# Forestry Development and Best Practices of Forest Management in Kyrgyzstan

Asia-Pacific Network for Sustainable Forest Management and Rehabilitation

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# Forestry Development and Best Practices of Forest Management in Greater Central Asia

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# Map of the World


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Arctic Circle
Nuuk (Godthåb)
Baffin I.
UNITED STATES
CANADA
NORTH AMERICA
BERING SEA
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G. of Newfoundland
Ottawa
Washington
Azores (Port.)
ATLANTIC OCEAN
BERMUDA (U.K.)
Mississippi
Tropic of Cancer
BAHAMAS
MEXICO
G. of Mexico
La Habana
CUBA
DOMINICAN REP.
HAITI
JAMAICA
Hawaiian Is. (U.S.)
Cd. de México
CARIBBEAN SEA
HONDURAS
GUATEMALA
NICARAGUA
Caracas
TRINIDAD AND TOBAGO
COSTA RICA
VENEZUELA
PANAMA
SURINAME
GUYANA
Bogotá
COLOMBIA
Equator
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Sucre
PARAGUAY
Asunción
Tropic of Capricorn
Santiago
CHILE
ARGENTINA
URUGUAY
Buenos Aires
IS. MALVINAS (FALKLAND IS. BY U.K.) (Claimed by Arg. & U.K.)
Drake Passage
ANTARCTICA
ROSS SEA
BELLINGSHAUSEN SEA
Antarctic Circle
PACIFIC OCEAN
POLYNESIA
MARSHALL IS.
SAMOA
COOK IS.
FIJI
Suva
VANUATU
Nouméa
FRENCH POLYNESIA
NEW ZEALAND
Wellington
LEGEND
Capital
Continental boundary
Undefined
International boundary
Regional boundary
Military demarcation line

## Map of the Asia


Ulaanbaatar
MONGOLIA
Beijing
Huang He
YELLOW SEA
'S REPUBLIC OF CHINA
EAST CHINA SEA
Chang Jiang
SOUTH CHINA SEA

# 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 Kyrgyzstan. 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 Kyrgyzstan.

**APFNet Executive Director**

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# Abbreviations

| | |
|---|---|
| AO | Aiyl Okmot |
| APFNet | Asia-Pacific Network for Sustainable Forest Management and Rehabilitation |
| CFM | Community Forest Management |
| ED | Ecological Development |
| EU | European Union |
| FAO | Food and Agriculture Organization |
| FEF | Forest Experimental Farm |
| FLEG | Forest Law Enforcement and Governance |
| FLERMONECA | Forest and Biodiversity Governance and Environmental Monitoring |
| FOWECA | The Forestry Outlook Study for West and Central Asia |
| FRA | Forest Resources Assessment |
| GDP | Gross Domestic Product |
| GEF | Global Environment Facility |
| GTZ | German Technical Cooperation |
| ILA | Indicate List Action |
| JICA | Japan International Cooperation Agency |
| KOICA | Korea International Cooperation Agency |
| NFP | National Forest Program |
| NGO | Nongovernmental Organization |
| NSC | National Statistics Committee |
| PAs | Protected Areas |
| PEI | Poor and Environment Initiative |
| PROFOR | The Program on Forests |
| REDD + | Reducing Emissions from Deforestation and Forest Degradation |
| SAEPF | The State Agency of Environment Protection and Forestry |
| SEEA | System of Environment and Economic Accounting |
| SFF | State Forest Fund |
| TEEB | The Economics of Ecosystem and Biodiversity |
| TICA | Turkey International Cooperation Agency |
| UNEP | United Nations Environment Program |
| UNDP | United Nations Development Program |

# Chapter 1 Current state of forests and forestry

## 1.1 Land use status

The Kyrgyz Republic is a sovereign state. The territory of the Kyrgyz Republic is 19.99 million ha, of which 54% are classified as agricultural lands, 5.6% covered with forests, 3.8% covered with waters and 36.6% classified as other lands. Almost 90% of the territory is occupied by mountains with the height of over 1,500 m above the sea level. The lowest point in the economy is 401 m above the sea level, while the average height is 2,750 m.

More than half of Kyrgyzstan is located at altitudes between 1,000 m and 3,000 m, and about its one third at the altitude greater than 3,000 m. High mountain ranges occupy about a quarter of the economy's territory and are mainly stretched as parallel chains in a latitudinal direction.

The territory of Kyrgyzstan is located within two large mountain systems, which to the large extent create the borders between the neighboring economies (Figure 1-1). The larger Eastern part lies within the Tien Shan Mountains running on Northeastern axis and separates Kyrgyzstan and China. In the East, the main ranges of the Tien Shan converge in the Meridional mountain range, thus creating a powerful mountain junction. The highest peak is Peak Pobeda (Peak Victory) whose summit is 7,439 m. To the South-West, the Pamir-Alay Mountains separate Kyrgyzstan from Tajikistan and Uzbekistan. In the North and Southwest, there are foothills and piedmont slopes, including the Chui Valley, a suburb of the larger Fergana Valley, which also separates Kyrgyzstan from Uzbekistan.


Source: State Environment and Forestry Bureau of the Kyrgyz Republic.

**Figure 1-1 Kyrgyzstan and bordering economies**

A majority (58%) of total population are located at altitudes between 1,000 m to 2,000 m (35% of the population), 5% above 2,000 m, and the remainder below 1,000 m. The most populated is the capital Bishkek.

Within the territory of the Kyrgyz Republic, the climate is varied and almost all climatic zones, except the tropical one, are represented. Climatic conditions in the economy are characterized by sharp continental, high zonality and large spatial differences. Climate in the high-altitude zones ranges from the sharply polar, through continental, to the almost marine climate due to the considerable unevenness of terrain and presence of Issyk Kul Lake (the 10th largest lake in the world). In the west of Kyrgyzstan, climate can be considered as sub-tropical as it is fed by the winds from deserts in Kazakhstan and Uzbekistan.

According to the Constitution of the Kyrgyz Republic, land, underground resources, air, water, forests, plant and animal world, and other natural resources are the property of the Kyrgyz Republic and can be under government, communal, private or other forms of ownership.

According to the data of the State Registration Service of the Kyrgyz Republic (as of 01.01.2010) the area of land in state ownership is 18,626,840 ha (93.16%), municipal ownership 112,150 ha (0.56%), and private ownership 1,255,930 ha (6.28%).

Table 1-1 indicates the area of land in the Kyrgyz Republic, by region, under different ownerships.

**Table 1-1 Land area by region and ownership**

| Regions | State ownership | | Municipal ownership | | Private ownership | | TOTAL |
|---|---|---|---|---|---|---|---|
| | thousand ha | percent of economy territory | thousand ha | percent of economy territory | thousand ha | percent of economy territory | |
| Batken | 1,617.37 | 94.87 | 3.32 | 0.19 | 84.15 | 4.94 | **1,704.84** |
| Osh | 2,678.75 | 92.00 | 6.74 | 0.23 | 226.15 | 7.77 | **2,911.64** |
| Jalal-Abad | 3,072.63 | 94.78 | 3.81 | 0.12 | 165.37 | 5.10 | **3,241.81** |
| Talas | 1,226.62 | 91.49 | 5.5 | 0.41 | 108.56 | 8.10 | **1,340.68** |
| Chyi | 1,598.92 | 79.69 | 26.48 | 1.32 | 381.04 | 18.99 | **2,006.44** |
| Issyk-Kul | 4,123.83 | 94.29 | 63.75 | 1.46 | 185.93 | 4.25 | **4,373.51** |
| Naryn | 4,308.72 | 97.57 | 2.55 | 0.06 | 104.73 | 2.37 | **4,416** |
| **TOTAL** | **18,626.84** | **93.16** | **112.15** | **0.56** | **1,255.9** | **6.28** | **19,994.92** |

Source: State Registration Service of the Kyrgyz Republic as of January 1st, 2010.

According to the Article 10 of the *Land Code of Kyrgyzstan*, all lands of the Kyrgyz Republic are divided into the following categories according to their key purposes (Table 1-2):

- Farmlands.
- Residential areas (cities, townships, and rural settlements).
- Lands for industry, transportation, communications, defense, and other purposes.
- Lands of SPAs.
- Forest lands.
- Water basin lands.
- Reserve lands.

**Table 1-2 Area by land category and region**

| Land Categories of the Kyrgyz Republic | Batken / thousand ha | Jalal-Abad / thousand ha | Issykkul / thousand ha | Naryn / thousand ha | Osh / thousand ha | Talas / thousand ha | Chuy / thousand ha | TOTAL | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | thousand ha | percent |
| Farmlands | 309.8 | 1,183.53 | 729.5 | 1,304.97 | 817.52 | 273.57 | 1,065.6 | **5,684.49** | **28.43** |
| Lands of populated areas | 27.84 | 38.45 | 33.86 | 21.06 | 49.26 | 21.33 | 71.46 | **263.26** | **1.32** |
| Lands for industrial and other purposes | 6.86 | 13.58 | 53.3 | 27.15 | 44.08 | 30.34 | 48.27 | **223.58** | **1.12** |
| Lands of SPAS | 106.54 | 193.39 | 112.43 | 57.83 | 25.8 | 72.95 | 138.47 | **707.41** | **3.54** |
| Forest lands | 433.76 | 753.48 | 334.44 | 390.69 | 551.13 | 94.93 | 55.29 | **2,613.72** | **13.07** |
| Water basin lands | 3.77 | 40.97 | 630.26 | 58.43 | 20.18 | 4.87 | 8.88 | **767.36** | **3.84** |
| Reserve lands | 816.27 | 1,018.4 | 2,479.72 | 2,555.88 | 1,403.68 | 842.69 | 618.46 | **9,735.1** | **48.69** |
| **TOTAL** | **1,704.84** | **3,241.80** | **4,373.51** | **4,416.01** | **2,911.65** | **1,340.68** | **2,006.43** | **19,994.92** | **100.00** |

Source: State Registration Service of the Kyrgyz Republic as of January 1st, 2010.

As mentioned above, the *Land Code of the Kyrgyz Republic* is comprised of 7 categories. According to the *National Forest Inventory* (2008-2010), the forests grow in all of these categories. Most of the forests are grown on State Forest Fund (SFF) and Protected Areas (PAs).

The total area of SFF, PAs and forests outside the SFF and the PAs of the Kyrgyz Republic on 1 January, 2013 is 3,766,058.3 ha, including, under the operational management of the SAEPF 3,474,073.8 ha, SFF 2,619,675.5 ha, and PAs 870,882.8 ha (Table 1-3).

**Table 1-3 The area of State Forest Fund, Protected Areas and forests outside the State Forest Fund and the Protected Areas of the Kyrgyz Republic**

| Land Categories of the Kyrgyz Republic | Total areas / ha |
|---|---|
| Total SFF, PAs and forests outside the SFF and the PAs of the Kyrgyz Republic | 3,766,058.3 |
| Total SFF, PAs, under the operational management of the SAEPF | 3,474,073.8 |
| State Forest Fund | 2,619,675.5 |

(Continued)

| Land Categories of the Kyrgyz Republic | Total areas / ha |
|---|---|
| Protected areas | 870,882.8 |
| a) state nature parks | 344,922.3 |
| b) state nature reserves | 509,476 |
| Forest of the Kyrgyz Republic President Department | 16,484.5 |
| a) state nature parks | 16,484.5 |
| Forests outside the GLF and the PAs | 275,500 |

Source: Accounting of Forest Fund (2013).

As of 01.01.2010, forested area (forests and shrubs) of the Kyrgyz Republic is 1,123,200 ha or 5.6% of total area of the economy. Forest areas under the management of the State Agency of Environmental Protection and Forestry (SAEPF), Government of the Kyrgyz Republic, represent 846,000 ha or 4.2%, and 277,000 ha or 1.4% are situated outside the territory of state forest lands and Strictly Protected Areas (SPAs) respectively (Source: National Forest Inventory of the Kyrgyz Republic, 2008-2010). The data of characteristics and forest area are presented in Table 1-4.

**Table 1-4 Characteristics of forest resources in Kyrgyz**

| No. | Types of land | thousand ha | percent of the economy's territory |
|---|---|---|---|
| 1 | **FOREST LAND** | **677** | **3.4** |
| 1.1 | **Natural forests** | 630 | 3.2 |
| 1.1.1 | Coniferous | 360 | 1.8 |
| 1.1.2 | Broadleaved | 239 | 1.2 |
| 1.1.3 | Mixed | 21 | 0.1 |
| 1.1.4 | Natural "forests" of small area | 10 | 0.1 |
| 1.2 | **Non-natural forests** | 47 | 0.2 |
| 1.2.1 | Coniferous | 5 | 0 |
| 1.2.2 | Broadleaved | 35 | 0.2 |
| 1.2.3 | Mixed | 3 | 0 |
| 1.2.4 | Natural "forests" of small area | 4 | 0.02 |
| 2 | **OTHER FOREST LAND** | **446** | **2.2** |
| 2.1 | **Shrubs** | 446 | 2.2 |
| | **TOTAL** | **1,123** | **5.6** |

Source: National Forest Inventory of the Kyrgyz Republic, 2008-2010.

The Table 1-4 shows that the area of nature forest is 630,000 ha, planting forest 47,000 ha and shrubs 446,000 ha.

The data of timber stock of forests are presented in Table 1-5.

**Table 1-5 Forest stocking**

| No. | Type of forest | Timber stock / thousand $m^3$ |
|---|---|---|
| **1** | **Natural forests** | **44,800** |
| ***1.1*** | **Coniferous** | **37,600** |
| | Fir | 32,600 |
| | Juniper | 5,000 |
| ***1.2*** | **Deciduous** | **4,800** |
| | Nut | 900 |
| | Apple | 220 |
| | Maple | 1,400 |
| | Hawthorn | 50 |
| | Riparian | 2,100 |
| | Other deciduous | 130 |
| ***1.3*** | **Mixed natural forests** | **2,400** |
| **2** | **Non-natural forests** | **3,200** |
| ***2.1*** | **Coniferous** | 1,800 |
| | Fir | 1,300 |
| | Other coniferous | 500 |
| ***2.2*** | **Deciduous** | **1,300** |
| | Nut | 1,000 |
| | Poplar | 190 |
| | Other deciduous | 110 |
| ***2.3*** | **Mixed non-natural forests** | 100 |

Source: National Forest Inventory of the Kyrgyz Republic, 2008-2010.

Table 1-5 shows that coniferous comprises 37,600,000 $m^3$, and deciduous 4,800,000 $m^3$.

The forests available in the Kyrgyz Republic are represented by four types: nuciferous, spruce, juniper and riparian forests.

- Nuciferous (walnut and fruit-bearing) forests. Unique nuciferous forests located in the Jalal-Abad and Osh regions in the western and south-western slopes of Ferghana and Chatkal ranges of the Tian Shan system are most valuable among the forested areas of the economy. It is the largest concentration of wild-growing nuciferous forests, covering 631,000 ha. Nuciferous forests are the center of origin of cultured plants, storage of biodiversity and genetic pool of plant and animal world. Currently they are viewed as the world natural heritage. Nuciferous forests have great significance for regulation of the water flow into the Ferghana valley, main agricultural zone of this region, and play a vital role, as the source of livelihood for local population (Figure 1-2).

**Figure1-2 Nuciferous forests**

- Spruce forests of the Kyrgyz Republic mostly consist of the prevalent variety: Tian-Shan fir or Schrenk fir (*Picea Schrenkiana*). Schrenk fir accounts for 116,600 ha or 13.5% of the total forest area in the Kyrgyz Republic. Most spruce forests are concentrated in the northern part of the economy on the slopes of the mountains surrounding the Issyk-Kul lake and basin of Naryn river. Small Tien-Shan fir forests are located on Kyrgyz and Talas ranges. Spruce forests cover only 13,900 ha in the south in Osh and Jalal-Abad regions. Despite the small area, spruce forests located on the steep slopes of mountain ranges hold back the erosion processes, protect the soil from harmful impact of avalanches, regulate water regime of mountain rivers, and channel surface flow into ground runoff (Figure 1-3).

**Figure 1-3 Spruce forests**

- Juniper forests constitute valuable unique natural complex. These are open evergreen coniferous low-productive forests, where Turkestan juniper (Juniperus turkestanica) is the most prevalent variety. The largest juniper forests are concentrated in Osh and Batken regions on the slopes of Turkestan and Alay ranges. In Jalal-Abad region, juniper grows in Chatkal, Alabuka and Aksu rayons. Small area of these forests are located in Chuy and Talas regions. Protection of soil from erosion is one of the most important functions of juniper forests. Creating solid litter layer of the fallen needles, it facilitates better drainage of soil to feed into the ground water supply. Water, generated under juniper forests, fills the basin of two most important water arteries of the Central Asia: Syrdarya and Amudarya rivers (Figure 1-4).

**Figure 1-4 Juniper forests**

- Riparian forests are located in the floodplains and banks of major rivers: Naryn, Chu, Tyup, Talas, Susamir, Jergalan, Yassi, and many small rivers. These forests usually play water protection functions. The composition of the riparian forests depends on the environment and competitive interaction of the tree and shrub varieties (Figure 1-5).

**Figure 1-5 Riparian forests**

## 1.2 Afforestation and reforestation

In 1930, the forests of Kyrgyz Republic occupied 1,194,000 ha but 619,800 ha in 1956. Forestland decrease resulted in the need in reforestation and afforestation that is actual up to now.

The process of reforestation and afforestation is provided by the system of forestry activities (seed preparation, growth of planting material, creation of forest crop, aid in reforestation).

Since the 1950s, Forest Institute of National Science Academy of the Kyrgyz Republic and Biology and Soil Institute of the Kyrgyz Republic have done different researches on interspecific and intraspecific variabilities of the common forest species: Picea schrenkiana subsp. Tianschanica, Ábies, Juníperus, Júglans régia, Pistácia, Prunus dulcis, Mālus, etc. These researches are focused on development and cultivation of the few species that are the most appropriate for wood production and pomiculture. During this period, the following methods of analysis and assessment of intraspecific variabilities are used:

- Inventory of the common forest species.
- Seed zoning of the common forest species.
- Emphasizing of permanent and temporary seed areas.
- Selection of plus trees and plantings of the common forest species.
- Selection of economically valuable forms of the common forest species.
- Type testing of the common forest species.
- Selection and vegetative reproduction of the common forest species.
- Creation of plantings of fast-growing economically valuable wood species.
- Creation of seed and masterbatch plantations.
- Technologies and agro techniques of cultivation of planting material of the common forest species.

Scientists of Forest Institute of National Science Academy of the Kyrgyz Republic selected the plus trees of following species: Abies semenovii B. Fedtsch. (70 trees), Picea schrenkiana subsp. Tianschanica (200 trees). There are established forest reserves of Abies semenovii B. Fedtsch. (1,172 ha); masterbatch plantations of Abies semenovii B. Fedtsch. (1 ha) and of Picea schrenkiana subsp. Tianschanica (1 ha); permanent seed areas of Abies semenovii B. Fedtsch. (155 ha) and of Picea schrenkiana subsp. Tianschanica (50 ha).

Plus trees perform increased economical qualities in the same conditions of growth next to the trees of the same age and the same species. In other words, these trees are better in marks of productiveness and economical value of forms.

In Kyrgyzstan, the program of revival of Malus niedzwetzkyana Dieck was held, and the farm was established in Sary-Chelek reserve.

The total area of permanent seed areas in the economy is 911 ha and the total area of temporary seed areas is 468.87 ha.

### *1.2.1 Seed laboratory*

Forest seeds harvested 60-85 tons per year: conifers 1.0-2.5 tons, walnut 50-70 tons, and the other 6-10 tons. Harvesting, drying and processing of seeds are done manually.

In 2013, with the help of Korea International Cooperation Agency (KOICA) project for "strengthening the capacity of conservation of forests in Kyrgyzstan", a seed laboratory was created to perform the analysis of quality of seeds.

The seed laboratory is provided with modern equipment and accredited in accordance with international rules by standards of seed-testing. The seed analysis includes the following procedures:
(i) Hitch weighing.
(ii) Determination of composition of pure and inert impurities.
(iii) Determination of weight of 1,000 seeds.
(iv) Determination of seed germination.
(v) Analysis of seed viability.

### *1.2.2 Nursery*

Nursery is organized for growing of forest planting material. There are temporary and permanent forest nurseries. Temporary farms are organized for the period of 5 years, permanent ones for more than 5 years. By size of the occupied area, nurseries are divided into small nurseries (up to 5 ha), average nurseries (6-25 ha) and large nurseries (more than 25 ha). Large nurseries are also called basic nurseries. Information about the nurseries is provided in the Table 1-6.

**Table 1-6 Nursery types**

| Region | Type of nursery | Areas / ha | Type of forest trees |
|---|---|---|---|
| **Batken region** | Permanent | 28.8 | Juniper, fruit trees |
| | Temporary | 18.62 | |
| | **TOTAL** | **47.42** | |
| **Jalal-Abad region** | Permanent | 76.31 | Walnut, pistachio, almond, fruit trees, poplar |
| | Temporary | 48.31 | |
| | **TOTAL** | **124.62** | |
| **Issyk-Kul region** | Permanent | 90.4 | Tyan Shan fir, blue spruce |
| | **TOTAL** | **90.4** | |
| **Naryn region** | Permanent | 17.1 | Tyan Shan fir, blue spruce |
| | Temporary | 22.3 | |
| | **TOTAL** | **39.4** | |

(Continued)

| Region | Type of nursery | Areas / ha | Type of forest trees |
|---|---|---|---|
| **Osh region** | Permanent | 44.22 | Walnut, pistachio, almond, fruit trees, poplar |
| | Temporary | 12.4 | |
| | **TOTAL** | **56.62** | |
| **Talas region** | Permanent | 4.8 | Poplar, fast-growing species |
| | Temporary | 6.43 | |
| | **TOTAL** | **11.23** | |
| **Chui region** | Permanent | 84.23 | Tyan Shan fir, blue spruce, poplar, willow, fast-growing species |
| | Temporary | 4 | |
| | **TOTAL** | **88.23** | |
| **Total of the Republic** | Permanement | 345.86 | |
| | Temporary | 99.66 | |
| | **TOTAL** | **445.52** | |

Source: Accounting of Forest Fund (2013).

The information in the Table 1-6 shows that there are 345.86 ha of permanent nurseries and 99.66 ha of temporary nurseries on the territory of the Kyrgyz Republic.

Every year of planting material planted more than 16 million in state nurseries.

In 2013, with the help of KOICA project for "strengthening the capacity of conservation of forests in Kyrgyzstan", there were two demonstrative greenhouses organized on the area of 0.03 ha. Planting material with closed root system is cultivated in these greenhouses (preparation of substratum, mixture of peat with mineral additives, cassette filling, seeding.)

Nevertheless, it is noticed that the area of existent nurseries is not sufficient. A majority of them are located in forests. And outdated methods and technologies of cultivation are used for organization of nurseries. There are no centralized basic nurseries that could provide forestry of the economy with planting materials.

### *1.2.3 Forest planting*

Forest planting of the mountainous terrain of Kyrgyzstan is made manually.

Annually forest and natural parks organize forest planting on the area of nearly 2,000 ha. During 5 years (2008-2012), the area of 9,446.9 ha was planted (Table 1-7).

**Table 1-7 Information about Forest Planting**

| Names | 2008 / ha | 2009 / ha | 2010 / ha | 2011 / ha | 2012 / ha | TOTAL / ha |
|---|---|---|---|---|---|---|
| Forest enterprises nature parks | 1,955 | 1,955 | 1,970.4 | 1,907.6 | 1,658.9 | 9,446.9 |

Source: Accounting of Forest Fund (2013).

The condition of planted material is evaluated as: good vegetation, satisfactory condition, unsatisfactory condition, and dead.

Information about the condition of planted material is performed on Figure 1-6.

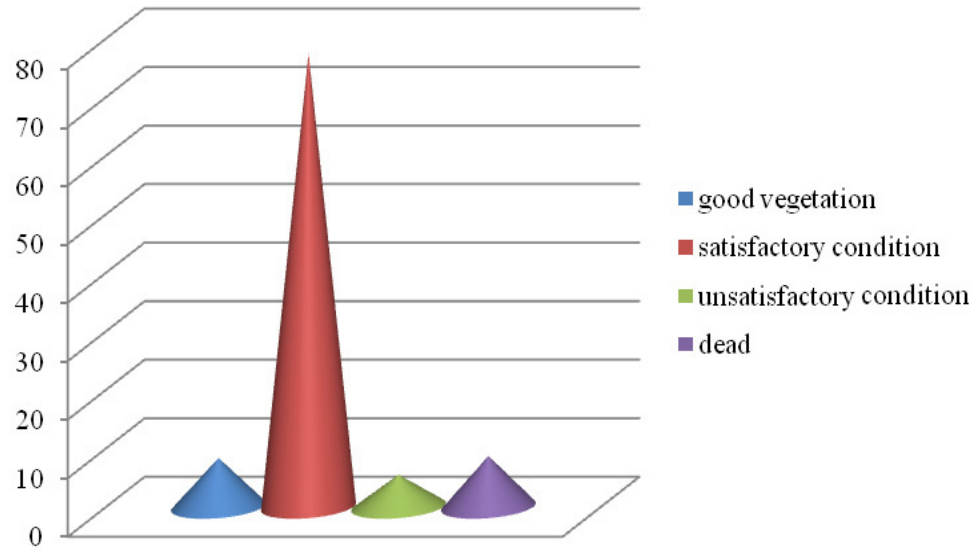



**Figure 1-6 The state of planted forest**

Actually, the planted material with good vegetation is 8%, satisfactory condition 77%, unsatisfactory condition 5%, and dead 9%.

This shows that methods, approaches and technologies applied to the forest planting should be updated and improved.

## 1.3 Urban forestry

The urban forestry practices culture and sustenance of tree plantings in the urban areas to improve their environment and, therefore, to preserve them. Workers of urban forestry plant trees, watch out for conservation of them, do different researches and promote the information about various advantages of plants in every possible way.

In the capital of Kyrgyzstan, Bishkek, there is a municipal enterprise “Zelenstroy”. Its main objectives are as follows:

- To implement a uniform policy of local authorities in Bishkek to develop green, landscape, nursery and farms;
- To provide the improvement of ecological situation in Bishkek;
- To create a convenient environment for recreation activities by population;
- To implement the modern methods and introduce advanced technologies into building, reconstruction and repair of landscaping objects.

In accordance with the main objectives, the company implements the following tasks:

- Cultivation of planting materials (flower seedlings, trees, shrubs, etc.) for landscaping and decoration of Bishkek;
- Growing of decorative pot plants and flowers;
- Organization of lawns, flower-gardens in parks, boulevards, squares, etc.;
- Tending and watering of plants, pruning and thinning of trees and shrubs;
- Protection of green spaces from insects and diseases, removal of weeds, top-dressing.

## 1.4 Community-based forestry

Forests of the Kyrgyz Republic perform a rich and complicated system that makes an extensive range of production. The production brings various goods in social-economic and ecological spheres.

The development of villages is a prior objective of the Government. Forest sector is known as one of the significant directions that provide the increase of standards of living and social standards in the economy.

In 1998, in the Kyrgyz Republic, collaborative forestry approach was piloted in walnut forests as a specific form of participation of population into the forest management.

Community Forest Management (CFM) is a new form of forestry work organization in the Kyrgyz Republic. It was offered within the Kyrgyz-Swiss Program.

The CFM is a forestry management made by rural community that lives directly in the forest area or around it. By the main assumption, the rural population would depend on forest goods and would be very interested in protection and management of the forest resources. It was also supposed that the community would participate in the processes of planning and making decisions.

During the first three years (1998–2000), the implementation of the CFM was focused on two pilot plots of walnut forests: Ortok and Uzgen. Here the models of rent for the CFM were developed based on the signing of several individual contracts.

In the same period, the legal framework of collaborative forest use was defined. For example, in 1999, the *Forest Code* was adopted; in 2001, *Statement* was affirmed by the government of the Kyrgyz Republic, and in 2007, several corrections in this *Statement* were made.

According to *Statement* of forestry management, the main clauses of the CFM are:

- Forest areas and resources given for use must not deteriorate or decline.
- Rented forest areas and resources must be totally protected.
- All members of community have equal rights to participate in forest management and use.
- The process of making decisions related to rent must include all interested sides and be impartial.
- Three commissions must control these events.
- Forestry authorities must instruct renters about the ways of preservation of forest, also check seedlings and forestation work every spring and evaluate the functioning of forest tending and seedling growth every autumn.
- Incomes from the use of forest resources must be connected with expenses of tending and improvement of forest areas.
- Size of forest area given to the household for the CFM must not exceed 5 ha in walnut forests, 20 ha in mixed forests and 2 ha in forests near rivers.
- The duration of the original agreement is 5 years, subsequently it may be prolonged for 50 years.
- A renter with the CFM purposes must be a local, must fully protect his forest areas, provide the functioning of forestry and, in his term, suggest the presence of workforce and knowledge concerning forestry work.

In 2000-2009, the process of the CFM had been implemented in the very proactive manner but the number of the CFM members was declining then (Figure 1-7).

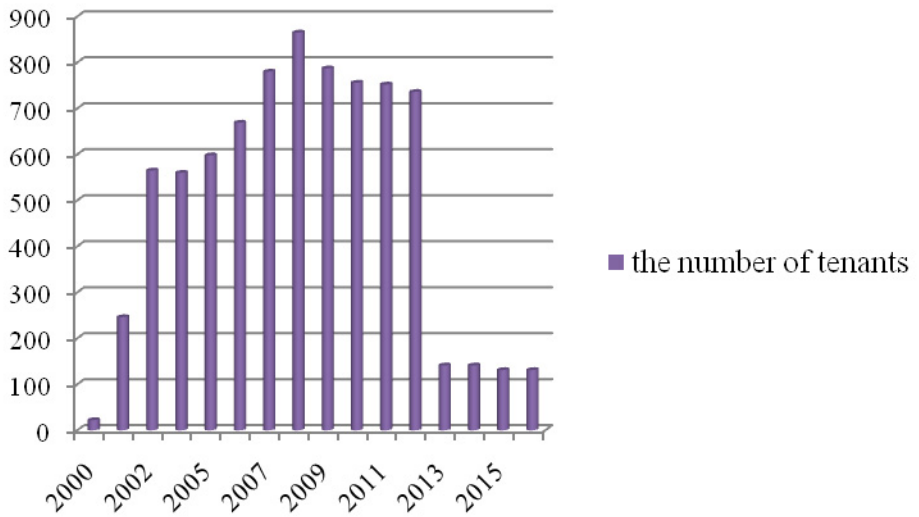



**Figure 1-7 Dynamics of the Community Forest Management 2000-2016**

Since 2010 until now, the amount of members of the CFM is declining and today is 131 renters.

It is obvious that the CFM did not spread all over the economy, even in districts where benefits of rural population from forest resources are very high. The reason is that above mentioned clauses contradicted with the principles of the CFM. For example:

- The space of walnut forests given for the CFM is 5 ha per family. Such approach allows dividing forest ecosystem into small plots that were managed each by separate family. Cutting of first tier of the forest, mainly shrubs occurred. This affected biodiversity, yield of walnut and its quality conditions.
- The duration of the original agreement by the CFM is 5 years, subsequently it may be prolonged for 49 years. There were situations, when renters awarded with 49-year rent terms cultivate crops in their areas. This fact causes the spread of illnesses of agricultural plants to the forest and crops drain soil. Also, sometimes renters even made fence in the given forest areas to protect them from livestock and forest violations.
- The process of the CFM involved particular families that could not join into communities. The attempts of uniting families into communities did not succeed because of the different amount of members in families. For example, there are 10 members in one family and 4-5 members in another.

According to the CFM principles, to use forests by the community members, they shall implement forestry-related activities (afforestation, reforestation, cultivation of a planting material, etc.) in conformity with their incomes. They also shall ensure protection of the given areas from unauthorized cutting, fire and other forest violations. The scope of forest-related activities is determined by the forestry during developing and concluding the contracts.

A big number of labor forces (people) are required to implement the above indicated activities and events. Despite the various numbers in families, the forest activities were divided equally among the families. Thus, a family with the bigger number of its members collects more forest products (nuts) during the harvesting time than other with the lower number of family members. This leads to the disintegration of community.

- A household needs a sufficient amount of workforce for the implementation of forest activities and events. Often, household provides the land or a part of its plot for sublease to relatives, or he (she) hires seasonal workers.
- Forestry determines the amount of rent payment that shall be done in the in-kind manner. The problem is that the cost of rent is estimated and made up based on the market prices, while the cost of forest-related activities and events is determined based on the official rates set by the State Agency, and these rates are very low.
- Households involved in the CFM do not participate in the processes of planning and making decision as both are under responsibility of the forestry authorities.
- System for reporting on forest use and implementation of forestry activities and events by the households was not developed and do not exists.

- Households do not have access to the critical information about the status of soil erosion, change of water qualities, decline of biodiversity, etc.
- Sometimes, household participates in illegal cutting of walnut wood for harvesting the wood burls.

The above-mentioned concerns affected the process of the CFM development. Since 2013, the collaborative forest management and use in walnut forests were cancelled by the majority of forest farms.

## 1.5 Production, consumption and trade of forest products

According to the *Forest Code of the Kyrgyz Republic*, forests are protected and can realize ecological, hygienic and other functions. Industrial cuttings are prohibited, and national industrial companies are allowed for use of imported wood only.

Walnut, pistachio and almond are among the popular products of walnut forests. Walnut is on sell in markets as solid nuts and kernels. According to the results of PROFOR research (2011), sales of solid walnuts produced by Toskol-Ata forestry amounted to approx. 9 tons but sales of walnut kernels amounted to 71 tons during 2010-2011.

The system of price addition related to sale of walnuts is very complicated. Many actors are involved and contributed to rendering various services. They include secondary dealers, sellers, workers of nuts processing, exporters and limited number of bakeries and confectioneries (PROFOR, 2011).

The major amount of kernels is bought by exporters who have done the nut processing, sorting and exported mainly to Turkey, Iran, Iraq and Syria. A part of walnuts are illegally sent to Uzbekistan for their cracking because the workforce is cheaper there. It's unknown how many tons are exactly exported per year. Supposedly, the amount might compose 10% of total harvest. Further prepared walnuts are possibly exported as a product of Uzbekistan rather than that of Kyrgyzstan.

In big cities as Bishkek, Osh and Jalal-Abad, sale of walnuts is slowly moving into shopping malls and supermarkets (30% in Bishkek).

There is about 20 average and big exporters of walnut kernels. These companies buy big amounts of products in wholesale markets of Bazar-Korgon and Jalal-Abad, and do sorting and packaging of nuts for export. Then they send the products to Turkey, Iran, Iraq, Syria crossing Uzbekistan, Tajikistan and Turkmenistan (PROFOR, 2011).

Amount of the exported solid walnuts is just the smaller part compared to that of exported walnut kernels. In 2006, 2007, 2010 and 2011, the first index was 7%-12% of total amount of

exported kernels. In 2008 and 2009, the major upturn was 23% and 32% respectively.

The results of the research showed that increase of efficiency of price addition system for walnuts produced in Jalal-Abad could increase incomes of many of the actors involved. Moreover, this could contribute to GDP through its export. Fair sharing of benefits from the regional economic growth could also decline interethnic struggle and separation. Help in increasing effectiveness of price addition system for sale of various nuts could contribute to development of sustainable management of walnut forests that is now overwhelmed by the anthropological pressure.

# Chapter 2 Contribution of forests to economic development

## 2.1 Economic and environmental significance of forests and woodlands

### *2.1.1 Environmental significance of forests and woodlands*

In the Kyrgyz Republic, the forests are represented mainly by mountain plantations, that are diverse and rich for valuable species. About 90% of forests of the Kyrgyz Republic are situated on the height of 700-3,500 m above the sea level.

The legal provisions on protecting forest resources are as follows:

- *Constitution of the Kyrgyz Republic*: the forests are exclusive property of the Kyrgyz Republic and are protected by the government.
- *Forest Code*: all the forests of the Kyrgyz Republic are nature protective forests and perform ecological functions.
- *Law of the Kyrgyz Republic*: forest fund is a strategic object, and the ownership, (or) use, and (or) management of it will influence the condition of security of the national economy.

Forest ecosystem is one of the most important elements of hydrologic cycle in the water regulation.

Results of numerous researches of Forest Institute of National Science Academy of the Kyrgyz Republic have been done in different natural and climatic conditions point on a big water-regulatory meaning of forests. Water-regulatory function of forests is determined by the structure of forest ecosystem. These functions depend on water characteristics of the upper layers of forest soil and power and water capacity of forest underlay.

According to statistics of P. Ghan, the glacial effluent takes only more than 6% of total effluent of the Central Asia. Therefore, the main source of supply of rivers of the Central Asia is melted with glacial water that composes major mass of superficial and mobile effluent of rivers.

Numerous observations of effluent on forest and forestless areas in various natural and climatic conditions proved that forest has an ability to transfer the superficial effluent to the deeper layers. Thereby, this contributes to the decline of unproductive evaporation and even the supply of precipitation into riverbed. By that, river floods noticeably decrease. It has a huge impact on the environment of the Central Asia given its irrigated agriculture. In this way, the ability of forests to maintain the high quality of superficial and subsurface water appears.

Forests in mountains also have a big significance in erosion prevention. According to researches, the main reason of water erosion is superficial effluent. It can appear in areas with intensive precipitation or fast snow melting.

Scientists of Forest Institute of National Science Academy of the Kyrgyz Republic also notice that forest doesn't substantially influence direct increase of atmospheric condensation in

Tyan Shan. But its role in redistribution of these condensations is extremely important: detention of precipitation by crowns, snow allocation, snow-melting mode. For example, spruce forests of Tyan Shan in the age of 80 detain 65.9% of condensations with crown cover 1.0%, and 33% with crown cover 0.5 % (Matveev, 1984).

The world community admitted that forest is the most reliable natural system to cope with the greenhouse effect because of their abilities for carbon sequestration and in particular the scale of the long-term carbon accumulation.

Data related to carbon stock in the forests of the Kyrgyz Republic are given in Table 2-1.

**Table 2-1 Carbon stocks in forests of the Kyrgyz Republic**

| Names | Forest land | Other forest land | TOTAL |
|---|---|---|---|
| Carbon stock above ground, million tons | 13.3 | 0.3 | 13.6 |
| Carbon stock under ground, million tons | 4 | 0.4 | 4.4 |
| Carbon stock of dead plants, million tons | 0.071 | 0.001 | 0.072 |
| Carbon stock of the litter, million tons | 16.5 | 8.6 | 25.1 |
| Carbon stock of soil, million tons | 1,161 | 967 | 2,128 |
| **TOTAL** | **1,194.9** | **976.3** | **2,171.2** |

Source: National Forest Inventory, 2008-2010.

The Table 2-1 shows that carbon stock in the forests of the Kyrgyz Republic is 2,171.2 million tons.

### *2.1.2 Economic significance of forests and woodlands*

The forestry of the Kyrgyz Republic is not a key sector in the economy as its contribution to the national economy is insignificant. The gross output of hunting and forestry is 0.05% of GDP (National Statistics Committee, 2015).

Since 2015, the implementation of System of Environment and Economic Accounting (SEEA) has been being carried out jointly with the National Statistics Committee (NSC) of the Kyrgyz Republic.

SEEA is an international statistical standard applied to ecological and economic accounting that presents the multi-purpose conceptual base for interaction of economy and environment, and supplies of ecological assets and change of supplies of ecological assets.

SEEA serves as an important instrument of sustainable management that allows evaluation of contributions of the environment to social and economic development of the economy.

Currently, forest accounts, which are part of the SEEA, are developed, and its base is the assessment of forest ecosystem services.

Forest accounts will show the real contributions of forestry to GDP of the economy. According to NSC, currently the contribution of forestry is up to 0.05%. However, based on carrying out pilot calculations of forest accounts, this number has been increased up to 1.24%.

The process of development of forest accounts showed that the system of reporting on the level of forestry enterprises was in poor condition for the last 25 years. The statistics provided by NSC are inaccurate: for instance, statistics related to collection of walnut, medical plants, honey, and information about cattle grazing on the SFF lands are understated or unavailable. To sort out this problem, NSC and SAEPF revisited the templates of statistical reporting designed for forestry enterprises. The improved templates are planned to be officially introduced into the system of reporting of forestry enterprises in 2017.

In order to execute the strategic plan in the sphere of preservation and sustainable use of biodiversity in 2011-2020, an economic evaluation of ecosystem services of "Karakol" state natural park was made within the framework of UNDP/UNEP project *Initiative of Poor and Environment*.

"Karakol" state natural park is situated on the territory of SAEPF. The park is its structural subdivision. "Karakol" is located in the southwest of Ak-Suu district (Issyk-Kul region), and its lands refer to the PAs.

Total area of the park is 38,159.3 ha, among which forest areas amount to 5,138.9 ha (13.5%), non-forest areas 32,365 ha (84.8%), including 12.3 ha (0.03%) of hayfields and meadows, and 5,668.6 ha (14.86%) of pastures.

On the territory of "Karakol" state natural park, there are ecosystems given in Table 2-2.

**Table 2-2 Ecosystems of "Karakol" national park**

| Names of ecosystem | Areas / ha |
|---|---|
| Forest ecosystem (spruce forest) | 5,138.9 |
| Mid-steppes and meadows steppes | 1,100.8 |
| Subalpine meadows | 5,727.2 |
| Glaciation | 26,192.40 |
| **TOTAL** | **38,159.3** |

Information from Table 2-2 shows that the area of forest ecosystems is 5,138.9 ha, mid-steppes 1,100.8 ha, subalpine meadows 5,727.2 ha and glaciations area 26,192.4 ha.

According to classification of TEEB, ecosystem services are divided into four groups:

- Provisioning services.
- Regulatory services.
- Cultural services.
- Support services.

The list of ecosystem services of “Karakol” natural park and benefits of them is given in Table 2-3.

**Table 2-3 List of ecosystem services of "Karakol" national park**

| Ecosystems name | Ecosystem services name | Benefit name |
|---|---|---|
| Forest ecosystem (spruce forest) | provisioning services | timber, firewood, gene product (seedlings), honey, medicinal plants, water supply, berries, mushrooms |
| | regulatory services | carbon capture and storage, water storage |
| | cultural services | recreation and tourism, education and spiritual enrichment |
| Mid-steppes and meadows steppes | providing services | hay |
| Subalpine meadows | providing services | meat, milk |
| | cultural services | recreation |
| Glaciation | regulatory services | regulation and storage of water |

According to classification of Millennium Ecosystem Assessment, providing services are represented by products we get from ecosystems. This category includes such products as food, fresh water, natural fibers, firewood and genetic resources. The source of these products is forest①.

Economic assessment of providing services of forest ecosystems of the park shows that economical value is USD 12,353,796.88 per year (Table 2-4).

**Table 2-4 Economic value of forest ecosystems services provided by “Karakol” national park**

| The products of forest ecosystem | Economic value | |
|---|---|---|
| | KGS | USD |
| Timber | 39,904,000.00 | 586,823.53 |
| Firewood | 22,655,250 | 333,165.44 |
| Mushrooms | 30,000,000 | 441,176.47 |
| Drug plants | 43,600,000.00 | 641,176.47 |
| Honey | 118,125,000 | 1,737,132.35 |
| Seedlings | 152,513,250.00 | 2,242,841.91 |
| Berries | 19,750,000.00 | 290,441.18 |

① Millennium Ecosystem Assessment. Ecosystems and Human Well-being: Current State and Trends Assessment. Washington, DC: Island Press, 2005 г..P. 28.

(Continued)

| The products of forest ecosystem | Economic value | |
|---|---|---|
| | KGS | USD |
| **TOTAL** | **426,547,500.00** | **6,272,757.35** |

According to the classification of Millennium Ecosystem Assessment, regulatory services are the benefits of regulation of ecosystem processes①.

Regulatory services of forest ecosystems of "Karakol" natural park imply regulation of climate by means of carbon sequestration and regulation of water.

Information in Table 2-5 shows that forest ecosystems of "Karakol" natural park on the area of 5,138.9 ha accumulate 510,294.7 tons of carbon and absorb 5,409.0 tons of carbon per year.

**Table 2-5 Economic assessment of climate regulation services provided by forest ecosystems**

| Parameters | Statistical figures |
|---|---|
| Total stock, ton C/ha | 510,294.7 |
| Carbon sequestration, ton C/year | 5,409.0 |
| **Total п.1+2:** | **515,703.7** |
| *Price of 1 ton C, KGS | 443.3 |
| Cost / KGS | 228,611,443.8 |
| ** Park costs / KGS | 2,493,000 |
| Clean price / KGS | 226,118,443.8 |
| Capitalization rate ( % ) | 0.01 |
| **Cost / KGS** | **22,611,844,375.6** |
| **Cost / USD** | **332,527,123.2** |

* Source: European Union Emission Trading (2014).
** Source: Report of National Park (2015).

Information in Table 2-5 shows that the cost of regulation of climate by forest ecosystems of "Karakol" natural park is 22,611,844,375.6 kg soms (US$ 332,527,123.2).

According to the classification of Millennium Ecosystem Assessment, cultural services present intangible benefits that people get from ecosystems such as spiritual enrichment, development of cognition processes, recreation, aesthetic experience, and cultural heritage

① Millennium Ecosystem Assessment. Ecosystems and Human Well-being: Current State and Trends Assessment. Washington, DC: Island Press, 2005 г..P. 28.

of the nation. For example, in the frames of different religions, several natural objects are considered to be sacred, this fact allows to save them in pristine condition.

"Karakol" natural park has rich recreational resources. The method of transport cost and direct market evaluation were used for the assessment of economic value of resources. The main information sources were expert assessments. Also, statistics of directorate of "Karakol" natural park were used.

According to the expert statistics, in 2015, the number of tourists who visited the park was 3,951 per day. The major part of visitors (50%) were from Kyrgyzstan, 31% Russia, 16% Kazakhstan, 2% Europe and 1% Asia (China, Republic of Korea, Japan, etc; Figure 2-1).

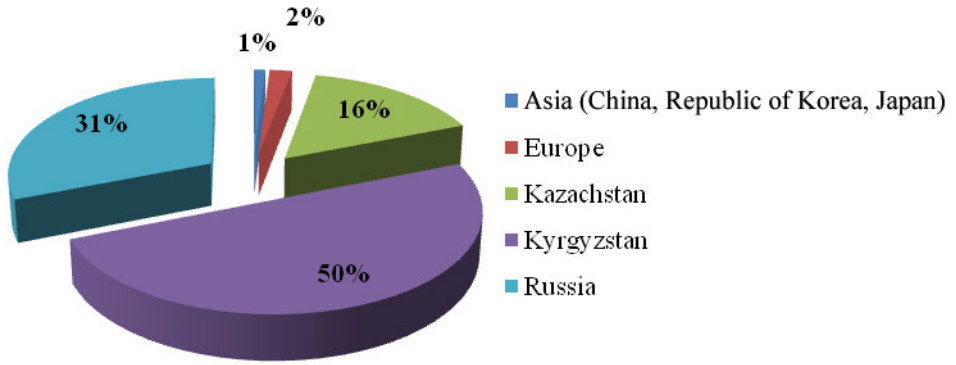



**Figure 2-1 Visitors of "Karakol" national park**

Information from Table 2-6 shows that the cost of recreational services of forest ecosystems of "Karakol" natural park is 135,193,117,920 kg soms (US$ 1,988,134,087).

**Table 2-6 Economic evaluation of recreational services provided by forest ecosystems**

| Name | | Clean price / KGS | Capitalization rate (%) | Cost | |
|---|---|---|---|---|---|
| | | | | KGS | USD |
| Income from tourists | | 1,273,772,340 | 0.01 | 127,377,234,000 | 1,873,194,618 |
| Income businesses | Income from accommodation and service | 49,908,560 | 0.01 | 4,990,856,000 | 73,394,941 |
| | Income from the cable car and rolling services | 27,283,079 | 0.01 | 2,728,307,920 | 40,122,175 |
| | Income from transportation Taxi | 967,200 | 0.01 | 96,720,000 | 1,422,353 |
| **TOTAL** | | **1,351,931,179** | **0.01** | **135,193,117,920** | **1,988,134,087** |

Results of the economic assessment of ecosystem services of forest ecosystems of "Karakol" natural park are given in Table 2-7.

**Table 2-7 Economic assessment of forest ecosystem services**

| Name | Clean price / KGS | Capitalization rate (%) | Cost | |
|---|---|---|---|---|
| | | | KGS | USD |
| Providing services | 4,265,475 | 0.01 | 426,547,500 | 6,272,757 |
| Regulatory services | 226,118,443.8 | 0.01 | 22,611,844,376 | 332,527,123 |
| Recreation services | 1,351,931,179 | 0.01 | 135,193,117,920 | 1,988,134,087 |
| **TOTAL** | **1,582,315,098** | | **158,231,509,796** | **2,326,933,968** |

In Table 2-7, we see the that economic assessment of ecosystem services of forest ecosystems is 158,480,809,796 kg soms (US$ 2,330,600,144).

Mechanisms of repayment of damages and losses from tree cuttings are implemented with consideration of ecosystem services. For example, the cadastral value of 16 ha of juniper forest with consideration of ecosystem services is 21 million kg soms, and without ecosystem services, 300,000 kg soms. This mechanism is used in case of tree cuttings on the territory of mining, laying of transport roads, and building of infrastructure for tourism, etc.

## 2.2 Financing and investment in forests and forestry

In Kyrgyzstan, the system of forestry financing has been staying without any crucial changes for the last 20 years. The budget financing as salary/wage payments and social fund remains unchanged. Financing of forest management is done at the expense of forestry enterprises (local level). These financial resources are not sufficient to cover all outlays of forestry management. This results in that the forestry is permanently lacking funding resources. Formation of resources of forestry enterprises is presented in Figure 2-2.

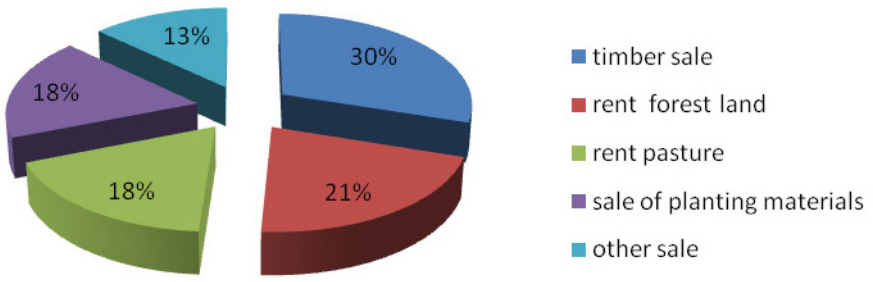



**Figure 2-2 Funding resources for forest enterprises**

Nevertheless, the Ministry of Finance starts to reconsider the system of forestry funding, and has introduced mechanisms of program budgeting. Moreover, a plan for funding biodiversity and forestry is planned to be developed.

## 2.3 Forests, livelihoods and poverty

In Kyrgyzstan, forests are mainly located next to rural settlements. After the collapse of the Soviet Union, the living standards of people in these settlements decreased significantly. Downturn of national economy and its unsustainable development affected their livelihood. In particular, the poorest were the most vulnerable and affected by the lack of social services and security protection. In the countryside, over half of population is registered as very poor.

According to official statistics, urban population accounts for 35%, and rural population 65%. Two millions of rural population live in or nearby the forests, therefore their social status depends directly on forests. Currently, 15% of the SFF lands are leased by 20,000 lessees.

Results of research done with the help of PROFOR (2011) show that all forests of Kyrgyzstan are traditionally divided into four main types:

- 109,372 households (546,862 persons) live nearby spruce forests that are mainly located in the Western and central part of the economy as well as in mountainous zones of the Fergana valley.
- 255,816 households (1,279,081 persons) live within or nearby walnut forests located on the lower slopes on the height of 1,300-1,800 m above the sea level in the South of the economy. These forests include both natural and human modified (planted) walnut trees (Juglans regia), apple trees (Malus species), cherry-plum (Prunus species) and other species of fruit trees.
- A significant number of people (109,372 households or 546,862 persons) live at the territory and nearby juniper forests located in various parts of the economy.
- Over 30,000 households (150, 000 persons) live nearby coastal forests.

According to the survey conducted within the framework of PROFOR (2011) research, the major sources of annual incomes of the interviewed are as follows:

- Cattle and forest products (37%).
- Agriculture (20%).
- Government funding of salaries/wages and pension payments (15%).

Economic status of interviewed persons who live next to forest depends on forest resources.

According to the *Forest Code*, it is permitted to use forests for cultural, recreational and touristic purposes. Today, 15% of the SFF lands are leased to 20,000 renters.

The results of analysis of incomes generated from the use of natural resources and ecosystem

services conducted in the national natural park “Karakol” showed that the use of benefits differs in the following way (Table 2-8).

**Table 2-8 Income benefit distribution of recipients**

| Benefit recipients | KGS | Percent (%) |
|---|---|---|
| Global community | 22,861,144,376 | 14 |
| Local population | 35,363,484,409 | 25 |
| Visitors | 39,206,004,197 | 22 |
| Business structure | 61,050,176,814 | 39 |
| **TOTAL** | **158,480,809,796** | **100** |

Information from Table 2-8 and Figure 2-3 shows that the world community that benefits from it is 14%, rural population 22%, visitors 25% and business structures 39%.

So, 22% of rural population who lives next to the natural park depends directly on forest ecosystems. The population uses the providing services (wood and other products of forest, water). Also, it has income from use of recreational services.

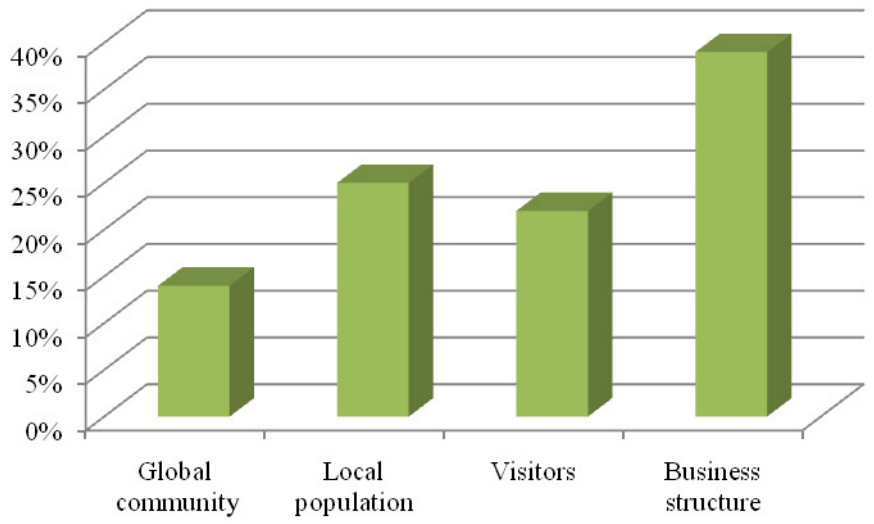



**Figure 2-3 Composition of beneficiaries**

# Chapter 3 Forestry policy and legislation

## 3.1 Forestry policy

National forest policy is a guarantee for sustainable development of forest sector. The process of transition to democracy and economy oriented on market relationships creates the need for the total reform of forest policy of Kyrgyzstan. The main reasons of reforming of forest policy are as follows:

- Decline of the efficiency of the former system of forest management based on principles of administrative and command system of planned economy.
- Increase of anthropogenic pressure on easily accessible forest resources caused by economic instability and increase of poverty of rural population.
- Disability of government to finance the hosting of forestry arrangements.

Thus, it was necessary to define the balance among ecological, economic and social aspects of forest management in national forest policy, thereby creating conditions for the sustainable development of forest sector.

National forest policy of the Kyrgyz Republic is a dynamic process that is periodically reconsidered and actualized. Actually, it is at the second stage of its development.

**1st stage (1998-2003):** The starting point of development of the new National Forest Policy is the Decree of the President of Kyrgyz Republic On the new national forest policy in Kyrgyz Republic, #300 of 06.10.1998.

The key elements of the 1st stage of National Forest Policy are:

- Concept on forestry development.
- Forest Code of Kyrgyz Republic and environmental legislation.
- “Forest” State Programme (2001-2005).

**2nd stage (2003-2016):** In 2003, the first assessment of implementation of the Concept and “Forest” State Programme during 2001-2005 was made.

The key elements of the 2nd stage of the National Forest Policy are:

- Concept on forestry development.
- National Forest Programme.
- Five-year Action Plan.

The National Forest Policy is developed spirally and every coil is a cycle of development of policy (Figure 3-1). The cycle has a repetitive nature. Transition from the one cycle to another is implemented through assessment of implementation of the planned arrangements and determination of new emerging priorities. Currently, the National Forest Policy of Kyrgyzstan is on the second cycle of its development.

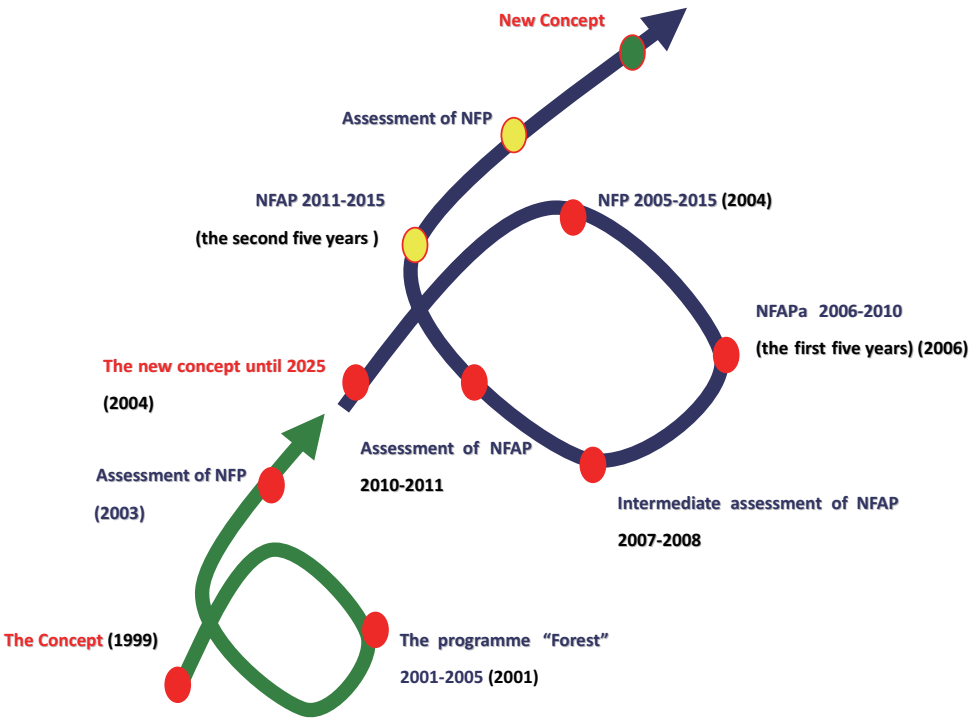



**Figure 3-1 Development of National Forest Policy to 2015**
**(Red circles represent the passed stages of development policy)**

Forest policy in Kyrgyzstan implies not only laws and documents, but also the process based on participation of local authorities, rural population, NGOs and other interested sides. It is implemented by means of collaborative design of integrative planes of forest management, development of the system of leases, CFM, integration of private forms of forestry activities (nurseries, creation of forest plantations, etc.). Eventually, such participation becomes more active and deliberate, various interdepartmental working groups are created.

All components of national forest policy are the results of wide and open discussions with all sides interested in sustainable development of forest sector of Kyrgyzstan: the Government, local communities, private sectors, representatives of science and international partners.

## 3.2 Forestry legislation

Forest legislation of the Kyrgyz Republic includes standards of *Constitution*, *Forest Code*, other laws and normative legal acts that regulate forest relationships in Kyrgyzstan. Forest legislation is oriented on protection of forest, reforestation, provision of rational use and forest accounting.

The most significant normative legal acts about forest of the Kyrgyz Republic are:

- *Forest Code of the Kyrgyz Republic* (1999).
- *Land Code of the Kyrgyz Republic* (1999).
- *Law of the Kyrgyz Republic* "*About animals*" (1999).
- *Law of the Kyrgyz Republic* "*On the chemical use and protection of plants*" (2001).
- *Law of the Kyrgyz Republic* "*On seeds*".
- *Law of the Kyrgyz Republic* "*On the biosphere territories in the Kyrgyz Republic*" (1999).
- *Law of the Kyrgyz Republic* "*On environmental protection*" (1999).
- *Law* "*On especially protected natural reserves*" (2011).

## 3.3 Short-term and long-term planning for forest development

In 2003, the assessment of execution of Concept of Forestry Development and "Forest" State Program for 2001-2005 was made. It allowed to determine the total goal achievement and efficiency of event realization. Based on it, there were developed recommendations for introduction of certain changes in national forest policy. Subsequently, the structure of forest policy changed. There were added National Forest Program for 2005-2015 and National Action Plan for 2006-2010, to replace "Forest" State Program.

Currently, the national forest policy is based on the three key components, namely "Forest, Human, Government", and is oriented on the creation of sustainable system of forest management and on transition from forest use to effective forest management aimed at preservation and augmenting of the national wealth.

- "Forest" is an object that should be protected by means of coordinated activity of the Government and population.
- "Human" is the keeper of forest, as well as its destroyer who is able to change forest sector. That is why Human needs to realize his significance to and responsibility for forest. Human should be not only the character in forest management, but also the recipient of benefits of forest activities;
- "Government" is the main character in the forest management. It must provide the precise distinction of spheres of responsibilities of the Government and all interested sides, and so to create a reliable partnership and provide preservation and rational use of forest resources.

The components of the national forest policy are as follows:

- Concept on forestry development is a long-term document that determines the government strategy on the forestry development.
- *Forest Code* and environmental legislation that provide the legal framework of forest policy.
- *National Forest Program* is a medium-term document that determines the complex of arrangements and measures to support implementation of the Concept.
- *National Action Plan* is a short-term document that provides particular activities that contribute to implementation of the National Forest Program.

The realization of documents of forest policy was weak. The expert assessment of realization of *National Action Plan* in 2006-2009 confirmed that in fact it was not realized the way it was supposed to be. The main problem was the insufficient adherence of the Government of Kyrgyzstan to its responsibilities that were expressed in different forms:

- Insufficient financial support for implementation of the National Action Plan. Financing was not sufficient even for some forest protection and forest management arrangements.
- Frequent reorganizations of forest management body, including changing of its overall status from the ministry level to the agency level, transition from the Administration of the President to Prime Minister's Office, merging with and separation from the other ministries. This also represents the low priority that is given to the forest sector. Every time when the Government announces a reduction of staff of the government administrations, forestry agency is the target of such reforms.
- Frequent changes in the leadership of the agency. Such changes discouraged initiation and restrained the development of reforms in the forestry sector. Since April of 2010, the senior management of the Agency has been changed three times in a row within this particular year.
- Absence of control over implementation of the launched policies and action plans from SAEPF that complicates the further reforms.

It shall be emphasized that limited technical potential of the staff prevents efficient implementation of the action plan, especially on the regional and local levels. Some workers employed in the forestry sector do not clearly understand the requirements of reforms, and prefer to keep up with *status quo* in the forest management, and keep going with the very centralized system that limits decision-making by the forestry employees only and without wider participation of population and local government. Many directions mentioned in Concept, Program and Plan were not realized, for example, decentralization of power on the level of forestry enterprises and separation of productive function from regulative and control functions.

## 3.4 Institutional framework

According to the *Constitution*, all forests are strictly under state ownership and the rights of forest management flock to the Government. That is why State Agency of Environment Protection and Forestry (SAEPF) is an executive state agency of forest management. Lands of the SFF and the PAs are under operative control of State Agency.

Institutional structure of forest management presents a vertical hierarchy and the system of forestry has republic, regional and local levels (Figure 3-2).

- Department of forest ecosystems and protected areas (republic level): functions are forest management (control and monitoring of forest management).
- Department controls regional forestry institutes and forestry enterprises of lower level.
- Regional forestry institutes (regional level): function is forest management (monitoring of forest management).

- Forestry enterprises (local level): functions are the execution of arrangements of protection of forests from insects and diseases, forest damages and fire, arrangements of forest reproduction (reforestation, afforestation), and forest use regulation. Forest enterprises were organized in the Soviet time. Forests are managed only by workers of forestry enterprises based on forest management projects and work plans. For example, the amount and time for conduction of forest plantations are established by department of forest management inventory. Based on this, forestry enterprises make work plans for the achievement of goals.

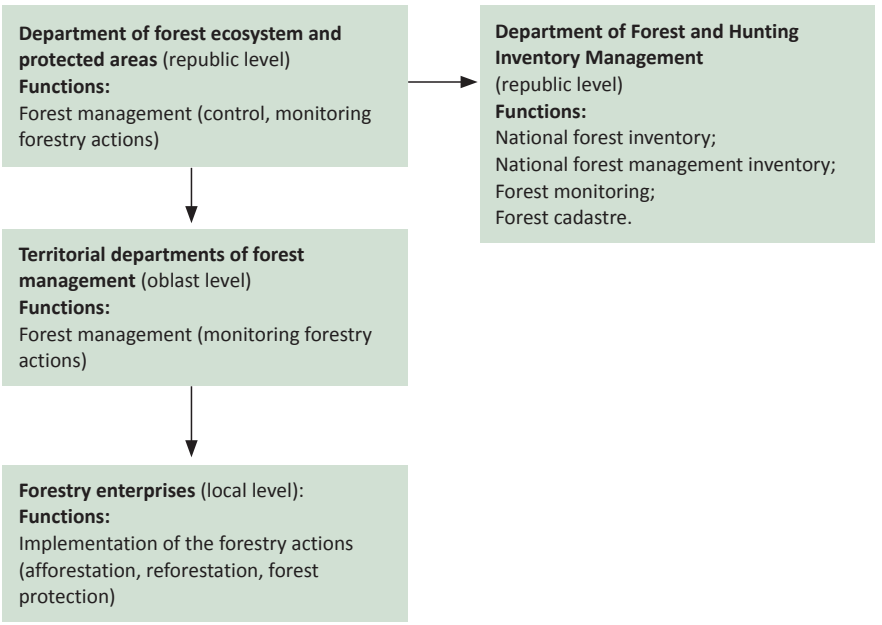



**Figure 3-2 State Forest Management System**

Department of forest and hunting management inventory (republic level): functions are provision of information, prognostication, planning and accounting of forests.

Department carries out national inventory of forests and forest management inventory, forest monitoring, forest cadastre and forest fund accounting.

## 3.5 The history and future of forestry development

The state forest management in the Kyrgyz Republic was introduced during the mid-19 century, when Kyrgyzstan became a part of the Russian Empire. During this time, a certain system of the state forest management was developed.

### *3.5.1 1860-1917*

In 1960s, after joining to Russian Empire, Russian government established a new forest

management system. Forests were under responsibility and control of the Forest Department of Ministry of State Property that was established in 1843. The three main goals were set up within the system: (i) protection of forests from fire and depredation; (ii) regulation of forest use; (iii) forest reproduction. The key operational element of forest management system was the forestry enterprises. Their duties included forestry management of the state forests and state policy related to the private forests.

Forests in Kyrgyzstan were not a subject of cuttings. Forest use included exclusively collection of firewood and harvesting fruit and nuts.

In 1894, in Russia, Ministry of Agriculture and State Property was created. In this period, the first forest researches were made on that territory. The first information about forest next to habitation of Kyrgyz was received. Further, during 1914-1916, the first forest management worked.

### *3.5.2 1917-1947*

After the Bolsheviks' revolution in 1917, all forests were nationalized and became a state property. Nationalization of forests resulted in the exclusive role of the Government in forest use regulation and forestry management.

In the period of industrialization, the first big reorganization of forestry management regulation took place. The reason was increase of wood demand. A merger of forestry and forest industrialism happened.

It negatively reflected on satisfaction of forestry's needs of protective and nature composing resources. In 1931, it led to the separation of forests into zones of timber and silvicultural appointment.

For example, cutting of walnut trunks were made in order to receive the specified range.

Due to applying of the administrative methods to economic development and poor professional level of the leadership, forestry development methodologies were ignored. Often, the instructions were provided without considering the territorial and natural features.

During the civil war (1918-1923), the Government had decided to divide the forests into three category groups according to their functional signs. In this regard, system of forestry management was differentiated which was the only positive change. In 1945, walnut forests were announced as a forest fruit sanctuary. Objectives of forest management approach were recovery and development of walnut forests, and efficient and comprehensive use of its wealth.

Introduction of the only one-party political system and absence of opposition led to the

administrative system of the economy. This resulted in very intensive use of forests and forest resources. During many years, forest resources were used to recover national economy, and affected the forestry, for example, reduced total forest areas, depleted forest formative composition and decreased their protective functions. Furthermore, principles of sustainability of forest use were not enforced and observed.

The positive side of this period was the differentiation of the system of forest management and forest use.

### *3.5.3 1947-1991*

Independent history of forest sector in Kyrgyzstan began in 1947, when positive transformations in forestry took place in USSR.

In 1965, the transition to industrial structure of agriculture management was done. The State Committee for Forestry was established. Its key objectives included strengthening the state control over the efficient forest use and forest reproduction, ensuring scientific and technical progress in forestry sector. The state management system, government policy, legal and regulatory framework were formed. This contributed positively to improving the shape of forests and situation in the forestry sector. Since 1966, forest cover lands are increased in Kyrgyzstan.

In 1988, the “Kyrgyzles” Production Forestry Association was established.

So, in this period, forestry had gone through many changes. The reforms of that time related only to upper levels of forest management. The transition of forestry to other services and ministries ended in failure, as a rule. Because of the multistage management, the responsibility of forest preservation was disappearing. It created the conditions for the development of corruption, uncontrolled use and plunder of forest. The main trend of that period was getting rid of symptoms, but not curing “the disease”. That is why the Government could not determine the role of forest sector in the policy of the economy.

### *3.5.4 1991-2003*

In 1991, the Soviet Union collapsed and Kyrgyzstan gained its independence.

In 1992, the State Inspectorate for Forestry was established within the framework of the administrative reforms. In 1994, it was reorganized into the Main Forest Management Department and became a part of the State Committee of Environment Protection of Kyrgyzstan.

During this transition period, forestry sector had faced challenges related to forest survival and their preservation within the market economy conditions. Shortage or lack of funding seriously affected the forestry management.

In 1994, the "Forest" State Program for the period 1995-2000 was developed and approved by the Government.

This program has triggered the establishing of the State Agency on Forestry in 1995. The Agency's strategic objectives are security, protection, reproduction of the forests, and ensuring efficient utilization of forest resources. In the same year, the Department on Forest and Hunting Inventory Management was established, which is unique in the Central Asian region, and GIS laboratory were equipped.

Since 1998, the forest sector has been completely exempted from any taxes. Its incomes were completely reinvested and used for implementation of forestry activities such as biodiversity protection and reproduction, and management of the PAs. Moreover, new advanced methodologies on biodiversity preservation have been implemented in Kyrgyzstan.

In the same year, the President of the Kyrgyz Republic adopted the Decree "On New National Forest Policy in Kyrgyzstan".

This is considered as launch of the new national forestry policy development in the economy. This was followed by the listed below major steps:

- Concept on national forest policy development for the period up to 2025 was designed (1999).
- The State Forestry Service of the Kyrgyz Republic was formed to control and monitor the Forest Fund (2001).
- The "Forest" State Program for 2001-2005 and Regulations "On the community forest management in the Kyrgyz Republic" was approved (2001).
- The First Congress of Foresters of Kyrgyz Republic was held. It was declared that forester is a key staff in forest sector. Kyrgyzstan joined the international environmental conventions. The State Forestry Service became the government executing agency responsible for the UN Convention on Biological Diversity and Ramsar Convention in Kyrgyzstan (2002).

In this period, forest sector tried to survive in the market economy conditions, overcome difficulties and hardships, and promote learning and knowledge management as part of new level of development. Forest sector managed establishing a unique structure of forestry under the supervision by the President. Government has started to pay particular attention to forest sector development and sort out the corresponding problems. International organizations have joined in planning and problem solving. Gradually, they started to be keen to contribute to development of forestry in Kyrgyzstan. It was the time of trials and mistakes, but also the time of victories and luck. This period was marked by the beginning of formation of new national forest policy of Kyrgyzstan.

### *3.5.5 2003 until now*

In 2003, assessment of the Concept and implementation of "Forest" State Program during

2001-2005 were conducted, and success and gaps were identified. Based on the assessment results, the key goals and strategic directions of the new edition of the Concept on Forestry Development up to 2025 were formulated and adopted in 2004. The Concept includes implementation of institutional and legal reforms, and development of the forest science and education.

The regional Forest Congress on "Forest Policy: Problems and Solutions" was held in Kyrgyzstan (on 25-27 November, 2004), the first time in the Central Asian region, with purposes of strengthening partnerships with states of the Central Asia, sharing experience in forestry reform, presenting achievements in sustainable forest management, etc. The event was initiated by the State Forest Service and supported by the Kyrgyz-Swiss Program, Norway Forestry Group and Forestry Department of FAO. Representatives of forestry sectors from Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan, etc. participated in the Congress.

The experience of the economy in formation of the new forest policy was presented and highly appreciated by the participants. Moreover, promotion of the international partnership and cooperation in forestry management and protection were also praised. The congress noted that, based on the example of the Kyrgyz Republic, the new model of sustainable forest management in the Central Asia was created.

In October 2005, the functions and responsibilities of the State Forest Service were transferred to the newly established State Agency of Environment Protection and Forestry in accordance with the decision of the Government of the Kyrgyz Republic. So, the system that covers all natural protective key areas and elements of the economy was formed.

# Chapter 4 Best practices for sustainable forest management

## 4.1 Soil and water conservation

### *4.1.1 Soil rescources*

Nature of Kyrgyzstan is known for landscape contrasts, big amplitudes of altitude, extremely multiple relief, various climatic conditions and forested area. Soil is very diverse. In Kyrgyzstan, there is the unique black-brown soil in walnut forests. Soil of Kyrgyzstan divides into several groups.

- Soil of the piedmont trough (500-3000 m) includes soil of low (500-1300 m) half-closed inter-mountain troughs-the grey earth; and soil of the closed inter-mountain troughs (1,300-3,000 m).
- Soil of the syrt highlands (3,000-4,000 m).
- Soil of the mountainside (1,000-5,000 m) includes soil of steppe zone (1,000-2,500 m), soil of steppe meadows (2,000-2,800 m), and soil of subalpine zone (2,800-3,500 m), soil of alpine zone (3,200-5,000 m).
- Intrazonal soil.

### *4.1.2 Water resources*

Kyrgyzstan has significant resources of water. In average, total water sources are annually 2,458 cubic kilometers: surface river flow 50 cubic kilometers, potential reserves of groundwater 13 cubic kilometers, lake water 1,745 cubic kilometers, and glaciers 650 cubic kilometers (Figure 4-1).

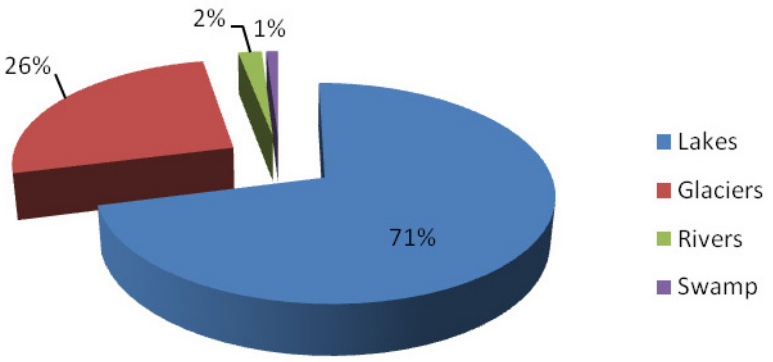



**Figure 4-1 Water resources**

- Glaciers.There are 8,208 glaciers in all on the territory of Kyrgyzstan. Glaciation area is 8,169.4 square kilometers or 4.2% of the territory of the economy. Main centers of the area are situated in watershed of Sary-Djaz. Reserves of fresh water in glaciers are considered to be 650 billion $m^3$, which exceed reserves of river flows of the economy 12 times. Tendency

of climate change leads to sustainable process of decrease of glacier surface. According to prognosis, in 2025, glacier surfaces will decrease for 30%-40%. It will continue in decline of conductivity for 25%-35%.

- Lakes. There are 1,923 lakes in Kyrgyzstan, and the total area of water surface is 6,838 square kilometers. The three biggest lakes of Kyrgyzstan are Issyk-Kul (6,236 square kilometers), Son-Kul (275 square kilometers), and Chatyr-Kul (175 square kilometers).
- Rivers. The longest rivers are Naryn river (535 kilometers), Chatkar river (205 kilometers), and Chu river (221 kilometers), the annual runoff is 5.83 cubic kilometers. Talas river and Assa river have the annual runoff of 2 cubic kilometers. More than 3,500 rivers that run on the territory of the economy provide Kazakhstan, Uzbekistan, Tajikistan and China with water.
- Swamps. Swamps of Kyrgyzstan is 0.5% of the territory of the economy.
- Reservoirs. There are 13 artificial reservoirs in Kyrgyzstan with total area of 378.2 square kilometers and water volume of 23.41 cubic kilometers. About 75% of runoff leaves the borders of the economy. 10 large reservoirs were built for regulation of international rivers (Chu, Talas, Naryn, Ak-Bura, Karadaria). Damage of shortage of agricultural production on the area taken by reservoirs is evaluated in US$ 11.3 million.

## 4.2 Desertification control

Geographic characteristics of Kyrgyzstan are intracontinental location, remoteness from seas and oceans, being surrounded by deserts, aridity of climate, clear horizontal and vertical zoning (Tian Shan, Pamir). It creates favorable conditions for processes of desertification and degradation of soil, especially because of increased exploitation of its natural complex in economy.

Aridity and drought of climate on the territory of Kyrgyzstan depend on annual precipitation. In the last 20-30 years, climatic situation in the Central Asian region significantly got worse due to drying-up of the Aral Sea and reduction of the acreage of glaciers in several mountain systems of Tian Shan and Pamir-Alai.

## 4.3 Salinization control

The Kyrgyz Republic is a small economy in Central Asia. It is located in spurs of Tien-Shan and Pamir-Altai. It's represented by a huge mountain structure with complex combination of ridges and intramountain valleys.

Soil of the economy is mountain-plain and mountain. Areas of saline soil take 3,780,220 ha, including areas of agriculture (773,860 ha) and areas of pasture (3,006,360 ha), saline soil 3,490,622 ha, solonetsous soil 281,501 ha.

Condition of agricultural areas and degree of their degradation have big influence on

agricultural production and the level of poverty in villages. Results of monitoring of pastures and arable land show high level of degradation of pastures (49% of pastures).

Arable areas degrade because of soil erosion. More than 2/3 of arable lands suffer from wind and water erosion.

Nonobservance of the methods against erosion and irrigation methods extremely damages soil. The most fertile soils of Chui region suffer from increase of groundwater and second salinization, 50% of saline soils are areas of Chui region.

So, degradation of soil is the result of combination of natural and anthropological factors, the most important ones are overgrazing and degradation of pastures, irrigation erosion, salinization, waterlogging, loss of nutrient, poverty and growth of locality.

## 4.4 Forest fire and disease prevention

Forest fire is uncontrollable spread of fire on the territory of the SFF, including forest and non-forest lands. Information about fire on the territory of the SFF is given below in Table 4-1.

**Table 4-1 Forest fire information**

| Years | General number of forest fire | Areas under the fire / ha | Including | |
|---|---|---|---|---|
| | | | Forest land / ha | Other forest land / ha |
| 2008 | 12 | 859.12 | 642.84 | 216.28 |
| 2009 | 3 | 136.1 | 72 | 64.1 |
| 2010 | 1 | 5.9 | 1.9 | 4 |
| 2011 | 1 | 44.27 | 18.25 | 26.02 |
| 2012 | 2 | 102.36 | 30.55 | 71.81 |
| 2013 | 2 | 76.54 | 43.97 | 32.57 |
| 2014 | 2 | 77.58 | 52.23 | 25.35 |

Table 4-1 shows that in the period of 2008-2014, the quantity of fires varies from 1 to 13 accidents, and total burnt area from 5.9 to 859.12 ha.

Intensive use of forest resources in Kyrgyzstan led to abrupt destabilization of forest ecosystems, which resulted in the lossing of biological sustainment of plantations. This was the reason for wide spread of pathological processes in forest, including massive damage of plantations by insects and diseases, and decline of their sanitary condition.

Diversity of forests, in terms of the content and agricultural meaning, determines the

specifics of forestry in Kyrgyzstan, and requires a special treatment for conducting events aimed at fighting against insects and diseases in every forest zone.

The shape of forests is of the serious concern. Ripe trees of Spruce tianshanica are affected by rot, and therefore are being the object for mass increase of insects. This is the reason for declining the quality of timber and its depreciation.

Floodplain forests are also affected. During the last 10-15 years, the catastrophic drying was remarked in these areas along with the mass increase of froth-insect (Cercopidae fam.)

About 50 years ago, there were no objects of mass increase of gipsy-moth (Lymantria dispar) in the walnut forests. Pistachio, Apple tree, hawthorn, cherry-plum suffer from this insect. Moreover and cherry-plum have been deeply damaged by plum Coccidae (Sphaerolecanium prunastri) during the last 20 years.

## 4.5 Biodiversity conservation

### *4.5.1 Diversity of ecosystems*

In Kyrgyzstan, 93% of the territory of Kyrgyzstan is determined as the unimpaired or slightly disturbed natural ecosystems. The ecosystem diversity is quite wide: from deserts to greenwood and coniferous forests, and alpine system (Figure 4-2).

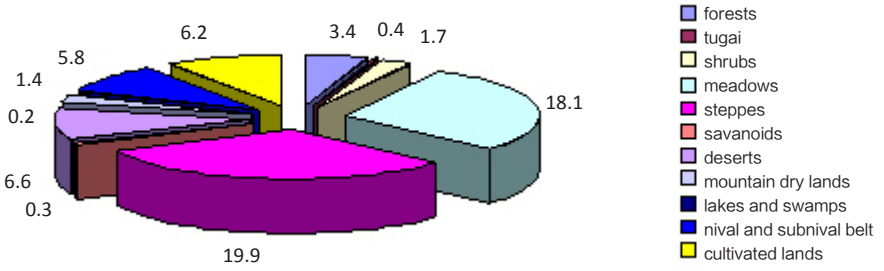



**Figure 4-2 Composition of natural ecosystem (percent of total territory)**

There are 22 classes of ecosystems. Deserts and nival areas lead to scarcity of ecosystems at the significant territory of the economy (12.6%). The most diverse ecosystems are situated in the central part of the mountain zone at 2,000-3,000 m above the sea level (14 kinds of ecosystems).

The wider diversity of ecosystems is presented in the east and center of Tian-Shan mountains (16 kinds of ecosystems) that is 72.7% of the total diversities. Regions of Fergana Valley and South of Kazakhstan are the poorest as there are only 3-5 kinds of ecosystems.

There is no ecosystem in the economy that does not suffer from the human impact.

Piedmont, prairie and swamp complexes are almost extinct in Chui region. Drought prairies, arid areas are extinct near Fergana.

Because of the severe contamination, ecosystems in river downstream are damaged. In many cases, these ecosystems are extinct due to water use for irrigation needs. Moreover, ecosystems in the economy are facing destructive impact by the cattle.

Therefore, the main functions of ecosystems such as ecological balance, absorption of carbon dioxide, strengthening of slopes, regulation of drains, etc. are disturbed.

### *4.5.2 Species Diversity*

Kyrgyzstan is a unique zone of concentration of species of wild animals and plants of the Central Asia (Figure 4-3 to Figure 4-5).

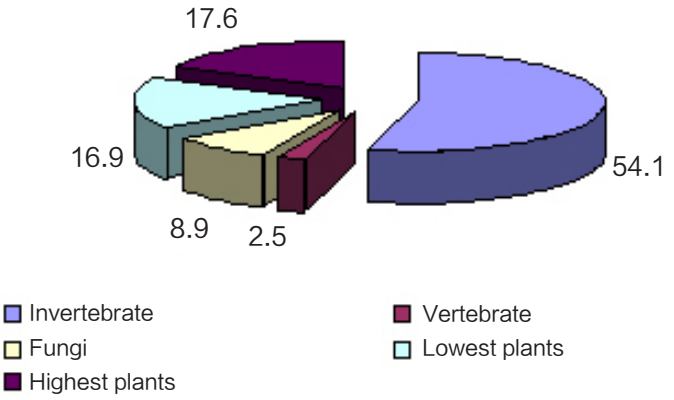



**Figure 4-3 Biodiversity of the natural ecosystem (percent of the total number)**

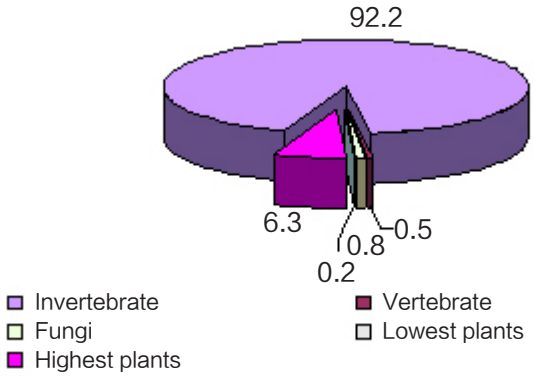



**Figure 4-4 Endemics species in different ecosystem (percent of the total number)**

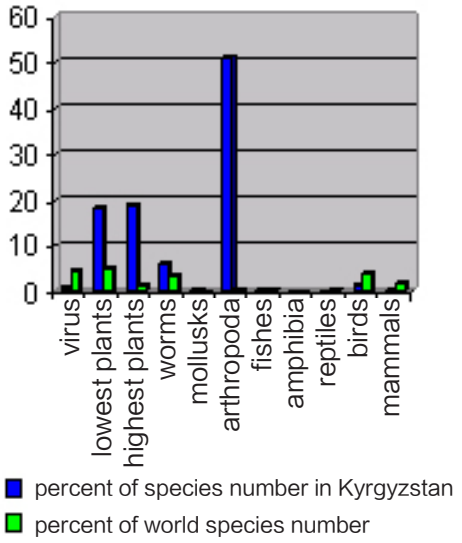



**Figure 4-5 Species diversity**

There are lots of valuable, rare and endemic species among plants and animals. Fauna is quite diverse in origin. Typical species in Central Asia and Mediterranean construct the basis of regional fauna. Over 500 species of vertebrates, including 83 species of mammals, 368 species of birds, 28 species of reptiles, 3 species of amphibia, 75 species of fishes, and 3,000 species of insects are available in Kyrgyzstan. The main species of endemic animals are represented by mollusks and several groups of insects (spiders, locust, Orthoptera, Hymenoptera). Mammals: Menzbier's marmot, Spermophilus relictus, Ochotona rutila. Endemics of Tian Shan and Pamir are represented by 4 species of reptiles: Lizard Nikolsky, Turkestan Zguana, Pavlovsky Zguana, Desert Lizard.

Flora of Kyrgyzstan includes over 4,500 species of plants, of which up to 1,600 have economic and practical values, including 450 species of feeds, 300 species of melliferous, 200 species of drugs, 62 ethereal species, and 50 food species. Such diversity of species represents the richest gene pool that provides stability of plants in condition of continental climate and use of its resources.

On the territory of Kyrgyzstan, dependence of diversity of flora and fauna on height level is clearly seen. In general, the Kyrgyz Republic has favorable nature conditions. But the growing process of anthropological impact on ecosystems prevents the conservation of many species of animals and plants in natural conditions.

Reduction of their number is a result of cattle grazing that has not been accompanied by the damage of environment before the reduction of trees and shrubs, plowing of big areas, draining of reservoirs and poaching harm populations and their habitats.

### *4.5.3 Threatened species*

Here is the list of 92 kinds of animals and 65 kinds of plants that are threatened. It is about 1% of biodiversity of Kyrgyzstan.

It is necessary to notice that a significant part of species has not been discovered yet. Habitats of registered species were not fully explored.

Several species were discovered only once and it's hard to affirm something with confidence. Today 68 kinds of animals and 65 kinds of plants are threatened and recorded in the *Red Book*.

The condition of amphibia, snakes, birds and predatory mammals is extremely alarming. Anthropological impact led to extinction of 11 species, others were threatened.

Among the fauna of big and average mammals, 3 species are extinct, and 15 species are threatened. Among the fauna of birds, 4 species are extinct, and 26 species are threatened. Among the flora, 3 species are almost extinct, and 54 species are threatened (Figure 4-6).

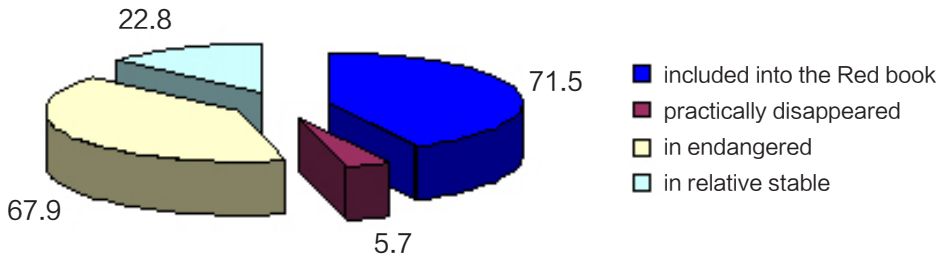



**Figure 4-6 Endangered Species**
**(percent of species number under the threat of disappearance)**

### *4.5.4 Protected areas of Kyrgyzstan*

The Kyrgyz Republic is a unique place for the growth of different plants. Total number of plant species is 4,500, of which 300 species are rare and threatened, 125 species are endemic, 200 species are drug plants, and about 130 species are trees and shrubs that make up the basis. of forests of the economy. The territory of the economy is habitat for 3% of world fauna. Concentration of species on unit of area is the highest in Central Asia.

In order to preserve the biodiversity of the economy, there is a system of the PAs: reserves, national natural parks and wildlife sanctuaries.

Since 2000, "Issyk-Kul" biosphere territory has functioned on the area of 4,314,400 ha. It has a status of protected area.

## 4.6 Rehabilitation of degraded forests

In forests of Kyrgyzstan, there are more than 120 species of trees and shrubs. Many of them can be related to relict and endemic species. Spruce, poplar, willow, tugai forest and sea-buckthorn are characteristics of the north of Kyrgyzstan. The south of Kyrgyzstan is characterized by juniper, walnut, maple, apple forests, almond and pistachio. Walnut forests of Kyrgyzstan have unique qualities. Currently, the condition of walnut forests is alarming.

In Kyrgyzstan, due to the intensive use of forest (1930-1988), their areas were decreased 2 times (513,300 ha). Currently, despite the increase of forest area, quality of forest leaves much to be desired, and reasons are as follows:

- Process of forest aging outpaces the reforestation process that results in loss of the basic protection functions and the intensified development of lesion by insects and diseases.
- Despite the prohibition of industrial cutting of trees, wood is cut as sanitary cuttings.
- Imposing part is cut by rural population for firewood and construction needs.
- Cattle grazing in forestlands results in dread action of all forest species.
- Soil erosion.

## 4.7 Comprehensive utilization of forest resources and non-timber forest products

Information about complex use of forest and non-forest resources is shown in Chapter 1. Best practices of pasture management and national forest assessment and monitoring are presented below.

### *4.7.1 Best practices for sustainable rangeland management*

Kyrgyzstan is a mountainous economy with an agrarian economy. The economic opportunities in mountainous and remote areas are represented particularly by livestock and agriculture. The role of livestock production is increasing and results in the growing demand for pastures.

The total area of pastures is 9,147,000 ha, including 2,063,000 ha village pastures, 2,955,000 ha pastures for intensive use, and 4,129,000 ha distant pastures.

After the abolishing of the collective and state farms, cattle were handed over to private ownership, and therefore many small-scale livestock holders were formed.

Due to the economic reasons, it became impossible to enforce the appropriate approach to cattle grazing and preserve its traditional cycle (spring – summer, autumn – winter). Almost all the cattle were grazed near villages all the year round. It caused a large overload. This led to decline of yields, pasture erosion, degradation and reduction of grazing areas. The

existing pasture management scheme has also contributed to deterioration of rangeland quality (Figure 4-7). These factors indicate the need for introduction and implementation of new pasture management approach that aims at conservation and improvement of pastures.

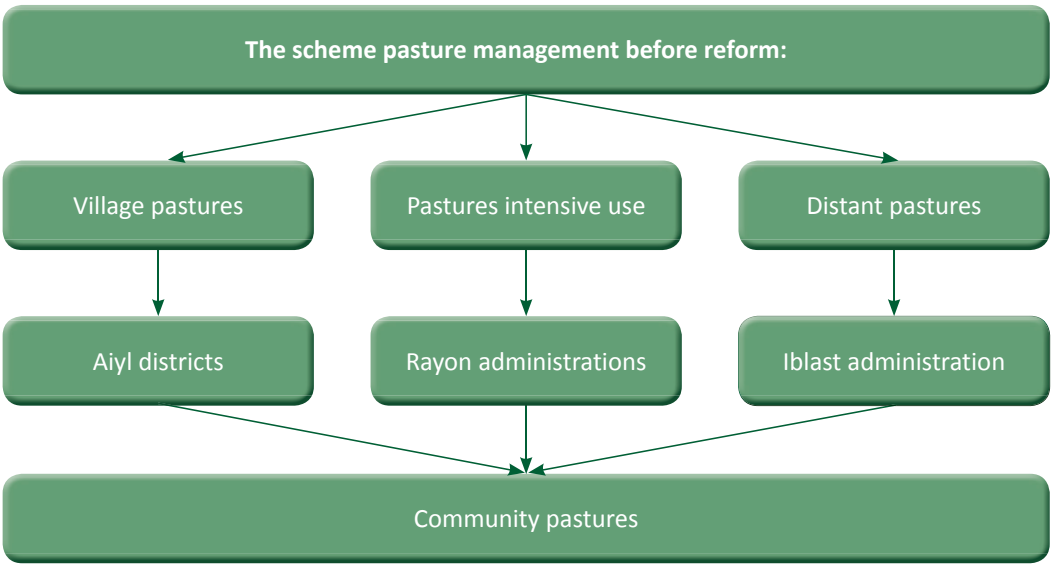



**Figure 4-7 The scheme for pasture management before reform**

According to the *Constitution of the Kyrgyz Republic*, pastures are state property and cannot be transferred to private ownership.

In this regard, a new Law *"On Pastures"* has been adopted. It was designed to ensure economically efficient and sustainable use of pastures. This envisages involvement of local communities in the pasture utilization.

The Law *"On Pastures"* must provide a legal framework for a sustainable pasture management, the elimination of the three-level governance and the transfer of all the functions and powers of the AO.

The main features of the new legal framework are as follows:

- Management of all grazing lands is decentralized and delegated to the local authority level, with the subsequent possibility of decentralization to the pasture user level through establishing an Association of Pasture Users.
- Association of Pasture Users should develop a Plan for communities to implement the control, maintenance, improvement and use of pastures.
- Pastures are considered as ecosystems, and, by the new law, pasture rent is replaced by the right of use, thereby ensuring pasture rotation and fair access to them for all users.

- Incomes from pasture use shall be channeled to the Association of Pasture Users and will be used for the improvement of pastures.
- Other users are involved in the decision-making process to be presented in the Pasture Committee.

To implement the newly adopted Law *"On Pastures"*, a new pasture management scheme has been developed (Figure 4-8).

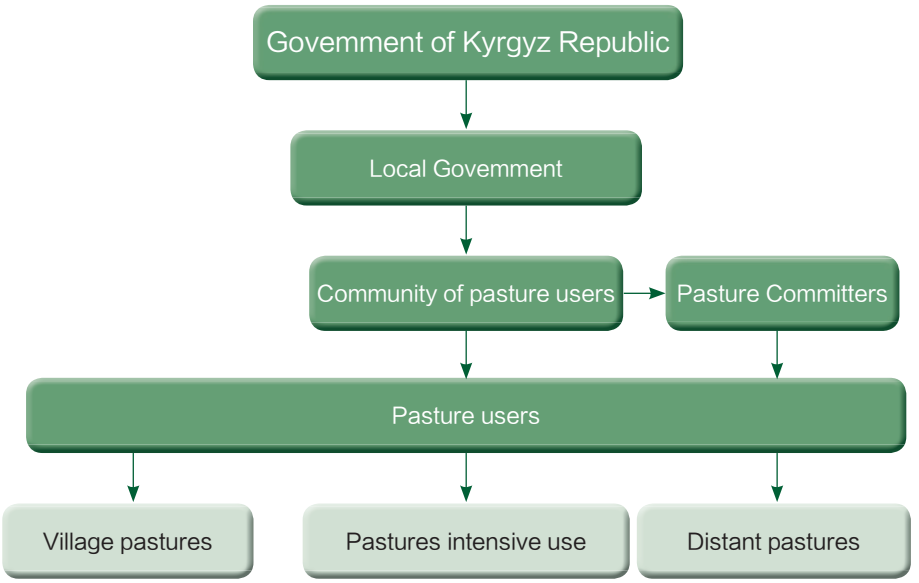



**Figure 4-8 A new pasture management scheme**

Creating of pasture committees has resulted in establishing a fair and transparent system of pasture use and increase of incomes of pasture users (Table 4-2).

The comparative analysis of financial inflows for 2011-2012 shows that incomes of pasture users in 2012 were 1.7 times higher compared to the incomes generated in 2011.

Table 4-2 shows that, the income from pasture users in 2012 increased 1.7 times compared to that in the same period in 2011.

**Table 4-2 Comparative data of financial inflows**

| Region | Financial inflows / KGS | | |
|---|---|---|---|
| | 2011 | 2012 | Difference |
| Batken | 484,530 | 1,087,300 | 2.2 |
| Jalal-Abad | 2,000,064 | 2,501,400 | 1.3 |
| Naryn | 1,390,000 | 2,050,620 | 1.5 |

(Continued)

| Region | Financial inflows / KGS | | |
|---|---|---|---|
| | 2011 | 2012 | Difference |
| Issyk-Kul | 729,700 | 1,209,490 | 1.7 |
| Osh | 710,878 | 1,583,100 | 2.2 |
| Talas | 1,005,124 | 1,276,130 | 1.3 |
| Chui | 1,007,000 | 2,400,800 | 2.4 |
| **TOTAL** | **7,327,296** | **12,108,840** | **1.7** |

Source: Department of Pasture under Agriculture Ministry.

### *4.7.2 The national forest monitoring and assessment of Kyrgyzstan*

Sustainable forest management requires a system of forest resource accounting.

The system of forest resource accounting consists of the following separate and complementary activities:

- National forest management inventory.
- National forest inventory.

#### *4.7.2.1 National forest management inventory*

National forest management inventory is the first level of forest accounting system, which determines the needs of operational planning (development of management plans).

The first forest inventory in Kyrgyzstan was made in 1892-1893 in the forests of Jalal-Abad and Naryn regions and the initial data on forest's separation into equal areas for protection purposes were obtained as a result.

Kyrgyzstan has more than 150 years of development of forest management, 14 forest surveying guidelines were developed during the period of the Soviet Union (up to 1995), and 2 during the post-Soviet period (1995-2008). The principles and technological methods of forest surveying have consistently been improved.

During the period of the Soviet Union, forest management was driven by the state forest surveying companies of Russia (Moscow, Voronezh) and Kazakhstan. Using visual interpretation and measurement methods, six inventory cycles of the forests had been completed.

Since 1995, forest surveying has been done by the state forest surveying service of Kyrgyzstan using random taxonomic method. Currently, one cycle has been completed.

Taxonomic assessment of allotments and forest inventory are being conducted in the forests

of Kyrgyzstan based on the visual measurements and random sampling approaches under forest management initiatives.

Assessment of allotments is forestry inventory by allotments based on the visual assessment, filling inventory assessment cards and designation of appropriate forestry management activities. The assessment of allotments consists of three activities:

- Assessment of the actual state of allotment. Allotment assessment is conducted in 22 dimensions. The following basic indicators are established: land category, slope exposition, type of forest, origin of forest, environmental condition, average diameter, composition, density, tree structure, tree age and class, etc.
- Definition of the purpose of allotment development for the period of evaluation depends on the actual composition of allotment. It is a basis for the appointment of appropriate activities, which should be implemented within the agreed timeline.
- Forestry management activities planning should correspond with the condition of allotment.

For the period from 1995 to 1999, the density, average stock, average diameter, average height, and age of the trees in the forestry management units of Chuy, Talas and partly Osh regions were evaluated only by means of visual assessment. The analysis of the data mentioned above demonstrated that the statistical error equaled to 20%-30%, especially with regard to the stock of plantations and running growth.

Since 2000, forest inventory on the forestry level has been carried out to minimize assessment errors during the forest surveying alongside with the allotment assessment (i.e. establishment of permanent trial plots, total of 13,352 trial plots were marked in the process of NFI).

As many researches demonstrate, the accuracy of visual measurement method is on average equal to ±10%-20%, whereas random sampling approach enables to reach the accuracy of up to ±3%-5%.

Random sampling approach to evaluation is based on the forest criteria estimation by establishment of circular trial plots, which are spread evenly across the forest area and have a geographical tie, i.e. coordinates which are used for GPS navigation and therefore their location in the forest area.

Circular trial plots in the forestries and SPA are distributed using a systematic approach on the reference grid of 500x500 m. At the same time, for coniferous and firry forests, there are two circles envisaged (internal 7.98 m and external 12.62 m), whereas only one circle is envisaged for the remaining types of forest trial plots (12.62 m).

Collection of information in the trial plots is carried out on four levels: on level 1, the information is collected in the trial plot centre; on level 2, it is collected in the external

and internal circles of the trial plots; on level 3, it is collected in the control zone, i.e. 50 m around the trial plot; and on level 4, it is collected in allotment where the trial plot is located (Handbook, 2008).

Since 1995, forest management inventory has been carried out on more than 3.0 million ha, and its dynamics are shown in Figure 4-9.


**Figure 4-9 Dynamics of National Forest Management Inventory 1995-2016**

*4.7.2.2 National Forest Inventory*

National Forest Inventory is the 2nd level of forest accounting system, which determines the needs of the Government and will serve as the basis for the development and implementation of the national forest policy.

The first national forest inventory is carried out using methodology of FAO. Plots or tracts (groups of plots) are laid throughout the economy. These tracts are arranged in a regular grid measuring in every 10 minutes in accordance with international standards and European information systems focused on global forest resources assessment.

The information is collected through observations, measurement and survey at different levels: within tracts, the highest level of inventory check, and in smaller sub-units, plots and small trial units, designated within tracts (Figure 4-10).

- Tract is a square-shape area of 1x1 kilometers (Figure 4-10). Coordinates of the South-West corner of the tract correspond with that of the points on the grid (intersection of the

coordinate grid). There are 4 field survey plots in each tract.

- Plot is a rectangular-shape area of 20-250 m located within the tract. Such area starts in every corner of the internal 500 m square (which matches the centre of the tract) and is numbered clockwise from 1 to 4 as shown in the Figure 4-10.

Characteristics of treatises, laid all over the economy, are presented in Table 4-3.

**Table 4-3 Features of tracts on the coordinate grid of 10×10 min**

| Total number of tracts | Total tracts in lakes' basin | Number of tracts located at 3,500 m above the sea level | Number of tracts suitable for the survey | Number of tracts by category of accessibility | | | |
|---|---|---|---|---|---|---|---|
| | | | | 1 | 2 | 3 | 4 |
| 766 | 26 | 176 | 564 | 132 | 114 | 282 | 36 |

Source: National Forest Inventory, 2008-2010.

Table 4-3 demonstrates that, with the grid dimension equal to 10x10 min, the total number of tracts comes to 766 units, of which 26 are in the lake zone, 176 located at 3,500 m above the sea level, and the remaining 564 acceptable for the field work. Of the 564 tracts, 132 are related to the 1st category of accessibility, 114 to the 2nd, 282 to the 3rd and 36 to the 4th category of accessibility.

Pledged network of plots on the territory of the economy and the gathering of information in them allowed to determine the area covered by forests of Kyrgyzstan, environmental issues and others.

Table 4-4 shows the area covered by forest of Kyrgyzstan according to the National Forest Inventory.

**Table 4-4 Forest cover area of Kyrgyz Republic**

| Region | Total forest area | | Forest of SFF and PAs | | Forest outside of SFF and PAs | |
|---|---|---|---|---|---|---|
| | thousand ha | percent | thousand ha | percent | thousand ha | percent |
| Batken | 166.50 | 0.83 | 138.77 | 0.69 | 27.73 | 0.14 |
| Osh | 186.31 | 0.93 | 110.55 | 0.55 | 75.76 | 0.38 |
| Jalal-Abad | 380.25 | 1.90 | 324.80 | 1.62 | 55.45 | 0.28 |
| Talas | 67.50 | 0.34 | 34.55 | 0.17 | 32.95 | 0.16 |
| Chui | 44.53 | 0.22 | 30.96 | 0.15 | 13.57 | 0.07 |
| Issyk-Kul | 142.36 | 0.71 | 102.80 | 0.51 | 39.56 | 0.20 |
| Naryn | 135.60 | 0.68 | 103.62 | 0.52 | 31.98 | 0.16 |
| **TOTAL** | **1,123.05** | **5.62** | **846.05** | **4.23** | **277.00** | **1.39** |

Source: National Forest Inventory, 2008-2010.

Table 4-4 shows that, according to the National Forest Inventory, the forest area of the economy constitutes 1,123,050 ha or 5.62%. The margin of error is within permissible range of ±10 %.

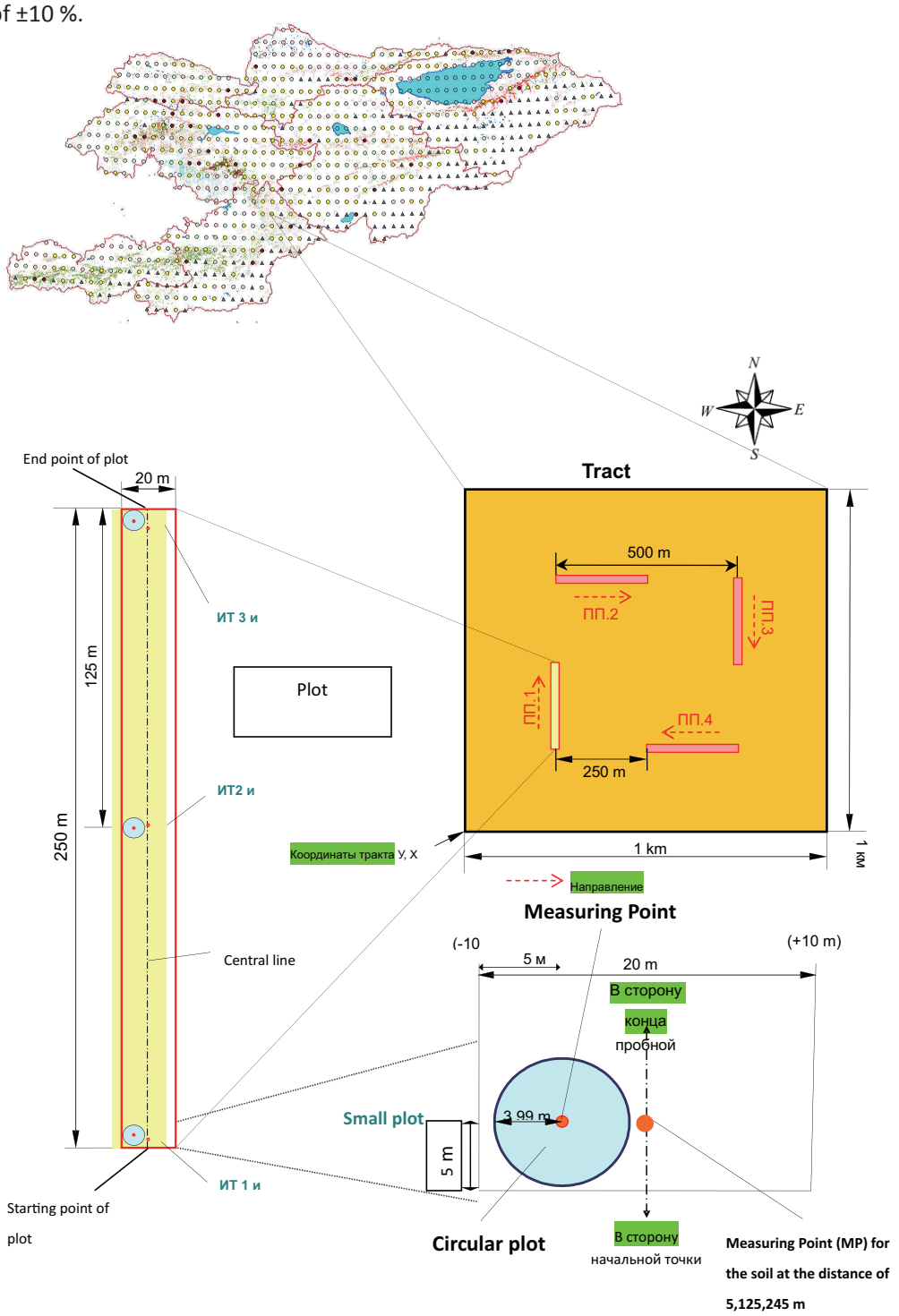



**Figure 4-10 Tract, plot and subplot layout**

# Chapter 5 Forestry education and research

## 5.1 Forestry education

During the period of the Soviet Union, forestry education was received in educational institutions of Russia. Since 1996, the training of forestry engineers has been done on the basis of the Agriculture Faculty of the Kyrgyz Agrarian University.

In 1999, the Forestry Department was established based on the Agronomy Department to improve the training of experts with assistance of the State Forest Service of the Kyrgyz Republic and the Kyrgyz-Swiss Program.

Students study the following subjects: Forestry, Forest Plantations, Forest Inventory, Horticulture, Forest Protection, Monitoring of Forestlands, Forest Management, etc.

Forestry Department owns two nurseries of forest trees and fruit trees. Students of 3-4 courses practice in all forests of Kyrgyzstan.

Over the years, 130 full-time and 200 part-time students have graduated from the department.

Material and technical base was provided by the Kyrgyz-Swiss Program. Currently, it needs to be updated. However, international cooperation was not established by the department; therefore, students had no chances to attend the exchange programs of forestry education.

## 5.2 Technical capacity of forestry authorities

Chapter 1 shows that the results of reforestation and afforestation are bad and their methods, approaches and technologies should be revised. Technical capacity of forestry authorities is weak, and equipment for carrying out forest events (forest protection, reforestation, afforestation) is outdated and has not been updated for the last 20 years.

Training of employees of forestry is held exclusively within the international projects. That is why the Fact Sheet (2010-2015) of Capacity Building activities focused on the Forestry Authorities indicates the major themes/trainings as reviews and evaluations done for the engaged authorities, as well as their specific expectations for improvements in this regard. The strategic planning/emerging trend/new initiatives on capacity building are lacked.

However, within the Regional program on sustainable use of forest resources in the Central Asia (GIZ), research on evaluation of potential of the experts employed within GIZ infrastructure and spatial data management in forestry has been undertaken.

As said in Chapter 3.4 of *Institutional Framework*, State Agency of Environment Protection and Forestry (SAEPF) is an executive state agency of forest management. Institutional structure of forest management presents a vertical hierarchy, and the system of forestry has republic, regional and local levels.

Department of forest ecosystems and protected areas (republic level): functions are forest management (control and monitoring of forest management).

Department of forest and hunting management inventory (republic level): functions are provision of information, prognostication, planning and accounting of forests.

Results of evaluation of potential of employees within GIZ infrastructure and management of spatial data of two Departments are given below.

### *5.2.1 Department of Forest Ecosystems and Protected Areas (DFEPA)*

(i) Total regular staff of DFEPA is 30, of whom 22 are directly responsible for the creation of information system of forestry.
(ii) Age structure of DFEPA employees is 14% under 30 years old, 45% under 40 years old, 18% under 50 years old and 23% under 60 years old. Only employees between 30 and 50 years old are allowed to increase their potential.
(iii) In DFEPA, there are employees with different specialties: forestry engineers (13), ecologists (4), geographer (1), biologist (1) and other (2).
(iv) In DFEPA, information system of forestry is made by means of reception of report data from forestry enterprises, reserves and natural parks in paper form. Every employee creates database based on received information according to his/her knowledge package. There is no database software.
(v) Despite the fact that employees took part in realization of international forest projects, the training of employees did not happen. Subsequently, employees do not have the basic knowledge.

### *5.2.2 Department of forest and hunting management inventory*

(i) Department of forest and hunting inventory mostly takes apart in the creation of information system of forestry. Total regular staff is 38, of whom 28 are directly responsible for the creation of digital data.
(ii) Age structure of departmental employees is 28% under 30 years old, 2% under 40 years old, and 66% under 50 years old. Subsequently, all employees are allowed for the trainings.
(iii) In Department, there are employees with different specialties: forestry engineers (16), ecologists (6), geographers (2), biologist (1), mathematician (1), land planning specialist (1) and other (2). Also, there are some nonresident programmers.
(iv) In the beginning of creation of digital models of maps, specialists didn't have necessary education. This ideology is valid nowadays. That is why for the last 20 years there have been no GIZ and IT specialists.

(v) Working experience on creation of NCJIX varies in gradation of 5 years, 6-10 years and over 11 years. In total, work is allocated evenly, the principle of continuity of staff is remarked and optimal age structure is permanent.
(vi) Evaluation showed that training on collection of information, creation of database and creation of digital models of maps is made. Trainings of employees are constantly done through realization of international projects. Also, in 2016, three workers of Department received training on use of GIZ and satellite imagery in India (NOIDA, New Delhi, India).

## 5.3 Forestry research

Forest Institute of National Academy of Sciences is one of the leading scientific institutions of the Kyrgyz Republic. It carries out fundamental and applied researches in the field of forestry and afforestation. Being reorganized several times, Forest Institute has been functioning since 1966.

The forest science is aimed at developing the scientific basis for conservation, reforestation, sustainable forest management and the expansion of forest area.

Currently, Forest Research Institute owns 5 laboratories.

- ***Plantation laboratory.*** An important part in researches of the laboratory is to develop methods of planting, plantation tending and new technologies of cultivation of planting material. The method of cultivation of forest species with closed root system is being tested and implemented.
- ***Laboratory of forestry and forest protection.*** It carries out researches on cuttings in order to recommend the best forestry technologies and methods that would promote natural regeneration, rejuvenation of forests and improvement of the quality of trees.
- ***Forest Resources Laboratory.*** The main direction of researches of the laboratory is connected with the preservation of the genetic resources of walnut forests.
- ***Forest Ecology Laboratory.*** The objective of the laboratory is the study of the state and dynamics of forest ecosystems, assessment and forecasting of changes, prevention and elimination of negative consequences of human impact on the forest.
- ***Laboratory of Economics and Organization of Forestry.*** The objective of the laboratory is the study of the relations of production, arising from the forest use and forests reproduction.

Fundamental researches on forestry and afforestation cannot be carried out without an experimental base. That is why there were organized experimental bases in all the forests of Kyrgyzstan. These bases are Ak-Suu forest experimental farm, Sary-Bulak base and Kara-Oy arboretum.

- Ak-Suu forest experimental farm was organized in 1956 and is located in a zone of spruce forests of Terskey Ala-Too (Issyk-Kul region). Its purpose is to carry out scientific experiments and researches in the spruce forests. The basic nursery has been built in

that area. Currently, introduction of new technologies of planting, cultivation of planting material, the development of methods of forest regeneration, cuttings and thinning in forest plantations are continuing in Ak-Suu FEF. Production verification and implementation of the completed development are carried out in this experimental farm.

- Sary-Bulak base was established in 1986 in order to select the range of species of trees and shrubs for protective afforestation and development of farming plantations in the foothills of the Kyrgyz ridge.
- Kara-Oy arboretum was created in 1966 on the north coast of Issyk-Kul lake. The objective of the park is the development of techniques of cultivation of park and other types of plantations in the resort area of Issyk-Kul region. Also, it is the introduction of trees and shrubs and the selection of the most valuable ones for urban forestry, seed collection and reproduction of valuable species and forms.

Despite the history and potential of the Institute, financing of scientific researches is not provided by the Government. So, new studies have not been carried out for the last 10-15 years. Also, the Institute does not have international research projects in the long term.

Material and technical bases are outdated; laboratories are in need of equipment updating and computer technologies. Employees also need to increase their professional potential, to gain new knowledge and to participate in researches.

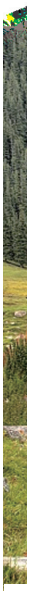
## 5.4 Non-governmental organizations involved in forestry development

Non-governmental organizations include Rural Development Fund, Independent Ecological Expertise and CAMP Alatoo.

- Rural Development Fund. It is a non-profit and nongovernmental policy and research organization established in 2003 to conduct research, develop policy recommendations, and implement activities in the field of the rural development.
  *Working priorities:* Support locally appropriate initiatives to alleviate poverty and achieve sustainable development in rural areas.
  *Major experiences:* The CFM in walnut forest and researches on the walnut and kernel value chain (2011-2016).
- Independent Ecological Expertise. It is a nongovernmental organization established in 1998. It has good practices on improving environmental policy and environmental legislation.
  *Working priorities:* Protect the rights of citizens of present and future generations and guarantee that they have a healthy life and healthy environment.
  *Major experiences:* Forest legislation and formulation of documents of forest policy (2003-2016).
- CAMP Alatoo. It is a leading regional Central Asian non-profit and non-governmental organization that promotes sustainable development in the mountain regions of the Central Asia.
  CAMP Alatoo's mission highlights two complementary and intrinsically linked goals:

improving the livelihoods of the Central Asian communities based on integrated natural resource management, and developing, adapting and implementing our tools with global and local experience.

*Major experiences:* The CFM in walnut forest and researches on cattle grazing (2012-2016).



# Chapter 6 Forestry projects and initiatives

International organizations allocate the grant for Kyrgyzstan for the implementation of international obligations. The international projects which have been implemented since 1994 are as follows:

In 1995, the Kyrgyz-Swiss Forestry Support Program has been implemented with the support of the Swiss Agency of Cooperation and Development.

Its activities were focused on the creation of necessary conditions for various institutions and individuals that carry out activities in the forestry sector of Kyrgyzstan. The program is also aimed at forest conservation and their biodiversity, increase of forest cover and use of forest resources in sustainable manner.

- The first phase of the Program (1995-1997) was a period of the formation of the program and determination of the key directions according to the external support.
- During the second phase of the Program (1998-2000), the National Concept of Forestry Development and new *Forest Code of the Kyrgyz Republic* were developed and adopted. Those included new methodologies on the implementation of forest management plans at the level of forestry enterprises; moreover, the new approach to forest management, namely the Collaborative Forest Management (CFM) was developed. Scientific researches were focused on the priority of forest sector. Department of Forestry under the Kyrgyz Agrarian Academy was established to initiate training of forestry professionals.
- During the third phase of the Program (2001-2003), all key directions identified within the second phase had been provided with the required further implementation and support. During this period, forest sector acquired an independent status, namely the State Forest Service of the Kyrgyz Republic was established, and its functions related to implementation of forest policy were expanded.
- The fourth phase of Program (2004-2007) was focused on the following: Reform of forest sector in accordance with the National Forest Policy; Development of forest sector management tools; Transfer of forest production activities to private sector; Development of the CFM that contributes to improving living standards of population living in and nearby the walnut forests; Organization of small-scale processing and marketing of non-timber forest products; Development of the National Action Plan on Forest Law Enforcement and Governance sector (FLEG); Education and science-based activities.
- During the fifth phase of Program (2008-2010), the Phase 4 was extended to complete the initiated activities, capitalize the experience and initiate the project KIRFOR.

From 1997 to 2005, the GTZ (currently GIZ) “Issyk-Kul Biosphere Territory” project was implemented. The goal of this project was to preserve the cultural and natural heritage, and to create a model and incentives for the sustainable ecological and economic development of the region.

From 2000 to 2006, GEF/World Bank’s transboundary project on conservation of biodiversity

of the Western Tian Shan was implemented. The project supported three countries: Kazakhstan, Kyrgyzstan and Uzbekistan in the development of PAs.

From 2001 to 2005, the EU project on the conservation of biodiversity of the Western Tian Shan supported Kazakhstan, Kyrgyzstan and Uzbekistan in the preservation of biodiversity and landscape, the creation of a cross-border park and the social and economic development of communities living in the buffer zone of the PAs.

Since 2004, the cooperation with FAO has been started, with its supporting projects of "harmonization of legislation of the PAs in the Central Asia" and "legal framework for the development of forestry and hunting" being implemented. With the support of FAO, criteria and indicators of sustainable forest management in the Central Asia were adopted. Also, the preparation of FOWECA and FRA national reports was executed.

From 2004 to 2006, with the support of the EU, "introduction of sustainable multipurpose management juniper forests" project was implemented. It focused on the development of plans of integrated management of juniper forests in southern Kyrgyzstan.

In 2004, the Kyrgyz-Norwegian Program was implemented in forest and environment sector. The goal of this program was to monitor the forest ecosystems in Kyrgyzstan. This Program was realized in two directions.

- The forest sector: the mechanism of separation of two functions (control and economic) and the mechanism of involvement of private sector into increase of the forested area in the economy were developed;
- The environment sector: sample plots were laid for the monitoring of forest conditions in the contaminated areas.

In 2004, the NFP Facility FAO supported the concept note on the implementation of the national forest policy of Kyrgyzstan.

Under the State Agency of environment, there is a National Steering Committee (NSC). Through the open and transparent competitions, NSC holds the following:

- The selection of the priorities of National Forestry Policy (NFP) to support the NFP Facility, through assessment of NFP.
- The selection of project proposals of the implementing organizations.
- Monitoring and evaluation of the implementation of the selected project proposals.

The national supervisory committee consists of such interested parties as the state agency for environment protection and forestry, research institutions, civil society, etc.

Since 2006, the NFP Facility has been supporting the following projects:

- Implementation of forest policies in Kyrgyzstan through the dissemination of information

about the involvement of local communities in the joint forest management (Implementer is BIOM Ecological Movement).

- Training of 28 forestry personnel for the dissemination of information on the implementation of forest policies (Implementer is the Kyrgyz-Swiss Program).
- Socio-economic assessment of the impact of afforestation and reforestation in the local community (The implementer is the institute of ecology and water problems).
- The definition of "forest" in the framework of the clean development mechanism for attracting investments for afforestation and reforestation (The implementer is PU "PIU").
- Edition of the Red Book of the Kyrgyz Republic (The implementer is PU "PIU").
- A seminar devoted to the international year of forests (The executor is State Agency for environment protection and forestry under the Government of the Kyrgyz Republic).
- Forest competition among juniors "Jash tokoichu" in Kyrgyzstan (The implementer is ED "BIOM").
- Improving the system of funding for forestry (The implementer is the institute of forest after P. A. Ghan of the NAS of the KR).
- Improving forest law enforcement of the Kyrgyz Republic (The implementer is NGO "Independent Ecological Expertise").

In 2008-2010, FAO TCP/KYR/3102 (D) "Capacity Building for National Forest and Tree Resource Assessment and Monitoring" project was implemented.

Within the frames of the project, the first national forest inventory was executed using the methodology of FAO. 3,064 plots or 766 tracts (groups of plots) were laid throughout the economy in a regular grid in 10 minutes, in accordance with international standards and European information systems focused on global forest resources assessment.

In 2010-2011, FAO project TCP/KYR/3203 "Development of the Production of Pistachio and Walnut in the Kyrgyz" was implemented. The project was aimed at making contributions to the production of pistachio and walnuts by use of sorts with higher productivity. The project has assisted in the creation of 10 ha of a standard walnut garden and 100 acres of plantation of pistachio trees.

In 2010-2012, JICA "Support for Joint Forest Management in the Kyrgyz Republic" project was implemented. The project was aimed at the expansion of areas where methods of joint forest management were used.

In 2012-2015, KOICA "Capacity Building of Conservation of Forests in Kyrgyzstan" project was implemented. This project was aimed at the development of forest nursery, and the creation of a research center of forest seed and a laboratory of monitoring of forest pests. A center of determination of seed quality and a laboratory of pest control were organized on the basis of Frunze forestry enterprise and on the station of forest protection in the Jalal-Abad region.

In 2013, the UNDP/UNEP project "Poverty and Environment" (PEI) initiative was implemented. Within the framework of this initiative, the natural capital accounting was executed. The accounting includes development of forest accounts, ecosystem accounts of Kyzyl-Unkur forestry enterprise and economic assessment of ecosystem services of the State Nature Park "Karakol".

In 2013, the UNDP/GEF project "Improving Effectiveness of Coverage and Management of Protected Areas (PAs) in the Mountains of Central Tian Shan" was implemented. The project was aimed at establishing the new state natural park "Khan Tengri" located in Issyk-Kul region.

In 2013-2015, the European Union project "Management of Forests and Biodiversity" was implemented that included monitoring of environment (FLERMONECA). The project was comprised of the three components: environment restoration and biodiversity conservation in Central Asia, forest law enforcement and forest management in Central Asia, and monitoring of status of environment in Central Asia.

In 2014-2016, the FAO project "National System of Forest Monitoring and Information to Open and Accurate Implementation of the REDD + (Reducing Emissions from Deforestation and Degradation)" was implemented. The project included capacity building of the experts from the Department of Forest and Hunting Management. The main goal of the project was to learn the methodology on assessment of changes in forests and forestlands in Kyrgyzstan by using Google Earth satellite imagery and TerraAmazon software. Based on the database of the obtained knowledge, 13,410 plots are established.

In 2014-2018, the FAO/GEF project "Sustainable Management of Mountain Forests and Land Resources in a Changing Climate" is being implemented. It is comprised of three main components: creation of favorable conditions for sustainable management of forests and land resources; increase of carbon stocks in forest ecosystems; promotion of agriculture with consideration of climate change impacts, including pastures as a part of sustainable land and water management in arid areas.

In 2015, the FAO project "Global Survey of Forests" project was implemented. The project was aimed at capacity building of experts of the Department of Forest and Hunting Management. The main goal of the project was to learn the methodologies on assessment of changes in forests in arid zones of Central Asia and Mongolia. The database of 20,000 plots was established.

In 2015, the TICA project "Development the Forest Management Plans" was implemented. The project was focused on development of forest management plan in Jeti-Oguz Forestry Enterprise, using the methodology provided by the Department on Forest Management in Turkey.

In 2016, the APFNet project “Study on Current Status, International Cooperation, Development Strategy of Forestry and Best Practices of Forest Management in Greater Central Asia” was implemented. The project included researches on contributions of forests to the Ecosystem Security, Green Development in Kyrgyzstan, Forest Development and Best Practices of Forest Management in Kyrgyzstan.

# Chapter 7 International forestry cooperation mechanisms

In Kyrgyzstan, the global value and significance of forests is becoming increasingly important as its forest cover disappears. As it was mentioned at the United Nations Conference on Environment and Development (1992), the reason is that forests are a global marketer of timber, a habitat of biodiversity and an absorber of greenhouse gases. That is why the concept of sustainable economic development with avoiding environment damaging, proclaimed in Rio de Janeiro, was transformed into the concept of sustainable forest management aimed at saving and conservation of forest ecosystems and using forest resources in an efficient way.

Achieving the sustainable forest management requires the combined efforts of many economies and fulfillment of national and international commitments by their governments as well as the greater involvement of and contributions by the international organizations, private sector and non-governmental groups.

Kyrgyzstan is the party of a number of environment and forestry-related international conventions and protocols signed and ratified by the economy. The protocols were developed under the auspices of United Nations.

Since 1995, the Kyrgyz Republic has signed and ratified 12 international conventions and 3 Protocols. The executive body to 11 international conventions is the State Agency for Environment Protection and Forestry of the Government of the Kyrgyz Republic (based on the government order #13-p and dated January 16, 2006). The Executive Body to the Convention to Combat Desertification (Act of Accession, #85 of 21.07.1999) is the Ministry of Agriculture, Water Economy and Processing Industry of the Kyrgyz Republic.

- The Framework Convention on Climate Change. Law of the Kyrgyz Republic on ratification from 14.01.2000 N 11.
- The Kyoto Protocol to the Framework Convention on Climate Change. Law of the Kyrgyz Republic on ratification from 23.01.2003 No. 9.
- The Convention on Biological Diversity. Law of the Kyrgyz Republic on ratification from 26.07.1996 N 40
- The Cartagena Protocol on Biosafety to the Convention on Biological Diversity. Law of the Kyrgyz Republic on ratification from 6.08.2005 # 140.
- Convention on Long-range Transboundary Air Pollution. Law of the Kyrgyz Republic on ratification from 14.01.2000 N 11.
- The Vienna Convention for the Protection of the Ozone Layer. The law on ratification of 15.01.2000 N16.
- The Montreal Protocol on substances that deplete the ozone layer.
- The Rotterdam Convention on the prior justification agreement on hazardous chemicals and pesticides in international trade. The law on ratification of 15.01.2000 N315.
- The Basel Convention on the control of transboundary movements of hazardous wastes

and their disposal, the Decree of SNP of Jogorku Kenesh on ratification of 30.11.1995. N 225-1; Decree of Jogorku Kenesh of accession from 18.01.1996 N 304-1.

- The Convention on environmental impact assessment in a transboundary context. Act of accession dd 12.01.2001 N 6.
- The Aarhus Convention on access to environmental information and public participation in decision-making and access to justice in the environmental field. Act of accession of 12.01.2001 N 5.
- The Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat. The law on ratification of 10.04.2002. N 54.
- The Stockholm Convention on Persistent Organic Pollutants. The Kyrgyz Government on signing from 5.03.02 N 94-p. Signed in May 2005. Law on ratification dd 19.07.2006 N 114.
- The Convention to Combat Desertification. Act of accession from 21.07.1999 N 85.
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Act of accession as of 30.11.2006, N 192.

Kyrgyzstan has ratified the thirteen international environmental conventions, and each of them has provisions related to forest conservation. The key relevant conventions are as follows:

- The UN Convention on Biological Diversity (CBD) is considering forests as one of the key components of vegetation cover that needs the biodiversity conservation.
- The United Nations Framework Convention on Climate Change (UNFCCC) is aimed at stabilization of concentration of greenhouse gases in the atmosphere that are contributing to the greenhouse effect. The forests of Kyrgyzstan can significantly contribute to the increase of the carbon dioxide stock.
- The UN Convention to Combat Land Desertification (UNCCD). One of the problems of global environmental changes induced by the anthropogenic factors is the desertification and land degradation occurred in arid, semi-arid and dry sub-humid regions. Afforestation is one of the key measures to combat land degradation and desertification.

Since 2004, the forest sector of Kyrgyzstan has participated in international processes.

In August, 2004, the first regional workshop of the Central Asian economies was organized with the support of FAO. The objective of such a workshop was the development of recommendation on criteria and indicators for sustainable forest management in the Central Asia.

Within the workshop, 7 criteria and 49 indicators were developed and adopted. The action plan for their application was developed. Recommendations were presented to the Central Asian economies for discussion and final decision-making.

Since 2005, Kyrgyzstan has been involved in FLEG as an observing economy.

In June, 2005, the first meeting was held in Moscow. It was marked as the official launch of the Europe and North-Asia ministerial negotiating process focused on the problems of law enforcement and governance in the forest sector (ENA FLEG). Kyrgyzstan participated in the meeting. Representatives of the government authorities of the economies participated in this event, jointly with the representatives of other stakeholders and civil society had confirmed the intentions of their governments for strengthening the fight against illegal activities in the forestry sector.

In November 2005, the Ministerial Conference issued the Ministerial Declaration and Indicative List of Actions (ILA) for implementation of the St. Petersburg Declaration as the official documents that reflect the intergovernmental agreement concluded at the highest political level.

Since 2014, Forestry of Kyrgyzstan initiated its cooperation with the Asia-Pacific Network for Sustainable Forest Management and Rehabilitation.

The Forestry of Kyrgyzstan participated in the 1st Regional Workshop on Strategic Forestry Cooperation in Central Asia held in Beijing, China, on 23–26, September, 2014; in the 2nd Regional Workshop on Strategic Forestry Cooperation in Greater Central Asia held in Ulaanbaatar, Mongolia on 15-17 July 2015; and in the 1st Ministerial Meeting held in Astana, Kazakhstan in May 2016. It is expected that the 3rd Regional Workshop will be held in Kyrgyzstan in 2017.

During the 2nd Regional Workshop on Strategic Forestry Cooperation in Greater Central Asia (15-17 July 2015), support was provided to the development of an action plan that should include the regional demonstration project, forestry training program on sustainable forest management, forest fire prevention and desertification. Moreover, it was noted that forest fires and desertification are the key challenges for the Greater Central Asia, and that the stronger regional cooperation in the forest management is required to improve the rural livelihoods and ensure healthy forests. Participants highly supported the action plan and confirmed their willingness to further cooperation with APFNet through joint efforts in promoting the sustainable forest management.

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