affairs”.
  (iii) for the 17 employees of the Almaty Reserve and the Ile-Alatau National Park organized training program guide ecotourism.
  (iv) for the 5 SPNA experts organized participation in the trainings in the Russian Federation and Kazakhstan on the protection of forests from fires, protected areas management and ecotourism.
  (v) for the specialists of the National Institute of fruit crops and viticulture organized training in the Main Botanical Garden named by N.V. Tsytsina (Moscow, Russia) for the development of methodologies for the genetic analysis of fruit crops.

(vi) for agencies held a training workshop on forest protected area and the project area for the protection of wild fruit forests from pests and diseases.

- The development of 5 laws in the field of protected areas management, relevant to the conservation of agro-biodiversity (acts approved at the level of the Republic of Kazakhstan and the governmental authority).
- The development (the first time) of the concept and the production version of "On Flora" bill (corresponding with the Forest Code of the Republic of Kazakhstan), which transferred to the authorized body in the field of forestry for the organization of its decision in accordance with the applicable procedures.
- The preparation and protection of proposals on Red Book species of woody plants in the IUCN category "wild species of apple (Malus sieversii and Malus niedzwetzkyana)" and "apricot (Armeniaca vulgaris)", which are accepted and are now included in the IUCN Red List.
- The implementation of projects of alternative (friendly wild fruit forest) species of local community activities, such as: a) 5 grant projects in agreement with the GEF Small Grants Programme, and b) 3 of the projects (the development of livestock and crop production), developed in the framework of cooperation with partner organization KazMicroFinance LLP preferential program micro-credit.
- A series of training sessions for more than 130 villagers, farmers on the organization and conduct of business, new technologies in agricultural production in the field of beekeeping, horticulture, animal husbandry, as well as in the field of eco-tourism.
- Creation of the project information campaign, which includes a 35-minute video "Pearl Necklace of Mountains" of the wild apple tree in Kazakhstan (in 3 languages), a 30-second video on the conservation of plants, primroses, and a 5-minute video (2 versions) "from wild apple in the garden of the 21st century".
- The release of 17 names of reference and information and methodical literature for specialists of forest institutions, protected areas and rural communities.
- The reconstruction of the Museum of Nature of Almaty Reserve, and design project development and production of exhibits for the visitor center of the Ile-Alatau National Park. The construction of the visitor center is currently being finalized.
- The acquisition and transmission of more than 50 items of machinery and equipment in the amount of about $ 170,000 for protected areas project area.

Executive agency for the projects related to the conservation of biodiversity, forests and wildlife is the Committee of Forestry and Wildlife Ministry of Agriculture of the Republic of Kazakhstan.

Chapter 7 International forestry cooperation mechanisms

The Republic of Kazakhstan is a member of more than 30 international conventions in the field of environmental protection protocol on environment, such as The UN Convention "On Biological Diversity" (CBD), the Cartagena and the Nagoya Protocol, the UN Convention to Combat Desertification (UNCCD), the UN Convention CITES, the UN Convention on Wetlands of International Importance Especially as Waterfowl Habitat and others.

The Committee of Forestry and Wildlife Ministry of Agriculture of the Republic of Kazakhstan is defined by the National Administrative Authority for CITES, Vice-Chairman of this Committee is the national coordinator of the CBD and UNCCD conventions.

Kazakhstan actively cooperates in this area within the CIS and EAEC. In particular, the Republic of Kazakhstan, the Republic of Armenia, Belarus, Kyrgyzstan, Republic of Moldova, the Russian Federation and the Republic of Tajikistan in September 1998 signed an agreement on cooperation in the timber industry and forestry. In accordance with this Agreement, the Parties have established the Intergovernmental Council for the timber industry and forestry, which organizes and coordinates this work, and contributes to its development. For the duration of the Agreement, the Parties conducted 15 meetings of the Intergovernmental Council on various issues of forestry and forest industries. In 2014, they adopted the basic directions of cooperation of the economies. The participants of the CIS in forestry and forest industries reached an agreement on the creation of conditions for sustainable and dynamic development of the forest sector of the economy, thereby ensuring economic security and meeting the needs of citizens to high-quality products and healthy forest properties.

In order to ensure control over the prevention of forest and steppe fires, harmonization and implementation of measures for the prevention and elimination of forest and steppe fires in the border area in June 2012, the Government of the Republic of Kazakhstan and the Government of the Russian Federation signed a special agreement on cooperation in this field, ensuring prompt detection and timely liquidation of fires occurred in the border areas between the two countries.

In September 2011, according to the Agreement between the Republic of Kazakhstan and the Russian Federation, both parties have agreed to establish a transboundary reserve "Altai". The objectives of establishing such reserve are as follows:

- The preservation of biological and landscape diversity of the mountainous Altai.
- Promotion of bilateral cooperation in the field of environmental protection and rational use of natural resources, taking into account environmental, social and cultural aspects.
- Environmental monitoring and study of natural complexes and objects.
- The development of environmental education and eco-tourism. Work on the creation of such reserve is in the active stage.

Kazakhstan develops cooperation within the framework of the strategic partnership of the Greater Central Asian economies (China, the Kyrgyz Republic, the Republic of Kazakhstan,

the Republic of Mongolia, the Republic of Tajikistan, the Republic of Uzbekistan) through APFNet's platform.

Through this partnership, Kazakhstan took part in the 1st (in China) and 2nd (in Mongolia) regional workshops on the strategic forestry cooperation of the Greater Central Asia. In May 2016, Kazakhstan (Astana) hosted the first Conference of Ministers of Forestry in the Greater Central Asia, adopted a resolution of the participating countries. It is planned to hold a second such conference in 2017.

Kazakhstan's the most promising areas of cooperation within the framework of the strategic partnership between the Greater Central Asian economies are the following:

- Implementation of joint monitoring with the use of remote sensing and other advanced monitoring and control systems of forests, forest fire situation and the proliferation of hotbeds of forest pests and diseases, especially in border areas, for the concerted management decisions.
- The fight against forest fires in border areas.
- The establishment of joint cross-border protected areas and areas for biodiversity conservation.
- The fight against illegal trafficking of timber.
- Organization for cooperation in the field of training, research staff in forestry, as well as training of specialists.
- Implementation of joint research programs and projects:
  (i) Mitigating the effects of climate change on forest health and sustainability.
  (ii) The development of effective and environmentally sound methods of biological protection of forests.
  (iii) The development of technologies to build sustainable agroforestry plantations in desert areas.
  (iv) The conservation and utilization of forest genetic resources.
  (v) The development of methodologies for assessing forest ecosystem services and others.
- Conferences, study tours, trainings and seminars to discuss the main and current challenges of forestry of the Greater Central Asian economies.
- Attracting investment funds and international organizations to address issues that are of interests to the Greater Central Asian economies.

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Acknowledgements

This book builds on the main research results from the project *"Study on Current Status, International Cooperation, Development Strategy of Forestry and Best Practices of Forest Management in Greater Central Asia (2016-R22)"*, which is funded by the Department of Science and Technology (DST) of State Forest Administration of China (SFA). We are deeply grateful to all colleagues from the DST for their technical and managerial guidance throughout the project implementation phase.

We are also highly grateful to the scholars and officials from the forest authorities of Kazakhstan, Tajikistan, Uzbekistan, Turkmenistan, Kyrgyzstan and Mongolia for their important inputs in compiling the main contents of this book.

Our great thanks also go to a number of consultants who peer-reviewed this book and offered their thoughtful insights for areas of improvement.

In particular, we would like to express our warm appreciation to all other colleagues from APFNet for their valuable suggestions in this process, especially Dr. Zhai Hongbo, who contributed greatly to development of the project concept and framework.