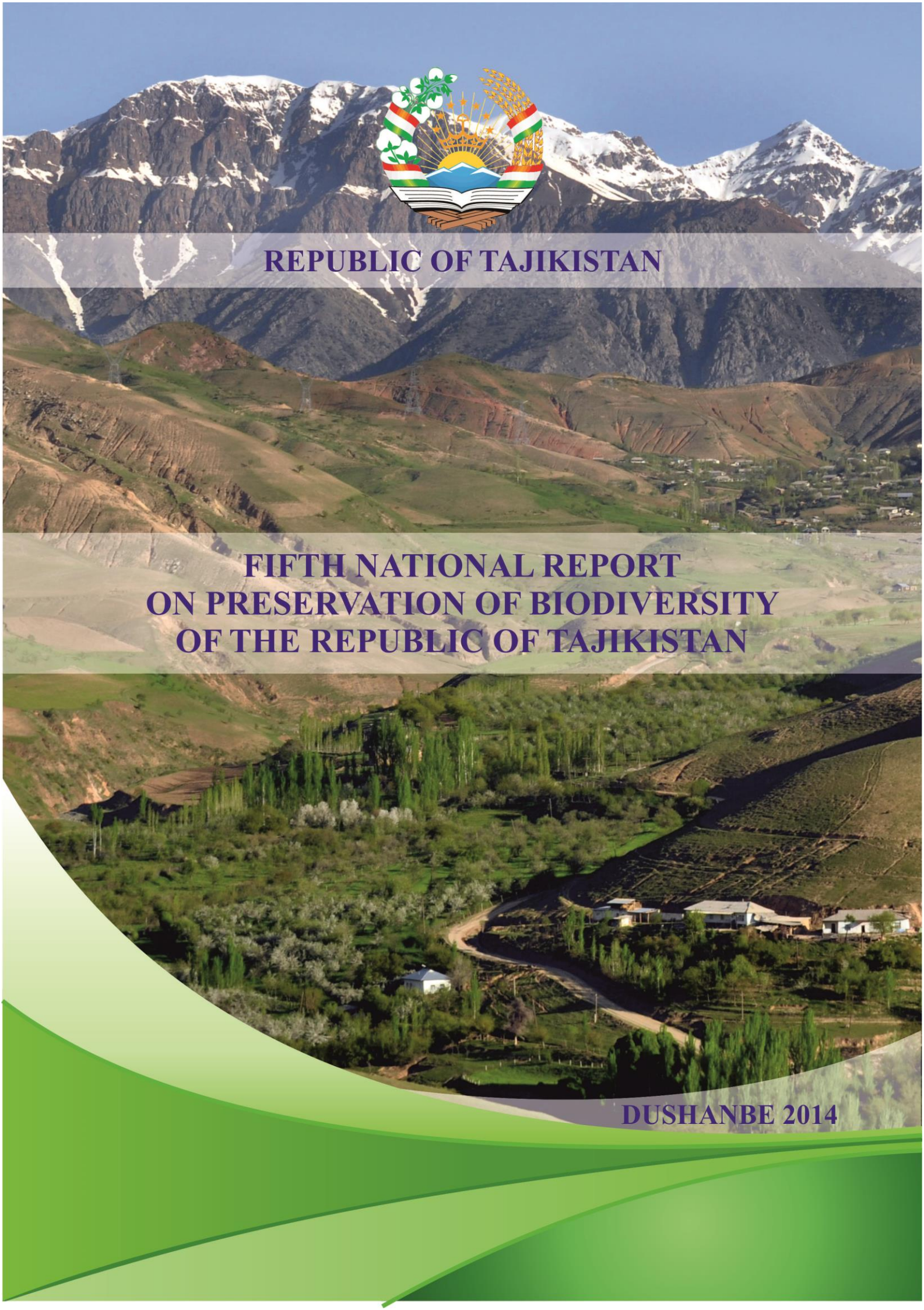

REPUBLIC OF TAJIKISTAN

FIFTH NATIONAL REPORT ON PRESERVATION OF BIODIVERSITY OF THE REPUBLIC OF TAJIKISTAN

DUSHANBE 2014

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LBC:

UDC:

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The Fifth National Report on Biodiversity of the Republic of Tajikistan is developed with financial support from the Global Ecological Fund (GEF), in the frames of its obligations under the Convention on Biological Diversoty (article 26) and on the basis of CC X/10.

The Fifth National Report includes the review of the state of biodiversity in the Republic of Tajikistan both on trivial and ecosystems levels. Identified tendencies and threats to the state of biodiversity are reviewed from the position of priority areas of work in the frames of NBSAP (2003). Results of the implementation of NBSAP and Стратегического плана КБР were summarized, and the areas for future activities of the country on preservation of biodiversity and Aichi Goals for 2011-2020 are identified. The areas of cooperation between various sectors of the society aimed at implementation of national obligations under the Convention on Biodiversity for achieving of preservation and sustainable use of biodiversity in RT are highlighted.

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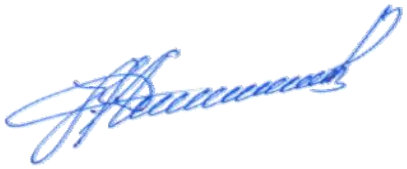
Signature of the officer in charge of presentation of the report	 ***Neimatullo Mahmadulloevich Safarov***
Date of submission of the report:	**31.03.2014**

CONTENT

INTRODUCTION

The threat of global economic crisis in the XXI century dictates the need to form the strategy on optimal co-relation between a man and nature. The Convention on Biological Diversity in conjunction with other international initiatives makes its input into preservation on life on the planet. At the current stage of development of human civilization the needs of society in biodiversity products increases multiply. At the present time thousands of species of flora and fauna on hundreds of thousands of earth's surface, in bossoms of the sea, and in mountainous areas are under the threat of extinction. Natural ecosystems are being intensively restructurized.

In this regard, degradation of biodiversity has particular importance among other environmental issues. Active inclusion of natural ecosystems into economic activities and extinction of species of living organisms takes place on all levels. Tajikistan is a mountainous and mostly agricultural country. Around 4600 thousands of ha of land including natural pastures are located in agricultural ecosystems. All intermountain areas of Tajikistan under 2500 meters above sea level are used for agricultural purposes. Desert, semidesert low-hill terrains and major river-valleys are largely cultivated and are impacted with anthropogenic changes. These are the areas of concentration of annual crops, melon-growing, vegetable farming, farming of cereal and industrial crops. Animal breeding develops on the basis of natural pastures of mountainous ecosystems. Agriculture is the main economic activity in Tajikistan. Around 70% of the country's labour force is concentrated in this sector of economics. Over the last 10 years the share of agricultural production in the structure of country's GDP resulted in 32%. This figure decreases annually, apparently, because of dropping out of the consideration the utilization of biodiversity for in-house needs by the local population.

Due to intensive development of economics, activities of the population in mountainous areas of Tajikistan have reached the most unique, remote, and sometimes difficult to access ecosystems. Therefore, the process of utilization of ecosystems can be observed in the most unique and protected forest areas. Thousands of species of plants and animals are under the threat of extinction. Upon development of irreversible processes in environment this will negatively impact the livelihood of people. Preservation of biodiversity on the Earth is an essential and crucial condition for survival of people and sustainable development of the civilization. Degradation of environmental capacity and the threat of loss of biodiversity in Tajikistan are linked to increase of the population and, accordingly, its needs in the products of biodiversity. The Government of the country applies great efforts on all structural levels aimed at preservation of biodiversity on the areas of specially protected natural objects and forest areas. However, economic needs dominate over the environment-oriented activities and initiatives.

As early as 1997 Tajikistan has ratified the Convention on Biodiversity and undertook obligations to ensure the necessary level of protection of the environment on its territory. It is clear that implementation of a strategy on sustainable development can be accomplished only on the basis of ecosystems approach to utilization of natural resources, mainly, on the basis of preservation of biodiversity. It is necessary to have indepth understanding of the mechanisms of operation of natural ecosystems in order to apply optimal technologies of management of natural resources and to be able to develop global and national strategies on environmental protection and management of natural resources.

For the purpose of rendering of assistance in development of the National Communication in the frames of the Project a number of events have been conducted, including working meetings, conferences and workshops which were carried out in cooperation with scientific, environmental, financial and economic institutions, with regional and local bodies. In the process of development of the Fifth National Communication representatives of public power, civil society and individual experts have been involved as project consultants and experts.

Particular chapters, objectives and national indicators have been discussed several times on

national, regional and international workshops, research and practice conferences dedicated to the issues of biodiversity. A series of academic and popular science articles on the issues discussed were published for wide-scale discussions of the national biodiversity indicators. Representatives of the main sectors of the executive power (around 1000 professionals and executive officers) have been involved into discussions. Significant progress was reached on development of sub-targets and steps for many objectives and on clear definition of biodiversity baseline and indicators. Ongoing are consultations on a number of objectives in regards of their introduction into updated National Strategy on Biodiversity.

EXECUTIVE SUMMARY

The Fifth National Report on Preservation of Biodiversity in the Republic of Tajikistan is aimed at preservation of biodiversity, is oriented on achievement of actual results on global strategic objectives and outcomes Aychi-Nagoya for the period until 2020.

In accordance with obligations of the Republic of Tajikistan under the United Nations Convention on Bilogical Diversity this Report contains information actual for the period in between the Fourth and the Fifth National Communications. National Communication is a country's document prepared for presentation before the Secretary of the Convention for review and consecutive control of the support on priority activities. The Fifth National Communication is a subsequent report in between Twelwth and Thirteenth Conferences on Biodiversity which contains information on the latest developments for the period of previous two years.

Because of wide differences between latitudinal and vertical zonality, and, aslo, as a result of combination of hot deserts, ever-frost subtropical zones and graciers Tajikistan has rich biodiversity.

In terms of natural and climatic features Tajikistan is situated on the border between temperate and subtropical climatic zones. Specific features of the climate are high-solar intensity, low cloudiness, long duration of solar radiance, aridness, wide fluctuations of dailt and seasonal temperature variations. Natural landscapes of Tajikistan are very diverse and are composed of ridge and valley geographical units.

Wide valleys and plats in low-hill terrain (up to 1000 meters above sea level) are notable for hot and prolonged summer with average atmospheric temperature of around 30°C in July, and with absolute maximum of 43-48°C. From July to September there are almost no precipitations. Winter is short and mild. Annual amount of precipitations equals to 300-600 mm which mainly fallout during winter and early spring.

Mountainous areas are mainly situated at a height of 2000 to 2300 meters above sea level and are notable for moderate climate with less hot summer and colder winter. High-mountainous areas can be noted for severely continental climate with prolonged harch winter and very short chilly summer. By their natural settings mountains of Tajikistan have wide range of diversity.

A great variety of landscapes, ecosystems, flora and fauna species (1.9% of the glocal species diversity) can be found on the territory of Tajkistan. The level of biodiversity of Tajikistan's biomes can be noted for great landscape variety and represented ecosystems.

Natural ecosystems represent exceptional value for biosphere and carry out the most important regulative functions. Particularly great is variety of soils. Mountainous forest ecosystems preserve valuable genetic resources – wild fruits.

Amid high vagaries of climatic conditions (microclimatic features), rich genofund of flora and fauna species is developing which presents potential resource for creation of high-productive and stable cultural varieties, ornamental plants, crude drugs, aromatic and technical raw materials. One of the world's centers of origin of cultivated plants is situated in here.

Around 70% of Tajikistan' territory refers to ecosystems which have not been subjected to significant economic impacts and are relatively unbroken.

About 20% of the territory has experienced significant impact on its ecosystems and preserved its capacity necessary for compensation of anthropogenic impacts.

Around 10% of the territory are populated with 2/3 of the total population and can be described with high degree of anthropogenic impact on natural ecosystems. Because of increase of economic activities in reent years transformation of natural ecosystems has tendency to expand, processed of erosion and land degradation grow.

Despite relative well-being of ecosystems particular communities in them experience significant

anthropogenic loads. Over the last three years the increase of Tajikistan's population in mountainous regions with rich biodiversity increased for 2.5% which equals to aroud 200 000 people from the total number of the population (around 8 million). At the same time the needs of the population for biodiversity products (medicinal and food plants) has increased by several times with the use of forests, pastures, hunting, fishing and other activities. In such a manner, just because of increase of livestock the load on natural pastures has grown on 15-18% (on one million).

Mountain ecosystems being least impacted by changes are vulnerable before various anthropogenic and technogenic impacts. The main part of natural ecosystems which contains rich biological resources covers areas where active pasturage, hudropower and hydrotechnical melioration works take place. These activities promote economic and social development of the country. Agricultural ecosystems formed on the basis of natural ecosystems are also significant in economic terms and their sustainability is directly linked to resources of valuable species.

This Communication is a part of the National Strategy. Its content is based on developed national target goals, indicators on achievement of biodiversity preservation and serves as a catalyzer for the process of mobilization of additional financial resourcs. For implementation of these target goals and indicators of it is necessary to develop financing mechanisms on priority areas which must be included into implementation of key indicators and target tasks on national level, and, also, implementation of secondary activities on international level.

In accordance with the current national procedures this National Report was reviewed, discussed and approved on the national workshop with participation of all stakeholders.

In accordance with the National Strategy and Action Plan on Preservation and Rational Use of Biodiversity there are observed nine categories of natural and three categories of anthropogenetic ecosystems. More than 30 percents of the country's territory were turned into anthropogenic systems in order to ensure socio-economic needs without consideration of the impact on biodiversity and its dynamics. Anthropogenic ecosystems include mainly agricultural lands and populated points. Agricultural ecosystems which are located in all natural zones have significantly expanded over the last decade. This fact in conjunction with absence of proper management resulted in degradation of fertile soil layer, and, respectively, in degradation of biodiversity.

CHAPTER I. UPDATED INFORMATION ON THE STATUS, TENDENCIES AND THREATS IN THE AREA OF BIODIVERSITY, AND THE CIRMUSTANCES IMPACTING THE WELFARE OF PEOPLE

General Description of Biodiversity of Tajikistan

Significant abundance of species diversity of flora and fauna, valuable genetic resources, endemic and epibiotic species of flora and fauna have developed in extremely diverse environmental conditions of Tajikistan. This great diversity are nowadays being preserved in natural ecosystems, and, partly, in agricultural ecosystems. Rich biodiversity is composed of around 23 thousands of flora and fauna species, 1900 of which are endemic (Table 1). The main sources of river formation which supply water into the basin of Aral Sea are glaciers and perennial snow cover. Country's water sources are used for irrigation of cotton, industrial and domestic needs, and it also accounts for 95% of the total electrical energy production. Tajikistan's biodiversity has great importance on the global, regional and national levels. From the amount of globally valuable there are 11 plant species which are important for selective breeding: *Aspicilia oxneriana, Hordeum bulbosum, Fritillaria regelii, Tulipa subquinquefolia, Punica granatum, Ficus carica, Juglans regia, Pistasio verae* and others. Two species have been introduced in the Red Book IUCN-2006: Darvaz dogwood *Swida darvasica* and apple-tree *Malus sieversii*. Among animals following species present global imrportance: markhor *Capra falconeri*, snow leopard *Uncia uncia* and urial (red sheep) *Ovis vignei*. The main protected species among plant communities of various landscapes are endemics, which present global importance. Among these are 30 plant species (Vavilov almonds, walnuts, pistachios, Darvazian plums, Kayon pears, Suvorov onion, Sambul Roots, bulbous barleys, Rozenbakh onions, and others). There are in total number 105 species of endemics. Valuable plant communities are wooded, meadow, tugay, piny and semi-savannah flora where could be found significant number of rare endemic and eibiotic species.

Table 1

Structural Level of Tajikistan's Biodiversity

#	Composition	Quantity
1.	Ecosystems	12 types
2.	Vegetation types	20 types
3.	Flora	9 771 species
4.	Wild congeners of cultivated plants	1000 species
5.	Endemic plants	1132 species
6.	Plants listed in the Red Book of Tajikistan	226 species
7.	Agricultural crops	500 cultivars
8.	Fauna	13531 species
9.	Endemic animals	800 species
10.	Animals listed in the Red Book of Tajikistan	162 species
11.	Domestic animals	30 breeds

Source: *National Strategy and Action Plan on Preservation of Biodiversity of the Republic of Tajikistan, 2003*

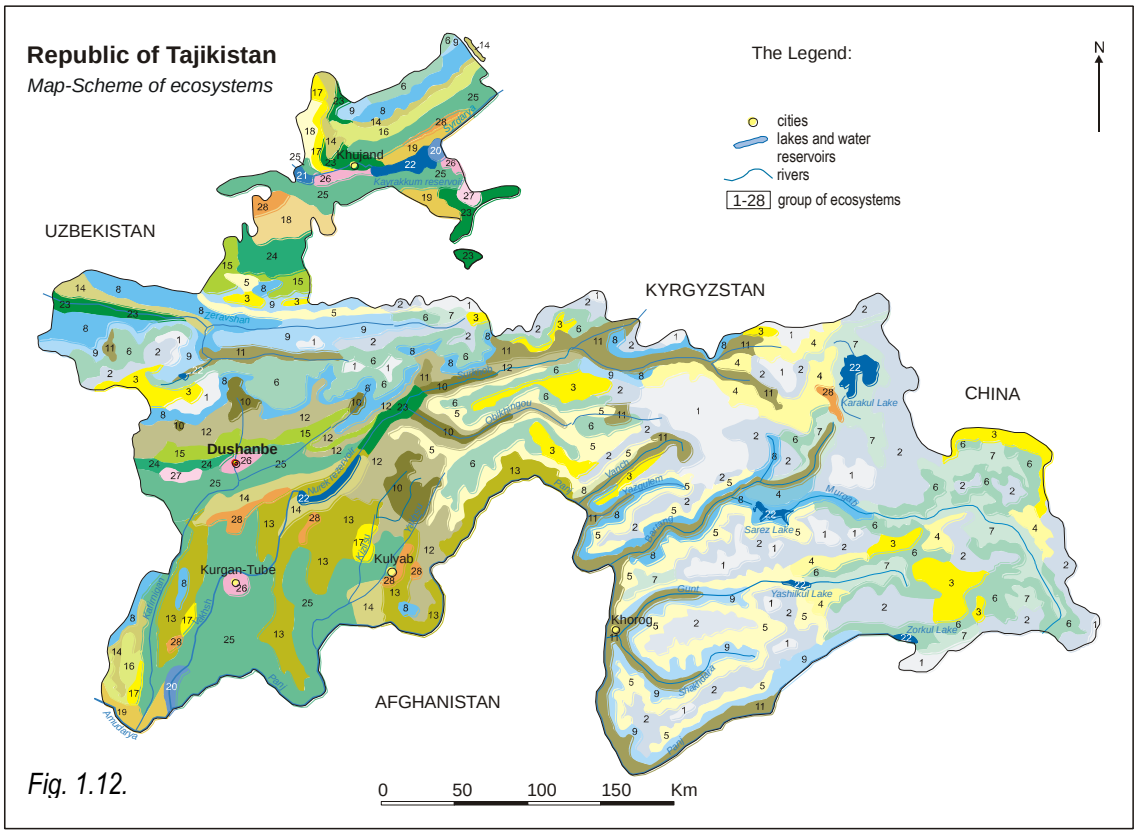


Fig. 1.12.

Fig. 1.12. **Legend to Map-Scheme of ecosystems**

Nival Glacier Ecosystems	
1	Glaciers and snowfields
2	Rocks and taluses with rare vegetation
High Mountain Desert Ecosystems	
3	Rare vegetation
4	Wormwood-teresken, steppe
5	Dwarf-shrub-steppe
High Mountain Meadow and Steppe Ecosystems	
6	Forbs meadow steppe, thymes
7	Low-grass meadow, swamp
Mid-Mountain Conifer Forest Ecosystems	
8	Various-shrub steppe and light forest
9	Forbs meadow-forest
Mid-Mountain Mesophyllic Forest Ecosystems	
10	Broad-leaf forest
11	Flood-plain small-leaf forest
12	Light forest, foliage tree, mesophyllic shrub
Mid-Mountain Xerophytic Light Forest Ecosystems	
13	High-grass, shrub, pistachio
14	Forbs wormwood, almond

Mid-Low-mountain Semisavanna (savannoide) Ecosystems	
15	High-grass
16	Forbs and shrub
17	Low-grass semisavanna
Foothill Semidesert and Desert Ecosystems	
18	Low-grass, saltwort-wormwood
19	Sand, semi-woody, shrub
Wetland Ecosystems	
20	Tugai
21	Meadow, swamp
22	Wetland
Agroecosystems	
23	Gardens, forest-plantations, personal plots
24	Rain-fed pastures
25	Irrigable pastures
Urban Ecosystems	
26	Municipal
27	Industrial
Ruderal-degraded Ecosystems	
28	Weed, ruderal

Importance of Biodiversity for the Republic of Tajiksitan

The main genetic resources are kept in laboratories and departments of a number of research and development institutes of Tajik Academy of Agricultural Sciences (collections of samples of cultivars of wild and cultivated plants, genetics bank of wild animals). Living collection of genetic resources is kept in botanical gardens, in particular nurseries, and also on the territories of reserved areas and forests (in natural reserves). Many cultivated plants have been created on the basis of many wild congeners of Tajikistan's fauna (Table 2).

Genetic Biodiversity Resources. Genetic biodiversity resources promote effective agriculture and higher economic profits based on improved features of breeds and cultivars without reclamation of new areas. Local varieties of breeds are also important for animal breeding. They are more productive and are less exposed to deceases. Entire divisions of TAAS work on perfection of methods of maintenance of plant cultivars and animal breeds for more effective and productive management, and also for creation of species with improved persistence to vulnerabilities in conditions of climate change, to pests and deceases.

In the moment Tajikistan still possesses significant genetic stock of local agricultural crops. Gene pool of grain, pulses, and oil-plant crops equals to almost 3 thousand samples including 510 samples of wheat, 500 of barley, 115 of bread-corn, 60 of oats, 500 of chickpea, 80 of lentils, 46 of soy, 8 of peanut, 234 of corn. The collection of cultivar samples of fine-stappled cotton includes more than 600 varieties and cultivar samples which have undergone tests in all ecological zones of Tajikistan. In the collection of sub-tropical cultures there are 7 cultivars of pecan nut, 30 of almond, 46 of jujube, 43 of fig and great variety of date-plum, pistachio, sea-buckthorn, hazelnut, mullberry. Selective work is in progress on citrus crops – lemon, orange, tangerine. Gourds are mainly presented by melons, watermelons and pumpkin.

Table 2

List of Some Agrobiodiveristy Crops Cultivated in Various Conditions of Tajikistan

Culture	Cultivated		Developed			Collection exists		
	Sorts	***hybrids***	***Sorts***	***hybrids***	***Lines***	***Sorts***	***hybrids***	***lines***
Fruits, including:	120	–	42	–	–	1143	–	–
Drupaceous	52	–	–	–	–	394	–	–
Pomaceous	31	–	–	–	–	224	–	–
Nut-fruited crops	13	–	10	–	–	177	–	–
Subtropical	12	–	21	–	–	159	–	–
Citrus	6	–	–	–	–	47	–	–
Other	6	–	2	–	–	124	–	–

***Source**: National Strategy and Action Plan on Preservation of Biodiversity of RT, 2003*

Fourty three varieties of soft wheat have been identified in Pamir, sixteen of which refer to ligule-free forms. More than twenty thousand varieties and sorts of plants are in nurseries and botanical gardens in conditions of Pamir. In the collection of Pamir botanical garden there are more than 40 sorts of apple-trees, 38 of apricots, 15 of pears, 14 of peaches, 20 of mullberies, various sorts of pine strawberry, raspberry, currant, gooseberry and other cultivars.

The total number of collections of sorts, hybrids and various forms of cotton, grain, pulses, oil-plants, fruits, vegetables, subtropical, citrus, berries and other cultures amounts to more than 32 thousand local and ecdemic samples. However, in recent years because of socio-economic constraints collection materials have been hardly refilled, plant-breeding stations, experimental plots, nurseries, botanical gardens, breeding farms, and state livestock breeding stations are in poor conditions. This enhances the risks of loss of the national wealth in the form of biodiversity gene pool.

Forest Ecosystems. More than 3.2 million of propagules and planting stocks of 26 types of hurdy-shrub species annually grown in forest nurseries of forest and hunt management farms. More than 1 million pieces of standard planting material are commercialized. Throughout the forestry works season the total number of workers in the forest management sector reaches up to 4.5 thousand people. Many forestry farms host beekeeping, animal breeding, horse breeding, and deer breeding.

Annual volume of commercialized of minor forest products and products of forestry manamgement farm households amounts to more than 1.5 million TJS. Country's forests flora is rich of medicinal herbs. More than 60 varieties of wild-growing medicinal herbs that in one or another form permitted to use by the public health authorities can be found in the country.

Forestry management farms procure more than 22 varieties of medicinal herbs such as briar, sea-buckthorn, St. John's wort, marjoram, peppermint, harmala, roots of inula, liquorice, sumach, milfoil, nettle, calendula, and manu more. On October 31st, 2005 the Government of the Republic of Tajikistan has adopted Decree No.396 according to which "Program on Development of Forest Management of the Republic of Tajikistan for 2006-2015" has been approved.

Grazings: Natural grazings and hayfields have great importance for economics of the country. Grazings and hayfields cover over 70% of the total area of agricultural lands. The total area of grazings is 3.2 million ha, and of hayfields is around 40 thousand ha.

High-mountainous meadow pastures ecosystems, Northern Tajikistan

The territory of Tajikistan has rich flora, vegetation and ecosystems which in natural condicitions contain great number of quite unique varieties of fodder plants. In highlands (on the level of 3000 meter above sea level) alone there are located 60% of pastures with the most valuable natural fodders. During half of a year these areas, namely, host the main body of animals on feeding. From environmental point of view the global objective is to universally preserve important mountain ecosystem by means of ensuring sustainable land use and preservation of biodiversity through development of relevant solutions on implementation of agricultural activities and investment policy. Such integrated managerial approach will ensure the possibility of expansion of positive experience and methods to other areas of the country with similar climate.

The basis of vegetational cover of grazings and hayfields is composed of grassy and semisuffroticus-suffruticous species which are formed both as self-consistent and as a part of tree and shrubbery formations.

Grazings in Tajikistan serve as an indicator of poverty reduction. In the present time the problem of the status of grazings and forest resources is acute because of increase of the level of population and reclamation of new territories. Natural grazings cover the area of 3689.5 thousand ha. The most valuable in fodder and environmental terms grassy and suffruticous communities cover 70% of the area of the country's agricultural lands.

Grazing lands can be found in almost all altitudinal belts and are very important for economic prosperity of Tajikistan. These lands became seriously transformed by cattle grazing which leads

to degradation and substtution of zonal vegetation with secondary or derivate. Especially high load is on autumn-winter-spring ephemer-ephemeroid and absinthial pastures of South and North Tajikistan and summer valley pastures of Kuramin range (north-east part of the country) (Table 1.12).

Agricultural ecosystems: Ancient agricultural culture of the population of Tajikistan has promoted creation of many sorts of tame plants and breeds of domestic animals based on genebank of wild congeners, mainly, of local species. In the present time more than 85 species and 360 sorts and hybrids of tame plants of various designations are cultivated in Tajikistan. Main zones of agricultural ecosystems are located below 3000 meters above sea level and on the basis of watering conditions can be devided into two sub-zones: sub-zones of bogharic (unwatered) and irrigated farming.

Agricultural Ecosystems

In various years the entire cultivation area of the country lies within the range of 758 to 864 thousand ha. More than half of this area is occupied by grain and pulse crops (more than 421 thousand ha) and wheat is the leading crop. Cotton annually occupies from 230 to 270 thousand ha of irrigated lands.

Importance of Biodiversity and Economic Evaluation

Considering current economic status of Tajikistan an important priority for its socio-economic development is preservation and management of biodiversity on all organizational levels (species, populations, ecosystems and communities) and its preservation in ecosystems (Table 1.9).

In environmental aspect biodiversity of Tajikistan's mountains, mainly forest resources and shrubby communities, performs soil-protective and water-regulative functions. Economic stability of the population both in mountains and in lower belts depends on the status of balance of biodiversity in mountains, inter-mountain areas and valley ecosystems. Such inter-connection from one side is caused by direct use of biodiversity by seasons and from the other side by sustainable maintenance of environmental balance in mountain-valley territories.

At the moment various forms of specially protected natural areas and eco-tourism zones, including international tourism, were created on great areas of the territory of Tajikistan. Regulated international auctions in the form of hunt on big high-priced species of wild animals are conducted in particular areas. Income generated by such auctions is dirtected at strengthening the capacity of preservation of biodiversity, decrease of poverty reduction and solution of agricultural safety issues. Income generated by eco-tourism in 2012-2014 alone made possible rehabilitation if degraded eurotia ecosystems on the area of over 1 thousand ha of the highest mountainous and fragile areas of the Tajik National Park. Saxaul communities on the area of 300 ha of desert ecosystems of South Tajikistan were rehabilited based on the income generated by eco-tourism. Because of heavy use of medicinal herbs over the past years (20 years) the areas covered with ferula in South and Central Tajikistan has reduced. As income of some households (renters) engaged in provision of tar of this valuable specie goes down, enterpreneurs have started the cultivation of ferula, thus, significantly expanded the area of its growth. In such a manner, some areas were rehabilitated, some new jobs were created, and, mainly, production was rehabilitated, areas are expanded and profits from use of natural biodiversity are gained.

Local population traditionally uses products of wildlife as raw materials for construction works, householding, production of colourants, etc.

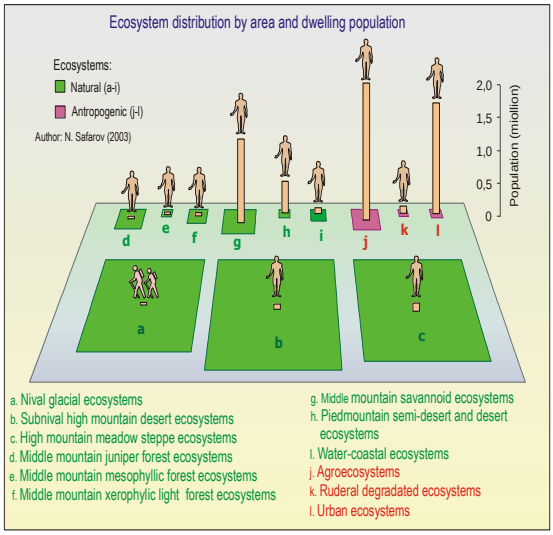
The total area of natural grasslands of Tajikistan equals to 3877.7 thousand ha, of which 3856.2 thousand ha (99.44%) are native pastures and 21.3 thousand ha are hayfields. Additionally, there are 32.1 thousand ha of wild lands whih are mainly used by population as forage resources for keeping more than 8 million of dual purpose cattle and wool livestock. These are located in all four regions of the republic (six administrative-territorial zones). Areas by administrative-territorial and natural zones significantly vary.

Despite immense territory the least areas of grasslands are used in Gorno-Badakshan Autonomous Region (Oblast) (in high-mountain belt – 751.3 thousand ha, 487.5 thousand ha – cultivated agricultural lands). The biggest area occupied by grasslands is in Khatlon region – 1299 thousand ha (1088.4 thousand ha of land for farming purposes) which are located in valley and submontane zones.

Valuable Ecosystems and Biodiversity Resources

According to updated classification of N.M. Safarov (2013) typologic structure of ecosystems of Tajikistan (Pamir-Alay province) includes 12 classes, 33 types, 6 sub-types and 259 forms of ecosystems. In the scheme the highest level of taxons is the class of ecosystems with such indicators as hypsographic levels and climatic conditions for forming life-forms of plant bodies. When characterizing ecosystems we will mainly pay attention to the class of ecosystem, and other taxons will be mentined as may be necessary.

1. High-mountain cryophyte ecosystems include 7 types and 21 forms of ecosystems. High-mountain hemixerophyte ecosystems include one type with three sub-types and 21 forms of ecosystems. The main structure of such monotypic class is composed of gramineous-steppe, mixed-herbs absinthial and meadow-steppe groupings. By environmental features these ecosystems verge to arid cold conditions of high-mountains.



2. High-mountain hemixerophyte ecosystems, an element and typically steppe sub-type of ecosystems which are represented by steppe tall grasses communities with mesophile agents of mixed-herbs perennial plants. In total, this class includes 1 type, 5 sub-types and 49 forms of ecosystems. Increase of number of forms of ecosystems in this class in comparison with others occurs due to intermediate position of such in between of zones of mountain steppes and the level of trees and shrubs. Meadow evosystems while occupying intermediate position among mountain steppes cover watered parts of northern slope exposures. Usually, dominance of meadow elements can be observed in such ecosystems, and on the edges, on elevated parts of landscapes there is active growth of drought-resistant species of biodiversity with soddy-cereal mixed-herbs meadow elements.

3. Mid and high-mountainous (subalpine) boreal (continental) ecosystems in conditions of Tajikistan is represented by one type and 14 forms. Significant part of forms of subalpine-savannah type of ecosystems inclines more to drought-resistant steppe ecological variants.

4. High and mid-mountain pine-forest ecosystems can be classified into three types (microterm, thermophilic and savannah-desert lepidote-pine) and 15 forms of ecosystems, and cover around 50% of the country's total forest cover.

Importance: Pinewoods and light forests perform water regulation, water protection, soil conservation, shore protection and anti-mudflow functions.

Composition of pine (juniperic) forests: *Juniperus seravschanica, J.turkestanica, J.semiglobosa and J.sibirica*

Some rare and vanishing animal species can be met in pinewoods: Tien Shan brown bear (*Ursus arctos*), urial (*Ovis vignei bochariensis*), markhor (*Capra falconeri*), lebetina viper (*Vipera lebetina*), wood pigeon (*Columba palumbus*) and other.

The most valuable communities are mixed-bushes steppificated and mixed-herbs meadowed juniperic forests.

In terms of environmental importance this class is very flexible to temperature and humidity, especially its edificatory – juniper. Forms of juniper grow in various environmental conditions and wide hypsometric levels from 700 to 3000 (3500) meters above sea level. The type of microthermic juniperic ecosystems in extreme, colder conditions attains trailing shrubbery form of low juniper and Turkestan juniper. Thermophilic junipers have very wide altitudinal and environmental range of spreading. Plant species with various ecological variants can be seen in their composition – from dry and desertificated to savannah, steppe and even meadow. In mountainous conditions of Tajikistan significant part of these ecosystems is ised as summer pastures. Therefore, regeneration by seed of juniper is seriously damaged by overgrazing of cattle. In such conditions juniper keeps its flexibility to various environmental conditions. This feature of juniper promotes preservation of regeneration by seed and stability of ecosystems.

5. Mid-mountain mesophile forest ecosystems are represented by maple-nutty, poplar-willow-birch forests with light forests mesophile shrubs, and are composed of 4 types and 50 forms.

Importance: socie-economic (fruit and berry harvest) and maintenance of environmental balance.

Spread across the entire country except North and South Tajikistan.

The most valuable communities – mesophilic old-grwoth forests: hazel-wood (*Juglans regia*) and maple forests (*Acer turkestanicum*) (Central Tajikistan), small-leaved forests – birch forests (*Betula tianschanica*) (along Zeravshan river, on the territory of Karategin range and West Pamir), mesophilic shrubs (Central Tajikistan).

The fullest hazel-mapple forests are located in Sarikhosor, Childukhtaron and Dashtidjum reserved forests.

Composition: many rare and vanishing species of flora and fauna (*Ungernia victoris, Ostrowskia magnifica, Cousinia darwasica, Cousinia leptocampyla, Iskandera hissarica, Stipa jagnobica*; from mammals: weasel (*Mustela nivalis pallida, M.n.heptneri*), Turkestanian bobcat (*Felis lynx*), snow leopard (*Uncia Uncial*), urial (*Ovis vignei bochariensis*), Tien Shan brown bear (*Ursus arctos*), Indian porcupine (*Hystrix leucura*); from birds: wood pigeon (*Columba palumbus*), pheasant (*Phasianus colchicus*), golden eagle (*Aquila chrysaetus*), neophron (*Neophron percnopterus*) and other).

Many wild congeners of fruits can be seen as a part of forest vegetation communities – apple-tree (*Malus*), pear tree (*Pyrus*), cherry plum (*Prunus*), hawthorn (*Crataegus*), barberry (*Berberis*) and other forms which create the most environment-friendly niche for big mammals.

6. Mid and low-mountain xerophytic light-forest ecosystems contain the following types of vegetation: soft-leaved, stiff-leaved and xerophytic-shrubby.

The main taxons of this class of ecosystems have wide spread in South and West Tajikistan. The class is represented by 4 types and 45 forms.

Composition: pistachio- and *calophca grandiflora, acer regeliana, celtis, ephedra* light forests.

Importance: Pistachio-woodlands perform water-regulative functions and are habitats for wild animals of arid zones. Because of active use as pastures and hayfields natural regeneration in pistachio woodlands is almost absent. Significant territories (up to 80%) previously occupied by pistachio-woodland communities are now overgrown with shrubs.

Wildlife: Persian gazelle (*Gazella subgutturosa*), urial (*Ovis vignei bochariensis*), wolf (*Canis lupus*), fox (*Vulpes vulpes*), from reptiles – Central Asian cobra (*Naja oxiana*), Central Asian tortoise (*Testudo horsfieldi*) and other.

As a part of this ecosystem there are wild congeners of barley (*Hordeum spontaneum*), everlasting pea (*Vicia tenuifolia*), almond (*Amygdalus bucharica*), persimmon (*Diospyros lotus*), *Zizyphus jujuba*, pomegranate (*Punica granatum*), grapes (*Vitis vinifera*) and other.

This class occupies the lower limit of spread of tree and shrubbery vegetation. In terms of composition and structure this ecosystem is the most diverse and rich. This class is composed of three types and 45 forms. Biotic communities of this class cover almost entire territory of South, South-East and, partly, North Tajikistan's mid and low-mountains. Significant parts of this ecosystem are actively used for pasturage in winter period. Except for seasonal cuttings, forms of this ecosystem are in relatively stable conditions.

7. Mid and low-mountain savannah ecosystems are composed of four types: xeromesophytic tall grasses with 5 forms of ecosystems; meso-xerophytic grass of tall grass with 6 forms of ecosystems; xerophytic-grain tall grasses with 9 forms, and xerophyte-short grasses with 6 forms of ecosystems. In terms of mountain elevation level, forms of this ecosystem cover highlands of 500 to 2800 meters above sea level. Various vegetation elements of this ecosystem crossing zonal and inter-zonal communities in the range of 500-2800 meters aboce sea level form conditions for entering of numerous flant species with various life forms into composition of other types and classes of ecosystems. By origin, types of this ecosystem are forms of succession from tree and shrubbery vegetation both because of natural causes and because of man-induced impacts. Diversity of the structure of this ecosystem is characterized on one hand by man-induced impacts, on the other hand – by wide range of spread of forms as part of the ecosystem by both elevation and horizontal profile. This ecosystem covers vast territory that is actively used for winter and, partly, summer pasturage.

8. Submontane semidesert and desert ecosystems of Tajikistan cover small areas in North, West and South-West Tajikistan, high terraces of bottom-lands of lover reaches of major rivers – Pyandj, Vakhsh, Kafarnigan, Syr-Darya and Zeravshan.

The main communities of these ecosystems are haloxylon deserts, black haloxylon deserts, calligonum and tangles of perennial saltwort. This class of ecosytems is also a habitat of endemic species of animals of regional and global importance many of which are under the threat of extinction. The main dominants of vegetation cover of this ecosystem are haloxylon (*Haloxylon persicum*), calligonum (*Calligonum litvinovii*), saltwart (*Salsola richteri*), wormwood (*Artemisia tenuisecta*), hammada (*Hammada leptoclada*), uncina (*Carex physodes*), *Halostachys belangeriana*, *Halocharis hispida*.

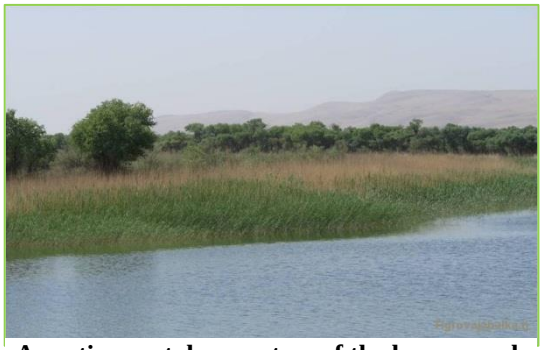
Persian gazelle (Gazella subgutturosa) in the reserved area "Tigrovaya Balka"

Wildlife is represented by forms which are adapted solely to open spaces with thinned vegetation and extremele hot and dry climate. Mammals – Persian gazelle (*Gazella subgutturosa*), eared-hedgehog (*Paraechinus hynomelus*), wild cat (*Felis libyca*). Reptiles: steppe agama (*Agama sanguinolenta*), desert monitor (*Varanus griseus*), snake-arrow (*Taphrometopon lineolatum*), phoorsa (*Echis carinatus*). Perform soil-protective and antierosion

functions. About 30-40% of its territory serves as winter pastures and the bigger part of which is heavily degraded and is developed for irrigated farming. About 30 thousand ha of this ecosystem in South Tajikistan serves as buffer pre-action area of preserved area of "Tigrovaya Balka". Significant territory of samdy-desert ecosystems are reclaimed for cotton cultivation.

In its composition this class has semi-desert and sandy-desert forms of ecosystems. Iptimal geographical position of this class serves as an advantage factor for successful farming. That is why communities of this ecosystem are heavily restructurised as a result of man-induced impact. Significant territory of these forms of ecosystems is used for pasturage and as arable irrigated lands since old times.

9. Submontane aquatic and semi-aquatic (tugay) ecosystems include coastal semi-aquatic territories which mainly occupy shores of major rivers (oasises of rivers Sir-Darya, Kafirnigan, Vaksh, Surkhob, Yakhsu, Pyandj) and some minor rivers of Tajikistan. Despite "belt-like" position of these ecosystems along river shores the role of the latter for ensuring of sustainable and balanced development of desert and savannah ecosystems is very important. In these ecosystems there are formed optimal conditions for migrating wetland and natatorial animal species. These ecosystems are the most stable in conditions of climate change. In the past many tugay ecosystems have been seriously transformed as a result of expansion of the area of reclaimed lands. Tugay (and sometimes tugay forests), meadow-boggy (in lower reaches), aquatic and semi-aquatic ecosystems are of great importance for maintenance of global environmental balance and regulation of population of natatorial animals of Eurasia which overwinter in here.



Aquatic-coastal ecosystem of the lower reach of Vakhsh river

In terms of presense of biomass tugay ecosytems are equal to sub-tropical forests of South Asia. On Earth full tugay ecosystems are preserved in reserved area "Tigrovaya Balka". 645 species of meadow-boggy and sandy-desert plants can be found in these ecosystems.

The main dominants are Asiatic poplar (*Populus pruinosa*), oleaster (*Elaeagnus angustifolia*), desert thorn (*Lycium dasystemum*), cattail (*Typha angusti-folia*), cogon (*Imperata cylindrica*), cane (*Phragmites communis*), sugar cane (*Saccharum spontaneum*), tamarisk (*Tamarix hispida*), rush (*Juncus articulatus*) and other. The most typical bird species of this ecosystem are egret and grey heron (*Egretta alba, Ardea cinerea*), bittern (*Botaurus stellaris*), garganey (*Anas querguedula*), common teal (*A.crecea*), marsh harrier (*Circus aeruginosus*), rail (*Rallus aquaticus*), moorhen (*Gallinula chloropus*), pheasant (*Phasianus colchicus*), pigmy cormorant (*Pholacrocarax pugmeus*), common cormorant (*Ph.carbo*), snake eagle (*Circaetus ferox*) and other. Common animal species of tugay ecosystems are jungle cat (*Felis cnans*), jackal (*Canis aureus*), Bukharian deer (*Cervus elaphus bactrianus*) and other.

Asiatic pooplar communities (*Populus pruinosa*) in the reserved area "Tigrovaya Balka"

Biodiversity of water reservoirs: mountainous arctic-alpine forms of uncina (*Carex diandra, C.oliveri, C.stenocarpa, C.parva*), cobresia (*Cobresia pamiroalaica, C.capillifolia, C.persica, C.stenocarpa*), buttercup (*Ranunculus songoricus*), forms of chamomile (*Primula capitellata, P.kaufmanniana, P.algida, P.farinose* and other). The main aquatic and semi-aqatic species of boggy places of tugay are meadow pine (*Equisetum arvense*), narrow-leaved cattail (*Typha angus-tifolia*),

potomogeton (*Potomogeton crispus*), pimpernel (*Anagalis arvensis*), uncina (*Carex orbicularis*), common reed grass (*Phrag-mites communis*) and many more.

Among 330 species of higher plants 145 are typical for mountainous and high-mountainous water reservoirs.

10. Weed-ruderal ecosystems can be devided into weed and ruderal types. However, there little difference between the two. In conditions of weed ecosystems only native vegetation communities become overgrown by super-weeds or invasive species. In the case of ruderal ecosystems degradation of biodiversity can be observed, but not entire territory is overgrown by weeds and alien species.

11. Agricultural ecosystems are acquired lands which are mainly used for cultivation of domestic crops, gardens, and fodder plants. In certain conditions agricultural ecosystems can be rehabilitated into other ecosystems.

12. Residential areas. Things are worse in residential ecosystems. Renewable natural components are almost fully destroyed in here. Dominance in this ecosystem is taken by artificial objects.

Depending on geographical location, its composition and structure aquatic and semi-aquatic ecosystems of Tajikistan can be classified as high-mountainous lacustrine, high-mountainous riverine, mid-mountainous limnetic, temporary non-perennial water streams with bitterish-brackish water, coastal-aquatic, semi-aquatic, aquatic-boggy types which ensure stability and enhance vitality of all ecosystems of Tajikistan in almost all geographical belts.

By reference to real environmental conditions afield, on the basis of evaluation of vegetation status, its spread by types and forms of landscapes, identification of dominant indicative species and their resistance to internal and external factors and to ecological processes, ecosystems of Tajikistan vary in the level of their geographical location, character, character of management of natural resources and the level of man-caused load. On the basis of these features ecosystems are devided into classes, types, sub-types and forms. In the system of classification of ecosystems provided by us we have used simplified scheme which is based on hierarchical approach, i.e. from the taxon of the highest level to the lowest. An analysis of value of ecosystems is provided in tabular format in accordance with the scheme presented above (Table 3).

Table 3

Qualitative and Quantitative Specifications of Ecosystems of Tajikistan

Name of ecosystem	Useful features of ecosystem	Geographical position	Percentage ratio to the total area of the country
1. Mid and low-mountain savannas	The main valuable communities of this ecosystem are tall grasses and hogweed/mixed-herbs/shrubbe communities. The significant part of wild animals and insects inhabit in these ecosystems during the summer period of dormant period.	Widespread in South and North of Tajikistan	6.99% of the total area
2. Submontane semi-deserts and deserts	Endemic animal species of regional and global significance and many of which are in danger of extinction can be found here. In South Tajikistan there is a nature reserve "Tigrovaya Balka" which covers the area of around 30 thousan ha of this ecosystem.	Cover high terraces of valley parts of lower reaches of major rivers – Pyandj, Vakhsh, Kafirnigan, Sir-Darya, and Zeravshan.	2.38% of the total area
3. Submontane, aquatic and semi-aquatic (tugay)	These ecosystems are of great significance for maintaining the global ecological balance, in particular, in regards to harmonization of numbers of aquatic animals of Eurasia. The reason for this is that some of aquatic birds of the continent come here for wintering.	These include tugay (sometimes tugay forests), К ним относятся тугаи (иногда тугайные леса), meadow-bog (in lower reaches of rivers), aquatic and semi-aquatic ecosystems.	3.50% of the total area
4. Agricultural	The main crop varieties are cultivated on the open land. For the last ten years the area of agricultural ecosystems increased, in particular, because of reclamation of bogharic and irrigated lands, which together with pasture-lands compose more than 4 million ha.	Located in all geographical belts from sultry foothills (300m above the sea level) to high-mountain deserts (3500 above the sea level).	5.94% of the total area
5. Residential	Major residential areas and manufacturing facilities cover the cities of Dushanbe, Khudjand, Isfara, Kulyab, Kurgan-Tube, Tursunzade. The urbanization zone widens around the cities. Environmental load per are unit increases, and stabilization methods become more complex.	Located in the most sensitive areas of natural environment (forests, river banks, lakes, water reservoirs, etc.).	1.60% of the total area
6.Ruderal	Within ruderal ecosystems it is noticed the shift of typical zonal ecosystems to inter-zonal, in majority of cases from lower zones. The composition of flora in ruderal ecosystems includes 690 species and 30 communities.	Can be found in all areas of active operations of men. They are particularly well expressed in the areas of animal breeding.	2.52% of the total area
7. High-mountainous cryophyte	Have great signigicance as climate forcing and environmental factors on the regional and global levels. The main water resources of the Central Asian region are being formed in here. No more than 16-17 species of	Cover highlands of the country, significant part of East and West Pamir.	20.27% of the total area

	flower plants can be found in cold and cliffy conditions of this ecosystem.		
8.High-mountainous hemixerophite	Are used for summer pastures, tourism and hunting friendly. With the increase of anthropogenic impact on flora and fauna the pastures significantly degenerate. In turn, this leads to limitation of habitat and reduction of number of wild animals.	Cover immense aras of East and West Pamir, can be found as fragments in the basin of Zeravshan river.	23.76% of the total area
13. Mid and high-mountainous (subalpian) cold temperate (continental)	This ecosystem is intermediate between forests (lower limit), subnival and nival (upper limit) ecosystems. As a result of anthropogenic impact many communities of this ecosystem become secondary. The productive capacity of plant stand in meadow and meadow-steppe ecosystems is 5-6 times higher in comparison to others.	Can be found as fragments in all mountain chains of Tajikistan, and, sometimes, in the form of great belts.	22.02% of the total area
14.High and mid-mountainous conifer forests	The main areas of juniperic forests and open woodlands decrease 2-3% annually. Around 30% of their species diversity is in danger of extinction. The most valuable communities are mixed-shrubby/steppe and mixed herbs/meadowy juniperic forests.	Compose around 50% of the total area of the country's forest cover. Widespread in North Tajikistan, within Kuraminsky, Turkestan and Zeravshan mountain chains.	5.59% of the total area
15. Mid-mountainous mesophile forests	Have socio-economic role (collection of fruits and berries) and maintain the environmental balance. The most full-scale walnut-maple forests are located in Sarikhosor, Childukhtaron and Dashtidjum reserved forests.	Widespread across the country except North and South Tajikistan.	1.40% of the total area
16. Mid and low-mountainous xerophytic light forests	In dry and hot areas pistachio woodlands maintain water-regulation function and are the optimal habitats for wild animals of arid zones. The large part of areas previously taken up by pistachio communities (up to 80%) are now overgrown with bushes.	Cover immense areas of South and West Tajikistan, small fragments of these can be met in North Tajikistan.	4.06% of the total area

In the process of development of ecosystems' specifications many important factors were taken into consideration. These include the inter-relation of main factors of the environment, the developmental character of flora, soils, and the location of ecosystems on the landscape, all of which play an important role in the forming of environment. The regularity on location and development of ecosystems was developed based on both the vertical mountain road, and on their positional application depending on change of natural settings, external and internal impacts, and also the services of ecosystems to the local population and the input of particular components of biodiversity to the national economy. Herewith, there were ultimately used the main habitat forming external factors, the mechanisms of their interplay, in particular, allelopathic and coevolutional adaptation mechanisms of living organisms, communities inhabiting the areas. There were established the main directions of successional transitions and processes. The mechanisms of preservation, rational use and planning while gaining benefits from ecosystem services were widely used.

As a part of an ecosystem the main products for satisfaction of day to day first needs of the population are the natural biological resources (food and medical plants, wood, fauna, timber

crops, forage plants, pastures and their derivates). At the present time the level of living of 70% of the population in mountain regions of Tajikistan depends on the productivity of these biological resources. The analysis of biological resources and the co-relation of the population to these are presented in the table below (Table 4).

Table 4

The State of Biodiversity within the Main Ecosystems of the Republic of Tajikistan

Name of the Ecosystem	Altitude	Area (mln ha)	Population Size (thousand)	Number of Species		Level of Disturbance			State Estimation		
				Animals	*Plants*	*High*	*Mid*	*Low*	*Good*	*Neutral*	*Poor*
1. High-mountainous cryophyte	above 4500	2,9	Temporary (alpinists, tourists) around 1.9	180	16-17	-	-	x	x	-	-
2. High-mountainous hemixerophite	3500-4500	3,4	81.9	1100	650	-	x	-	-	x	-
3. Mid and high-mountainous (subalpian) cold temperate (continental)	3200-4000	3,15	150,0	2400	730	-	x	-	-	x	-
4. High and mid-mountainous conifer forests	1100-3000	0.8	20,0	2900	1280	-	x	-	-	x	-
5. Mid-mountainous mesophile forests	1300-2400	0,2	50.0	3390	1700	x	-	-	-	-	x
6. Mid and low-mountainous xerophytic light forests	1100-2000	0,58	20,0	5950	2400	x	-	-	-	-	x
7. Mid and low-mountainous savannas	600-1600	1,0	1443,0	4500	450	-	x	-	-	x	-
8. Submontane semi-deserts and deserts	400-600	0.34	475,1	2000	520	-	x	-	-	x	-
9. Submontane, aquatic and semi-aquatic (tugay)	300-4200	0,50	90,0	4000	400	x	-	-	-	x	-
10. Ruderal	600-2500	0,360	100.0	2000	70	-	-	-	-	-	-
11.Agricultural	350-3000	0,85	2070,0	3000	900	-	x	-	-	x	-
12. Residential	400-2000	0,229	1700,0	2000	250	x	-	-	-	-	x
Total:		14.31	6201,9								

Depending on number and state of biodiversity species there will be designed the plan of action, management plan, and the strategy of preservation and sustainable utilization of biodiversity. The forecast on the expected level of their usefulness and viability of their use will be made. Below please find the summary list on the number of wild animals on the territory with respective preservation duty and rational use (Table 5).

Table 5

The Balance of Animal Species in the Natural Areas of Protection of Tajikistan (as of 2010-2013)

#	Animal Species	SNR Tigrovaya Balka	SNR Ramit	SNR Dashtidjum	SNR Zorkul	NP Sarikhosor	HNP Shirkent	TNP	Total
1	Bukharian deer	140							**140**
2	Red sheep (Urial)	30		223					**253**
3	Markhor			239					**239**
4	Wild sheep (Argali)				830			1125	**1955**
5	Persian gazelle (Gazella subgutturoza)	60							**60**
6	Siberian ibex		75		715	30	30	4190	**5041**
7	Wild boar	120	227	571		200	120	354	**1528**
8	Snow leopard		5	8	3	1	1	28	**47**
9	Bobcat		8	3	3			23	**43**
10	Jungle cat	60							**60**
11	Hyena	18							**18**
12	Bear		49	9	2	3	6	24	**93**
13	Wolf	20	45	37	38		12	104	**243**
14	Jackal	130		152		5	5	50	**242**
15	Fox	230	43	262	49	40	40	245	**891**
16	Otter	16	12	12	32		8	38	**103**
17	Stone-marten		35		30		23	58	**144**
18	Badger	15	28	8		20	10	78	**160**
19	Porcupine	30	63	262		20	22		**365**
20	Marmot		93		1 800	20		8850	**9921**
21	Hare	140	24	125	960	30		4515	**5790**
22	Nutria	20							**20**
23	Snow partridge		193		300 пар		15	1536	**2383**
24	Tibetan snowcock							160	**160**
25	Pheasant	1200		85					**1285**
26	Pigeons		159	300		50	40	1150	**1752**
27	Chukar		1032	3500		80	400	1580	**5647**
28	Bar-headed goose				218 пар			275	**691**
29	Ducks	46 000	91		2000			3140	**51140**
30	**Birds of prey**		**85**					**145**	**230**

Ecosystem Services and the Input of Biodiversity into Welfare and Development

Since 2010 the Republic of Tajikistan is in the state of sustainable economic growth and development. This resulted in 6.5% growth of real GDP in 2010, and 7.4% in 2011. In other words, according to the official exchange rate, republic's GDP was 5642.2 million USD in 2010, and 6523.6 million USD in 2011. (Table 1.33, graphs 1.5 and 1.6)

Over the last years, in the context of Tajikistan biodiversity has become one of the main factors of the increase of socio-economic status of the country's population. It has to be mentioned, that over the last years the income generated from the utilization of biodiversity has had a great impact on sustainable development of the country. The part of GDP generated by forestry was

equal to 6.8 million TJS in 2010 and 7.0 million TJS in 2011. The part of the GDP generated by forestry in 2012 in comparison to the previous year (2010) has increased on 0.4 million TJS. However, despite the existing capacities, the GDP generated by forestry is insignificant. The part of GDP generated by forestry is only about 0.14% of the total GDP generated by agricultural production. Despite the fact that the Republic of Tajikistan is an agricultural country, the GDP generated by forestry and agriculture is only 19.6%. Over the last years the income generated by agricultural production, hunting and forestry totaled in 14938.7 million TJS, which equaled to 29.1% of GDP for 2013. Fishery and fish breedin totaled in 12.9 million TJS.

This can be explained by saying that more than 80% of pasture grounds and more than 50% of hay acrage are located in mountainous areas. For the period from 2010 to 2013 country's flora (rational use, pastures and haying) have promoted the increase of number of live-stock up to 8 million animals of dairy-meat and leather-wool directin which created conditions for improved social situation of the rural population. For the past three years, as a result of intensive use of biodiversity and increase of livestock inventory there was produced from 134.4 to 150.7 tons of meat (4.9 million TJS), from 629.7 to 695.9 tons of milk (3.5 million TJS) and from 188.5 to 254.7 millions of eggs (177.8 million TJS) *(all the data provided is valid as of 2012).* Overall, in 2012 the input of biodiversity to the increase of economic and social standing of the country resulted in 186.2 million TJS. For the same period, gardens and vineyards, medicinal plants, edibles and other products partly gathered in nature and partly produced on the newly reclaimed natural ecosystems have increased: from 213.9 to 263.1 tons of fruits, including production of grapes which has increased from 138.7 thousand to 154.7 thousand tons, and which resulted in 190 million TJS of profits. For the same period of one year the profits from drupaceus at average has increased by 7.2 million TJS. The volume of produced wood has increased by 9 thousand cubic meters.

According to statistical data, in 2013 from the area of 120 thousand ha of the national forestry there were collected 140 tons of wild growing fruits (1.5 million TJS), 57 tons of brier (0.2 million TJS), there were prepared 109.8 tons of dried fruits (0.9 million TJS), 267 tons of pistachios, nuts and almonds (6.7 million TJS), 12.3 million tons of honey (0.5 million TJS), 3103 thousand tons dry weight of hay, halm and other types of feed stuff (1.6 million TJS). In total, just for 2012 the cumulative income from the commercialization of agrobiodiveristy and wood products totaled in 28.8 million TJS (see Table No.1.4).

Besides, on account of utilization of flora (medicinal plants) there was collected 5.6 million TJS. Therefore, economic efficiency of the country's plant life in 2012 was close to **220.6 million TJS.** Over the last three years economic efficiency of utilization of the country's flora amounts to **660.8 million TJS.**

The tendency of increase of the overall income generated by the country's biodiversity, particularly, forests, can be observed. In comparison to the previous year (2011), in 2012 the overall income from commercialization of forest products has increased over 3 million TJS. The utilization of traditional species accounts for more than 270.1 million TJS every year.

Besides, on account of utilization of country's biodiversity – fauna (hunting) there was collected 23.5 million TJS (eco payments). In total, ecology-economic profits from the use of biodiversity accounts for **514.1 million TJS.**

In Rio+20 Declaration it was proposed to countries and the private sector to expand their obligations in regards to accounting of natural capital and introduction of the latter to national accounts.

Below is the record of the natural capital, i.e. rationale of the ecological-economic diversity of the country (Table 6).

Table 6

Evolution Summary of Biodiversity Natural Capital of Tajikistan (as of 2013)

№	Sources of natural capital stock	Amount (thousand TJS)
1	Economic value of natural capital of wild animals and birds in SPNAs	**179,105.1**
2	Economic value of natural capital stock of wild animals and birds in public enterprises of forest management and hunting	**254,808.9**
3	Economic value of natural capital stock of Tajikistan' flora	**688,418.3**
4	Economic value of natural stock of Tajikistan's forest products	**529,752.6**
	Sub-total:	**1,218,170.9**
5	*Unaccounted biodiversity products	**712,380.2**
	TOTAL:	**1,930,551.1**

Environmental coefficient includes:

- recreational,
- genetical,
- water-regulative,
- soil-protective,
- cadastral values of biodiversity.

As of 2012 the overall cost of biodiversity's natural capital – wild animals and birds in SPNAs, and public enterprises of forest management and hunting according to the market value within Tajikistan equals to 433.9 million TJS. Taking into consideration the entire territory of the country, as of 2012 the overall cost of biodiversity's natural capital equals to approximately 979.8 million TJS (206.1 million USD).

This includes:

- Actually utilized biodiversity – 433.9 million TJS,
- Biodiversity stock (unused) – 545.9 million TJS.

Biodiveristy of SPNAs has great economic importance. For the purposes of rational utilization of biodiversity of SPNAs the Government of the country every year determines the quota for hunting on animals introduced to the Red List. Annual economic value generated by biodiversity of SPNAs (hunting in 2012) equals to 2.9 million USD.

According to the results of records of wild animals in SPNAs and the expert analysis, as of 2012 the economic value of wild animals equals to 210903.5 thousand TJS. (See Tables 1.20, 1.21).

This consists of:

- "Tigrovaya Balka" reserve 3,299.7 thousand TJS
- "Ramit" reserve 1,202.3 thousand TJS
- "Dashti Dzhum" reserve 48,784.0 thousand TJS
- "Zorkul" reserve 51,340.5 thousand TJS
- "Sarikhosor" historical-natural park 266.5 thousand TJS
- "Shirkent" historical-natural park 260.4 thousand TJS
- National park 105,750.1 thousand TJS

Accordingly, input of and income generated by utilization of country's biodiversity equals to 514.1 million TJS (111.6 million USD). These include the input of biodiversity to the economic basket of the country – 186.2 million TJS, and income from utilization of biodiversity – 327.9 million TJS.

This analysis evidences that changes in biodiversity greatly influence the socio-economic standing of the country's population.

Status of Biodiversity and Tendencies in the Republic of Tajiksitan

Considering the importance of biodiversity for the environmental-economic development of the country, the policy of the Government, its environmental bodies and specificity are aimed at preservation and sustainable use if biological resources. At the present time, in the view of implementation of strategic goals on sustainable preservation and use of biodiversity, the Government has adopted decisions on granting the special priority to the issues in this sphere.

In conditions of transitional economics the use of natural biological resources by population with the aim of improved welfare has significantly raised (forests, pastures, wetlands). Life and livelihoods of around 80% of the population residing in mountainous areas depends on the composition and structure of biodiversity.

A swell in population and its migration into mountainous areas of the country create an additional burden on the state of biodiversity and the fragmentation of ecosystems. It happens due to inclusion of new areas rich of biodiversity into economic turnover. Because of a swell in population in mountainous areas and herds expansion the areas of pastures tapers and the level of productivity of land decreases. All these lead to degradation of the state of biodiversity and incomes of the population.

Notwithstanding that the policy of the country is aimed at sustainable preservation and rational use of biodiversity, in the light of development of the private sector, the mechanisms of environmentally sustainable development, and country's natural and geographical peculiarity were not taken into consideration. This leads to increased man-induced impact and excessive use of biological sources, disruption of habitats, land degradation, environmental pollution. It is hardly possible to manage the improvement of the state of biodiversity.

Pine tree forest, *juniper zeravchanica*

Forests and forest areas are one of the main indicators of the state of biodiversity in ecosystems. That is why the wide range of expansion of forest ecosystems from 400-500 to 3000 meters above sea level at the mountain profile does not only very accurately reflect the state of the forrest ecosystems, but other components of biodiversity in other zonal ecosystems as well (Table 7).

Table 7

Trends in Forest Development for the Period of 1991-2004

Main indicators	Years						
	1991	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**
Gross area of forest resources (including forests transferred into long-term use), million ha	1.7	1.8	1.8	1.8	1.8	1.8	**1.8**
Area covered with forests, thousand ha	390	408	410	410	410	410	**410**
Total stock of forest plantings, million cubic meters	5.7	5.3	5.3	5.3	5.3	5.3	**5.3**
Forest-lands percentage (%)	2.7	3.0	3.0	3.0	3.0	3.0	**3.0**
Reforestation, thousand ha	4.0	3.1	2.9	1.7	2.3	2.2	**2.3**
***including*:**							
Forest planting	3.9	2.2	2.1	1.4	1.7	1.5	**1.7**
Promotion of natural forest regeneration, ha	**0.1**	**0.9**	**0.8**	**0.3**	**0.6**	**0.7**	**0.7**

***Source**: Yearbook of the Republic of Tajikistan, Dushanbe, 2005*

Table 8

Forests and Othre Wooded Areas

Name	Units	2010	2011	2012
1.Forests	sq. km / or 1000 ha	412.4	412.4	**421.1**
- including protected	%	100	100	**100**
2.Total area of forest and other wooded areas	sq. km / or 1000 ha	410	410	**421.1**
3.Ration of the total area of forests and other wooded areas, and the total area	%	3	3	**3**
4.Stocks and composition of forests:				
-Conifers	1000 sq. km ^{3}	150	150	**150**
-Foliar	1000 sq. km ^{3}	257	257	**257**
5.Protective forests and other wooded areas	sq. km / or 1000 ha	410	410	**421.2**
6.Ratio of protective forests to the total area of forests and other wooded areas (% from cub.meters)	%	90	90	**90**
7.Ratio of forests and other wooded areas under the management plan (% from cub.meters)	%	30	30	**30**
8.Area of reforestation	sq. km / or 1000 ha	0,0	0,0	**0,0**
9.Naturality of forests and other wooded areas				
10.Forests not impaced by human activities	sq. km / or 1000 ha	320	320	**320**
11.Seminatural forests	sq. km / or 1000 ha	80	80	**80**
12.Man-made forests	**sq. km / or 1000 ha**	**10**	**10**	**10**

***Source**: Public Office for Forest Management and Hunting CEP (Committee for Environmental Preservation), 2012*

Table 9

Area and Stocks of Forest Plantings

Main indicators	1991	2008	2009	2010	2011	2012
Total forest area (including forests transferred into long-term use), million ha	1.8	1.8	1.8	1.8	1.8	**1.8**
Area covered by forests, thousand ha, total	408.5	410.0	410.0	412.4	412.4	**421.1**
Including those under the supervision of forest management bodies	392.3	402.0	402.0	408.0	408.0	**408.0**
Total stocks of forest plantings, million ha	5.66	5.10	5.10	5.10	5.10	**5.10**
Forest-lands percentage (%)	**2.7**	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**

***Source**: Yearbook of the Republic of Tajikistan, Dushanbe, 2012*

Table 10

Preservation and Rational Use of Forest Resources (thousand ha)

Main indicators	1991	2008	2009	2010	2011	2012
Reafforestation	4.0	1.0	1.9	2.2	1.1	**2.1**
including:						
Forest planting and seeding	3.9	1.0	1.9	2.2	2.1	**2.1**
Promotion of natural forest regeneration	**0.1**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

***Source**: Review of data provided by CEP RT, 2012*

Table 11

Protection of Forests from Pests and Deceases (thousand ha)

Main indicators	1991	2008	2009	2010	2011	2012
Protection of forests using biological technique	8,7	7,8	7,8	7,3	7,4	**0,2**
Of which:						
Land-based control measures	6,7	7,6	6,5	6,4	6,4	**9,2**
Land-based chemical control measures	**5,2**	**5,4**	**5,4**	**5,4**	**5,4**	**0,0**

***Source**: Public Office for Forest Management and Hunting CEP (Committee for Environmental Preservation), 2012*

For planning of activities dedicated to preservation and rational use of Tajikistan's fauna the periodical registering of number of wild animals, the offset of which is presented by 12-year profile on the area of Tajikistan is conducted (Table 12).

Table 12

Abundance Dynamics of Wild Animals and Birds (number of species)

Name	1991	2008	2009	2010	2011	2012
Bukharian deer	335	160	31	33	43	**44**
Dappled deer (sika)	390	180	182	183	180	**168**
Persian gazelle (subgutturoza)	140	75	-	-	-	**-**
Wild boar	4250	1677	7299	7351	8019	**9367**
Capricorn	4600	6592	4804	5614	5524	**5166**
Markhor	1351	221	159	171	143	**198**
Bear	335	41	641	1017	1168	**1075**
Wolf	650	950	1674	2095	2571	**2875**
Snow leopard	59	50	146	196	197	**148**
Bobcat	60	54	100	75	77	**131**
Fox	4740	1044	6216	5865	7125	**6589**
Badger	380	1730	2024	2122	2465	**2619**
Porcupine	1260	1400	1408	1585	2006	**1879**
Hare	5500	12100	15076	15570	18129	**16995**
Nutria	2440	390	20	22	165	**165**
Jackal	630	200	782	1087	2244	**3117**
Otter	38	40	84	122	313	**333**
Argali	4000	4200	2268	2400	2450	**2980**
Marten	790	1300	1870	1881	1686	**1709**
Marmot	…	8150	10555	11068	11738	**12619**
Peasant	565	3650	1091	1035	1613	**1401**

Chukar	44,5	35,0	28,4	32,2	37,3	**41.2**
Natatorials (thousand)	**35**	**7.5**	**12.9**	**6.1**	**7.6**	**11.6**

***Source**: PO SPNA CEP RT, 2012*

For the purpose of improved prosperity of the local population, regulation of population of wild animals, support to the environmental authorities, and the input to the country's economics, there are 3-4% of wild animals are being taken out of their natural habitats every year (Table 13).

Table 13

Dynamics of Hunting on Wild Species of Animals and Illegal Hunting *(number of species)*

Name	1991	2008	2009	2010	2011	2012
Wild hog	85	650	124	134	142	**198**
Capricorn	30	-	-		15	**124**
Badger	100	35	39	58	22	**20**
Hare	240	300	350	163	248	**472**
Chukar	880	1200	884	827	1754	**1227**
Pigeon	1450	2000	1157	1320	948	**919**
Brown bear	40	40	50	50	30	**20**
Marco Polo's sheep	20	60	70	80	100	**150**
Central Asian tortoise	-	5000	15000	15000	13000	**10000**
Trapping of poisonous snakes	100	80	40	40	30	**-**
Natatorials	**150**	**3000**	**1565**	**1489**	**1570**	**985**

***Source**: SO SPNA CEP RT, 2012*

Review of the State, Tendencies and Threats to Biodiversity

Evaluation and understanding of the inter-relation between preservation and sustainable use of biodiversity and factors leading to degradation of environment, ensures more effective implementation of activities on prevention of decreased productivity of wild flora and fauna. At the present time we do not posses the decent level of information about quantitative and qualitative composition of the entire country's biodiversity. In practice, there is no data base on assessment of state of ecosystems and biodiversity in the country. Due to lack of adequate monitoring system all the existing data is fragmented and most of the times are hardly appropriate for analysis. National measurement and monitoring grids on the components of environment are mostly oriented on pollution assessment, and the less on its consequences. In the past, monitoring of state of ecosystems has been carried out less attentively and was poorly equipped in terms of technical capacity, and sometimes was not carried out at all except of follow-ups on particular animal species and phonological observations in SPNAs in the frames of "Letopisi Prirodi" [Nature Records].

At the moment there is no single, complex and agreed biodiversity monitoring system which would comply with international standards, and would cover both master natural areas (natural parks) and different classes of ecosystems outside of SPNAs. There is no upt—date data base.

Professional systematic approach to the issues of management of biological sources for more effective productivity and respective improvement of socio-economic standing in the regions of Tajikistan is very important. Lack of sustained training facilities results in the fact that graduate students can hardly orient in the issues of the recent species classification. The number of lecturers with academic degrees falls down, and there is a tendency of increasing number of lecturers of middle and senior age. There is a deficit of training and study materials. Unfortunately, the recent scientific developments in the field of biodiversity preservation are

hardly used even in training programs. Therefore, the function of environmental education is oftenly taken up by various environmental NGOs who invite qualified experts on various environmental topics.

Thank to natural vegetation of pastures there are 1 million of cattle stock, 6 million sheeps and goats, 100 thousand horses which are being kept and which consistently support households' budgets of the population. In its turn, this creates jobs, decreases the level of poverty, and ensures food security in Tajikistan and in the region. A major input to the country's GDP is made by sustainable use of wild-growing forest products. The population stores up the products of nuts and drupaceus which naturally grow in forests – walnuts (*Juglans*), pistachios (*Pistacia*), almonds (*Amygdalus*), fruits of crab apple (*Malus*), pears (*Pyrus*), apricots (*Armeniaca*), plums (*Prunus*), cherry plum (*Prunus sogdiana*).

Collection of wild-growing berries has a big importance for the local population – seabuckthorn (*Hippophae rhamnoides*), barberry (*Berberis*), currant (*Ribes*), raspberry (*Rubus odoratus*), hawthron (*Crataegus*) and tens of species of medicinal plants. According to official data the part from their use for economic needs and increase of household budget composes no less than 3% of the country's GDP.

Small part of the population is engaged in hunting and fishing activities. Among game animlas and birds there are 11 mamal species, 36 bird species and 20 fish species. Population prepares leathers of red marmot (*Marmota caudata*), muskrat (*Ondatra zibethica*), fox (*Vulpes vulpes*), badger (*Meles meles*), wolf (*Canis lupus*) and others. Incomes generated by hunting activities and by use of biodibersity are deployed for improvement of food security and reduction of poverty of the population. Improved country's capacity in terms of genetic resources is aimed at establishment optimal conditions of sustainable development and use of natural sources, as well as conduction of selective activities and biotechnology.

At the present time the country lacks regulative acts dedicated to preservation of genetic stock of wild plants, regulation of inter-relations in the area of biotechnology and access to genetic resources, and use of genetically modified organisms.

In conditions of transitional economics, the population began to actively involve natural biological resources (forests, pastures, and waterlands) for the purpose of development of mountainous areas and for improved welfare. The tendency of involvement of biological sources and their input into the country's economics has significantly increased for the past 3-5 years, and it constantly increases. This process began to negatively influence on biodiversity resources. Some areas are under the threat of degradation and are already in need of rehabilitation measures for unique species of biodiversity and ecosystems. Under the threat of degradation there are first of all valuable genetic resources, particularly, forests, fruits and nut bearing species.

Pasture lands which can be seen almost in all altitudinal belts and which are important for the economic welfare of the population are significantly converted by cattle-grazing. This has led to degradation and substitution of zonal flora with secondary, derivative flora. The environmental load is particularly high during autumn-winter-spring ephemeral-ephemeroid and absinthial pastures of South and North Tajikistan, and summer pastures of Kuramin crest (north-east part of the country).

The level of pastures degradation near residential areas is critical. Even remoted areas experience full transformation of the composition of plant formation. The productivity of fodder mass constanly reduces. Weed invasion on pastures can be observed. Biotopes decay leads to intensification of number of biodiversity taxons, in general. Genetic sources of many of the local plant species are under the threat of extinction. The productivity of fodder mass of plant stand decreased up to 5-10 times.

Under the high load of pasturage bulbous bluegrass, sedge, and absinth have disappeared from absinthial-ephemeral patsures. Peganum and some one-year cereals have appeard. Thereat,

productivity of dry fodder mass reduced from 2.5 to 0.3 center/ha.

Under extensive pasturage the grazed grasses almost completely lack generation and sprouting, their morphostructure is changed; plants become low-growing, above-ground sprouts transform, leaves dwindle up to 2-3 times, the height of grass stand reduces up to several times (in hig-mountain pastures from 40 to 2-5 cm), above-ground plant mass is mainly concentrated in lowest layers of the soil.

Mesophile forests area dwindles every year, and reforestation activities are almost completely lacking. Together with dwindle of forests around 50% of flora and fauna is under the threat of extinction. In most of the cases it is caused by significant man-made loads related to expansion of agricultural areas. Every year because of extensive use of the areas of these ecosystems as pastures and hayfields the natural regeneration of pistachio has almost completely stopped. As a result of active exploitation, forest areas are being replaced with secondary communities. Close location of population centres, bogharic plantings and pasture lands creates pre-conditions for decline of the composition of communities and reduction of the areas of xerophytic light forests.

However, over the past years due to socio-economic constraints there is a slow refill of collection materials, plant selection stations, experimental plots, nurseries, botanical gardens, breed livestock farms, state breed livestock stations and others are in poor conditions. These increase the risks of loss of national wealth from biodiversity genetic resources.

Over the last 15 years as a result of soil degradation (increase of the level of ground water, salination, soil erosion) the total area of agricultural lands has reduced over 3.2% (24.7 thousand ha). This fact is especially critical taking into consideration the high percentage of mountains and land-poor valleys on the territory of the country. Because of salination, boggin, earthfalls 4-5 thousands ha of irrigated lands are empy, 70450 ha of land are in inadequate conditions. Other factors also have influence over the state of agricultural ecosystems.

It has to be mentioned that over 57% of rural and 40% of natural grasslands of the country are exposed to degradation and erosion (soil, water and, particularly, pastures). From this amount, 30-35% is in extremely critical conditions. Almost on all pastures the process of worsening of cultural-technical conditions is active, which is even more active on the pastures of Rasht and Darvaz valleys. Significat plots of natural resources are transformed into acres and roads, which is the reason for erosion of soil and degradation of the region’s ecology.

Over the last decade the process of forest degradation and de-aforestation has significantly entensifid in various areas of the country. Moreover, this process can be observed in the areas of habitat of valuable wild fruits and genetic resources. Not only forest areas are suffering, the entire composition of ecosystems is under transformation. Natural ecosystems are degrading, and in some areas have been already replaced with redural and man-made.

Poverty of the population in conjunction with lack of land title lead to increased illegal deaforestation and collection of non-wood forest products above the permitted level. The reasons for these are the search for income (wood products), for additional food resources (pits, fruits, food plants) and to support the health of the population (collection of medicinal plants).

Degradation of forests, Central Tajikisan

The environmental consequences of deaforestation can be observed in almost all natural zones with forest ecosystems.

Influencing Factors and Measures on Preservation of Biodiversity

The country's overall development and its socio-economic welfare are directly linked to natural resources, and, primarily, to biodiversity resources. The consequences of loss of biodiversity for Tajikistan, as well as other developing countries, can be significant enough. The major part of the population is still more or less dependent on biological resources – for their nutrition, income and welfare.

Over the past years there have appeared numerous acute tasks on rational use of natural resources (pastures and haylands) which require direct solutions. The resolution of these tasks has strategic importance not only for land utilization, reduction of degradation of natural resources, preservation of flora biodiversity, soil erosion, improved environment, but also for development and sustainable management of natural resources of the country. At the present time, except of high-mountanous, sub-alpian and alpian pastures the regressive development of natural flora has been constantly observed: a) regression process, self-development of plant communities and flora, in general; b) reduction of the number of eatable plants in the community; в) reduction of phytomass of plants, the main reason of which is unsatisfying cultural-technical state of pastures. In our opinion, all these are caused by economic activities of the local population on the sites.

The loss of forest resources is one of the factors of degradation of life-sustaining activities of rural population because the local population uses forest resources for woods and construction works, collects medicinal plants, keep bees. Reduction of these resources will not only have impact on individual households, but the economics of these areas, in general.

Medicinal plants serve as a basis for traditional medicine which is significantly widespread in remote mountainous areas. Thus, the reduction of species diversity will impact the health of the local population.

The root causes and influencing factors are:

1. High rate of population growth;
2. High rate of dependency of the population on natural biological resources (from 20 to 80% in different regions);
3. Domination of consumer attitude to biodiversity by the population of Tajikistan;
4. Transitional character of market economynd and new forms of state regulation (but not provision, as was prior to 1990s);
5. Major heterogeneity of socio-economic conditions over the areas in the country:
    a. Unequeal distribution of the population;
    b. Great variety of types of economic management in the regions (agricultural, production, poorly developed in economic terms); and
    c. Traditional forms of economic management and specific attitude to some biological resources and biodiversity in remote mountainous areas.
6. Specific features of economic character:
    a. Lack of real evaluation of biodiversity as the most valuable element of the national welfare;
    b. Low efficiency of economic and financial mechanisms of preservation of biodiversity; and
    c. Existence of powerful motivation in the form of significant and quick income by means of overexploitation of natural resources.
7. Insufficient development of the system of public monitoring and statistical recording in the sphere of utilization of natural resources and environmental preservation.
8. Noncompletion of land and administrative reforms complicate the operation of SPNAs, influence the efficienty of state control, reduce the capacity for improvement of SPNAs

operation, accentuation of buffer areas, and complexifies effective introduction of new regimes of environmental management on the basis of territorial zonation.

The Main Threats to Biodiversity of the Republic of Tajikistan

Genetic resources promote the maintainance of effective of agriculture and higher economic gains on the basis of improved qualities of breeds and cultivars without additional land invasions. Local species are also important for animal breeding. They are more productive and less exposed to deceases. Entire departments of the TAAS (Tajik Academcy of Agricultural Sciences) work on improvement of the methods of plants animal species fore more effective and productive economic management, and also for creation of species with improved resistance to pests and deceases, as well as to vulnerabilities in conditions of climate change.

However, now due to annual increase of animal breeding in the country there are issues related to environmental conservation. For instance, in winter pastures in absinthial-ephemeral ecosystems under high loads of pasturage bulbous bluegrass, sedge, and absinth have disappeared from plant stand. Peganum and some one-year cereals have appeard. Thereat, productivity of dry fodder mass reduced from 2.5 to 0.3 center/ha. Productivity decline and weed invasion of flora can be observed in the places of excessive grazing; valuable wild-growing species and even floral cenotypes (tugay, some types of deserts) are being wiped out.

The main reasons and threats are:

- Weakness of administrative mechanisms on implementation of laws and regulations;
- Attitude towards forests as to only the object of economic resources and poverty of the population;
- Unresolved/disputable issues of land utilization in forest areas which causes conflicts and lack of control and responsibility;
- Excessive forest clearance above the permitted norm (salvage cutting) for commercial reasons (for sale)
- Unefficiency of inter-sectorial cooperation in solution of forest preservation issues, primarily, energy sector, agricultural sector (pastures) and others.

Cattle drive to winter pastures

General Description of Negative Impacts on Biodiversity and the Main Reasons of Such

The dynamics of socio-economic transformations, particularly, in regards of restructuring of agricultural enterprises in Tajikistan is directly impacting on the processes of preservation and sustainable use of biodiversity. Significant part of the country's biodiversity which composes of thousans of species is mainly preserved in long-cultivated landscapes of Tajikistan's agricultural ecosystems. Some agricultural ecosystems are changed natural ecosystems, oftenly with destroyed vegetation cover and acutely lean floristic composition.

Irrational use of pasturages resulted in significant reduction of their capacity, and intensified pastures degradation.

The processes of desertification of pastures and weed invasion, worsen quality of plant formation, decrease in species diversity, and reduction of the degree of projective cover can be observed in some areas.

Thus, we can observe active degradation of grass and scrub vegetation in some areas of South Tajikistan. Significant changes in valley flora can be observed in North Tajikistan. Decrease of

productivity and weed invasion of pastures flora can be observed in Central Tajikistan in the basins of Vaksh, Obi Mazar, Zeravshan and Surkhob rivers. The competency of these rivers does not match the scheduled capacity which can result in acute transformation of pastures' flora in these areas. Overgrazing results in direct extermination of valuable wild-growing species and even some floral cenotypes (tugay, some types of deserts).

According to the data of State Land Fund, as of 1 January 2012, 706.9 thousands ha of pastures are waterlogged (mainly, winter pastures). The vast majority of summer pastures are supplied with water through rivers and streams. However, due to lack and irregularity of water supply only around 1 million ha of pastures can fully utilized. Unemployed stock of pasture lands is mainly located in Garm, Komsomolobad rayons and GBAO (around 192.0 thousand ha).

At the moment, total stock of grazed dry fodder mass of native pastures and hayfields of Tajikistan is equal to 1.5 million tons. In the longer term, in 2020, the area of pasture lands will reduce on 227 thousand ha due to introduction of new objects. Moreover, the increae of livestock is scheduled: sheeps and goats – up to 2.5 millions, cattles – more than 20 thousands, horses – up to 50 thousands in addition to already existing.

According to estimates, by 2020 due to decrease in productivity and degradation the area of native pastures can reduce from 3.5 to 3 million ha or even less. Such tendency of increase of the load on pastures requires implementation of practical measures on improvement, and strengthening the land capacity of native forage lands, particularly, winter pastures with yield capacity no more than 1.5-3 dt/ha.

At the same time, the country still possesses internal resources and opportunities for boosting the development of the national economics, and on this basis to ensure the consequetive improvement of living conditions of the population.

In 2013, the income of the population increased up to 18%, and monthly salary of an employee – up to 21.5%. In 2012, the level of poverty reduced from 38.2% to 35.6%. For the matter of strengthening the achieved development, boosting of the process of sustainable progress of the country's economics, the significant part of the socio-economic progress progress was achieved through active utilization of biodiversity of native pastures, forests, meadows, valleys, savanna ranges and deserts.

Despite the fact that in 2013 the production of agricultural products increased on 7.6% in comparison to 2012, and its economic value has reached 16.7 billion TJS. In future it is predicted that the rate of development of the agricultural sector will increase because the major part of the population of the country lives in rural areas and traditionally actively uses biodiversity for improvement of socio-economic conditions and simply for satisfaction of their needs.

The Main Resons of Loss of Biodiversity and its Impact on Economics

The Republic of Tajikistan is under negative impact of great number of various natural limitations that are mainly related to climatic changes, soil degradation, lack of energy reserves and others which are the main factors of degradation of biodiversity. Meteorologic monitoring has indicated that the average temperature in Central Asia increases from 1 to 2 degrees Celcius in the course of the past 100 years (source: ICCCC 2007). Current prognosis indicates that in Tajikistan the general temperatures will increase at average on 0.1-0.2 degrees Celcius in the course of a decade (source: UN FCCC 2008). The increase of winter temperatures will be equal to 2 degrees Celcius by 2050 (source: SO on Hydrometeorology CEP 2008). At the same time, it is expected that asperity of such natural disasters like drought, flood, creeps and others will worsen. In the past years the reduction of the area of major glaciers in Tajikistan has been observed. Climate change multiplied with man-made impact will become the main reasons of the degradation of biodiversity. In practice, country's biodiversity covers various environmental conditions. And species variety has adapted to extreme conditions. In these conditions, modern

man-made factor particularly, active use of forest, pastures, haying, and weak regulation of these are one of the main impacting factors on degradation of biodiversity.

Other factors which are influencing the degradation of biodiversity are various types of sopil degradation (erosion, saltification, polluition, loss of soil organic matter, etc.) which promote further degradation of biodiversity by causuing creeps (destroying villages, roads, agricultural lands, watering and irrigational systems).

Significant mountainous and submontane areas of Tajikistan with globally significant ecosystems, diverse flora and fauna have great economic importance. These areas face constant threats of unstable land use and irrational use of land resources.

The main reasons of worsen conditions of valuable pinewiids are:

- Intense explitation and cutting-down in the course of several centuries;
- Total absence of biotehnical activities;
- Lack of monitoring and forest farming;
- Intense unregulated pasturage;
- Slow growth of juniper; and
- Lack of pine-tree nurseries.

Subsequently, degradation of the state of biodiversity will become the reason of:

- Extinction of traditional cultivars;
- Extinction of species biodiversity;
- Extinction of natural landscapes;
- Extinction of genetic resources;
- Extinction of natural features;
- Degradation of the ecosystem;
- Reduced productivity of biodiversity;
- Worsen socio-economic level of living of households;
- Reduced number of livestock and its productivity; and
- And other types of cultural life-sustaining activities of the population.

At the present time the scale of active impact on environment have grown so much and have such serious consequences that the issues of complex assessment, utilization and preservation of natural resources are flagged in the group of the most serious issues of the republic of Tajikistan.

However, due to natural features of the country, the aquatic and coastal ecosystems of major valleys where the main population is living and active economic activities are conducted, are constantly under the impact of man-made factors. These are change of water level in water reservouirs, poaching, agricultural effluents and residential sewage, etc. Most evident is the effect of change of water level because of power assets – daily and seasonal. Most vulnerable is benthic fauna as the main food reserve for fishes. Man-made impact near coastal ecosystems (plowing of slopes, quarry developments for construction materials, etc.) significantly worsens the state of the ecosystem and will harm the local population: silting of water reservoirs, pollution of irrigational systems.

Rich tugay ecosystems are conserved exceptionally on the territory of protected area “Tigrovaya Balka”. In other areas this ecosystems are conserved fragmentally in the form of lines in oasises of major Central Asian rivers (Pyandzh, Vaksh and Kofarnigan). The areas previously covered

by wetland ecosystems are slowly being taken by irrigated lands. In most of the cases the composition of tugay ecosystems is transformed into herbous boggy halophytic giant grasses of savanna type such as cogon grass (*Imperata cylindrical)*, bulrush or *Erianthus ravennae*, wild sugar-cane (*Phragmites communis)*, woodreed (*Calamagrostis pseudophragmites)*, licorice (*Glycyrrhiza glabra)*, typhus (*Typha minima*) and others.

Natural pastures in many areas of Tajikitan have degraded. Their carrying capacity reduces anually, and at the present time they compose 10-50% from the total plant stand. Big areas of pastures are polluted with non-grazed grasses. The main reason of catastrophic degradation of pastures is prolonged unsystematic pasturage and high loads, as well as total absence of pastures farming which has led to environmental degradation of pastures.

Unsystematic use of pastures has led to undesirable effects (soil erosion, depauperization of pastures' flora, mass outbreak of poisonous and harmful plants, etc.) For the past decade there were no betterment works on these forage lands which has aggravated aforementioned undesirable effects.

The main issues with worsened pasturelands' biodiversity are:

- Lack of the managing system for rational use and preservation of pasture resources;
- Low level of environmental education amongst the local population, recently-established farming enterprises on animal breeding, especially, amongst authorities on the sites who make decisions on management and use of land and pasturage resources;
- Lack of monitoring results on cultural-technical state of pastures in the country (have not been conducted for about 25 years);
- Uneven distribution of pasture resources on the basis of number of livestock in regions and rayons;
- As a result of overgrazing the area of cultivation of fodder cultivars has reduced by more than 47%, and extensive path of development of irrigated farming of fodder cultivars resulted in lack of fodder during winter seasons;
- As a result of overgrazing in the most areas of the country pastures degradation resulted in loss of plant communities and their fodder capacity, degradation of flora and soil;
- Widespread development of the processes of water and pasture erosion of winter and spring-autumn pastures, washout of fertile soil layer;
- Lack of water sources and watering places on the big area of winter and spring pastures;
- Progressing anthropogenic process (transformation of plant communities, bush clearing, fires and human factor);
- Anthropogenic desertification in rayons where there are mining activities and installation of new high-voltage power transmission line poles;
- Degradation of ameliorative state of pastures;
- High level of pollution of pastures with non-fodder, poisonous and harmful plants, etc.
- Absense of farmers communities or associations on the use of pastures;
- Absense of public or private seed farming households or centers of fodder or pasture species;
- Lack of activities directed at simplificated improvement and amelioration of pastures (the sources allocated from the budget and directed for improvement of pastures are insignificant);
- Lack of activities directed at improved exploitation of pastures;
- Excessive load from grazing activities on the unit of area, which is worsened by dai;y during cattle crossing from and to the grazing site;
- Nonobservance of seasons and periods of browsing; and
- Early spring browsing (of grazing) before grass stand is formed and grown.

The factors of socio-economic influence are limited to:

- The level of education of the majority of stock-breeders and small commodity wasteful system of animal breeding resulted in disordered and random grazing of livestock throughout the year;
- Lack of winter food reserves among the population forces them to increase pasture forage days (duration of use and consequences of early cattle grazing);
- Low level of knowledge among farming and stock-breeding households on systems of cattle breeding and management of pasture resources;
- Underdeveloped infrastructure in rural areas (lack of roads, cattle-driving paths, medical services and insufficient level of access to veterinary services); and
- Many households do not habe the opportunity to put cattle to mountainous and high-mountanous summer pastures.

Table 14

Dynamics of Countrywise Transformation of Grazings and Hayfields over 2010-2013

Name	Unit	Total Republic			
		2010	**2011**	**2012**	**20013**
Grazings	ha	3846564	3852564	3849242	3849242
Including irrigable	ha	3600	3661	3874	3874
Including seasonal	ha				
- Winter	ha	707399	708496	707885	706,9
- Summer	ha	2124280	2127574	2125739	288,3
- Spring-Autumn	ha	626989	627961	627419	683,4
- Hayfields	ha	21300	20831	20858	200000

***Source**: Statistical Book of RT, 2012*

Table 15

Dynamics of Countrywise Change of Area of Fodder Crops over 2010-2013

Name	Unit	By years			Difference (+; -)
		2010	**2011**	**2013**	
Republic	ha	122587	87710	86042	-36545
Khatlon	ha	41507	30466	27957	-13550
Sogd	ha	55068	36661	37894	-17174
RRS	ha	23628	18494	17867	-5761
GBAO	ha	2384	2089	2324	-60

***Source**:Statistical Book of the Regions of Tajikistan, 2012*

Diagram 1

Countrywise Dynamics of Growth of Livestock Population in the Period of 2010-2012 (in%)

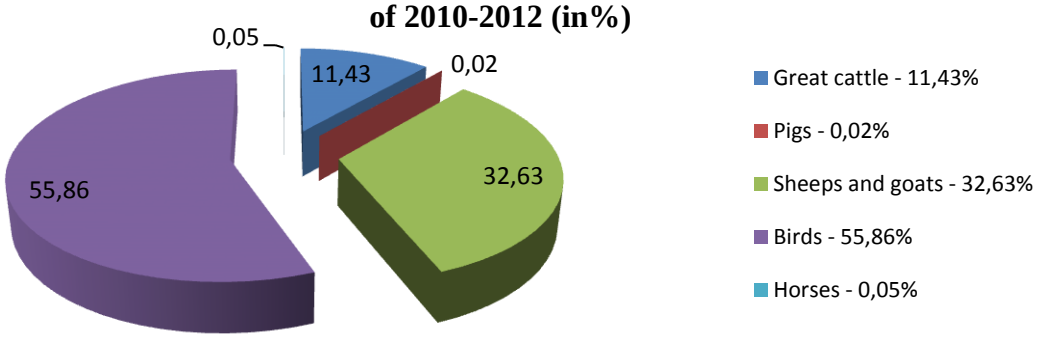
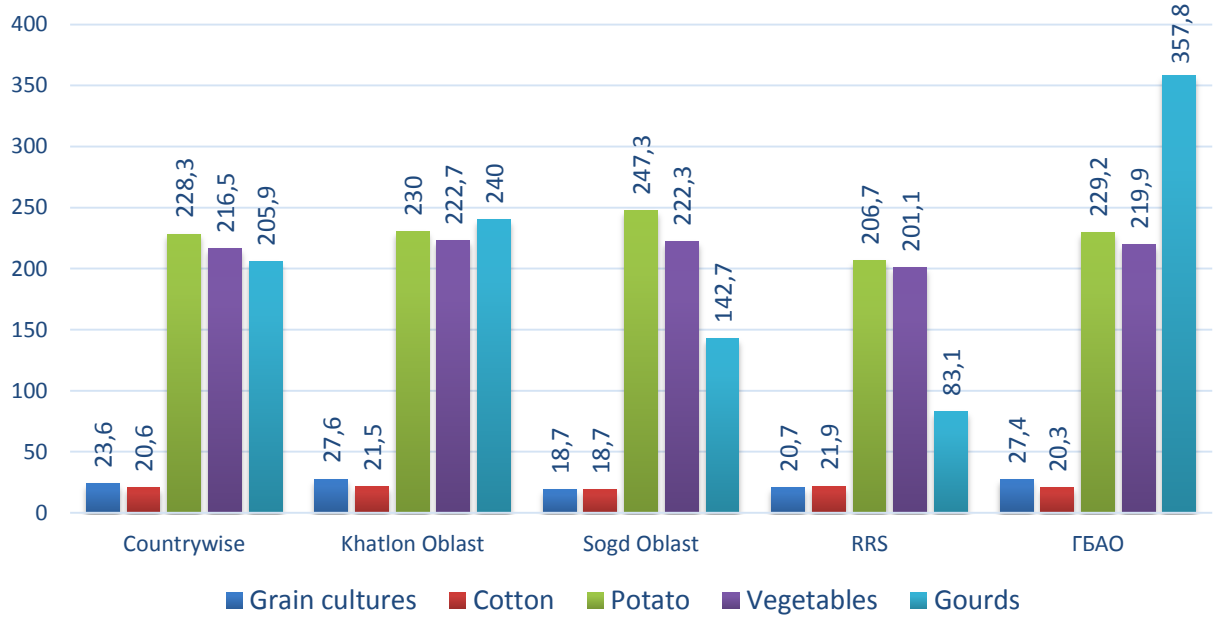


Diagram 2

Ratio of Productivity of Agrobiodiversity by Regions of the Republic in 2012 (center/ha)



In recent times the cooperation of public environmental bodies and environmental non-governmental organisations has significantly weakened.

Incopleteness of environmental protection law, including on the issues of inter-relation of land law and property rights on natural resources, plays the key role for status of biodiversity in the country.

Over the last decade the process of forest degradation and deforestation has significantly intensified in various parts of the country. Moreover, this process can be observed in the places of habitation of valuable wild fruit and genetic resources. Not only forest areas suffer, but the composition of ecosystems is under transformation. Natural ecosystems degrade and in some territories are already displaced by ruderal and anthropogenic.

Having laws in place there are almost no secondary legislation and it is not up to date. With consideration of environmental conservation laws the legislative basis of Tajikistan still does not reflect core principles of conservation of natural environment, including ecosystems and habitats, well enough. This is one of the main disincentives in the policy of biodiversity conservation and implementation of CBD.

Other main threats to plentifulness of biodiversity in Tajikistan are the following factors.

Extermination of animal and plant populations as a result of:

- Excessive volumes of extraction;
- Predatory forms of extraction*;*
- Illegal operations;
- Irrational and non-selective weed and pests control in agriculture and forestry (burning-out);
- Extermination of animal and plants considered by the population as dangerous, harmful or unpleasant.

Extraction and exploitation of biological resources, predatory methods and above permitted level volumes of extraction resulted in reduction or loss of populations of many plant and animal species. This has placed some of the species at the edge of extinction. In the present time the growth of illegal extraction volumes of biodiversity resources – poaching. This is caused by low level of real income of the population, especiallu in rural areas, by weakened system of state control, increase of demand for rare wild-growing species of plants, birds and mammals.

Extermination of natural ecosystems as a result of:

- Transformation of the latter into agricultural lands, including ploughing up of promontory lands;
- Utilization of alien and invasive species in the course of forest regeneration;
- Various forms of construction works, including those in the frames of rehabilitation of mountainous villages without consideration of environmental norms and standards;
- Anthropogenic, aquatic and arid soil erosion;
- Significantly impacts the status of biodiversity.

Indirect man-induced impact transforms species' life environment and disturbs ecosystems. The main threats of indirect man-induced impact:

- Physical disorded of soil characteristics, shift of water regime (drain or flood).
- Chemical action from environmental pollution, pests, toxic chemicals used for pests and decease control; upon man-made accidents. For instance, pollution of water resources decreases species diversity of aquatic and semi-aquatic ecosystems which is discussed in the respective section. Especially indicative is the example of degradation of ecosystem of tugay forests in reserved area "Tigrovaya Balka" because of disturbance of water regime and pollution of river basin by waste water from agricultural lands.
- Biological disturbance of the structure of natural biosenoses as a result of human activities: deliberate and undeliberate introduction, and self-expansion of alien species; spread of pathogenic agents of animals and plants; explosion of population of particular species; eutrophication of water reservoirs, possible introduction into ecosystems of living modified organisms (so far has not been recorded anywhere in Tajikistan), extermination of food resources of animals.

Usually, various types of human activity have both direct and indirect impact which acts on several directions at once. Often man-induced impact is complex and is attended by synergetic effects.

Change of Status of Biodiversity and Ecosystem Services: Socio-Economic and Cultural Consequences

Fragmentation of ecosystems and degradation of species' habitats is the most serious threat to all wild species of flora and fauna of Tajikistan. It has strikingly revelaed over the last 3-5 years during reclamation of valleys for gardening, for gourds and for housebuilding.

According to currently available experience new farmers and land users, as a matter of rule, are not aware of environmentally stable approaches and practical methods of farming or environmental security on preservation of biodiversity. The population may not be able to foresee possible negative consequences (for instance, for soil) related to practiced methods of farming (for instance, excessive exploitation of soil without crop rotation, insufficient use of organix fertilizers, salination of irrigable lands in meadow areas, firming of soil and loss of fertile soil structure, etc.). This creates certain risk for environment and may cause adverse changes of soil quality, including soil erosion, reduction of the level of organic matter in soil, degradation of soil and biodiversity.

Population of mountainous areas can increase population of cattle and, thus, intensify degradation of grazings, especially of winter grazings near rural settlements. That is why it is necessary to take measures on risk reduction, and grazings management through increase of the area of fodder crops and introduction of rotational grazing.

Annually forest parasites cause damage to biodiversity of forests on the area of more than 9 thousand ha. Over past 3 years the area of biodiversity damaged by forest parasites increased over 1.8 thousand ha. Forests parasites are fought using biological and, unfortunately, chemical means.

Institutional capabilities of the country's regulatory framework are enough for promotion and maintenance of secure, effective and environmentally-stable pest control.

The Role of Biodiversity for Ecosystem Services

The overwhelming majority of forest range in Tajikistan (about 90%) is of natural origin. And just a little more of 10%, i.e. 50 thousand ha of forests are planted by human. Because of poor material and technical basis of forestries and lack of sources forest organization works have not been implemented for many years now. The volume of forest restoration works has been reduced to the lowest limit possible. The quality of implemented restoration works is reducing year by year which directly impacts an establishment of forest crops, their further growth, development and survival.

Forests serve as habitats for flora and fauna, and are the main communities which ensure stability of natural mountainous ecosystems. The main factors impacting the status and quality of forests are: climate change (natural factor) and man-induced impact caused by energy and food problems (mass illegal extraction of trees, random and above-level pasturage on forest lands, reclamation of mountainous areas for cultivation of grain and other agricultural crops, wood extraction for construction of mountainous villages).

Life activities of the population of the majority of mountainous areas depend on collection of non-wood forest products for profit-making, securing of family budget, provision of food items and medicinal plants.

In the long term in the country there are planned activities on reinstatement of natural grasslands which cover the area of more than 3 million ha.

Natural grasslands in all natural areas of Tajikistan have big importance in the overall balance of fodder base of cattle breeding. However, rich pastures and hayfields cover only particular lands from the total area of natural grasslands (3.5 million ha) and have relatively small specific density.

According to estimates of experts, food reserves of natural grasslands and hayfields of the country equals to 1.55 million tonne of dry weight. Cropping of such can be enhanced by the way of improwement and rational use of grazings. Urgency of the issue is characterized by its link with the Food Programme and resolution of tasks raised in it. In accordance with the objectives the half of all grazings of the country shall be improved by surface and root methods by 2015.

The total area of tillable lands of Tajikistan amounts to 800 thousand ha, including irrigable tillage which equals to 765 thousand ha. In the present time it equals to 0.15 ha of tillage, including 0.9 ha of irrigable tillage per capita. It is expected that in future these figures (per capita) will further decrease because of significant increase in population, enhanced industrial development, urban expansion, extremely limited capacities for expansion of tillage by means of reclamation of new lands.

Protracted socio-political instability, unfinished system of transition into market relations (still ongoing) and violations in management of the sector has led to vast damages for cattle breeding in the country, and resulted in crisis situation.

Over the past decade many tasks on use of natural grasslands (hayfields and pastures) have arisen in Tajikisan which require direct solutions. Resolution of these tasks has strategic importance for development of cattle breeding sector because current situation with production of cattle breeding products is secured by yield of pastures and hayfields by almost 60%.

Grazing system of farm animals allows to reduce the costs for production of beef, lamb, milk and, partly, eggs by up to two times. This is especially important for preservation of the leading branches of cattle breeding and for transformation of natural lands into agricultural.

Presently, Tajikistan still possesses significant genetic stock of local agricultural crops. The genetic stock of cereals, purses, oil-plants equals to about 3 thousand samples, including 510 samples of wheat, 500 of barley, 115 of rey, 60 of oats, 500 of chickpea, 80 of lentils, 46 of soy, 8 of peanut, 234 of corn. The collection of clones of fine-steppled cotton includes 600 various forms and clones which have passed through tests in all environmental zones of Tajikistan. The collection of sub-tropical crops consists of 7 sorts of pecan nut, 30 sorts of almond, 46 of unabi, 43 of fig, and great variety of date plum, pistachio, sea-buckthorn, hazelnut, and mulberry. Breeding works are ongoing with citrus crops – lemon, orange, tangerine. Cucubits crops are mainly represented by melond, water-melons and pumpkin.

More than twenty thousand varieties and sorts of plants are in nurseries and botanical gardens in conditions of Pamir. In the collection of Pamir botanical garden there are more than 40 sorts of apple-trees, 38 of apricots, 15 of pears, 14 of peaches, 20 of mullberies, various sorts of pine strawberry, raspberry, currant, gooseberry and other cultivars.

The total number of collections of sorts, hybrids and various forms of cotton, grain, pulses, oil-plants, fruits, vegetables, subtropical, citrus, berries and other cultures amounts to more than 32 thousand local and ecdemic samples. However, in recent years because of socio-economic constraints collection materials have been hardly refilled, plant-breeding stations, experimental plots, nurseries, botanical gardens, breeding farms, and state livestock breeding stations are in poor conditions. This enhances the risks of loss of the national wealth in the form of biodiversity gene pool.

Ancient agricultural culture of the population of Tajikistan has promoted creation of many sorts of tame plants and breeds of domestic animals on the basis of genebank of wild congeners, mainly, of local species. In the present time more than 85 species and 360 sorts and hybrids of tame plants of various designations are cultivated in Tajikistan. Main zones of agricultural ecosystems are located below 3000 meters above sea level and on the basis of watering conditions can be devided into two sub-zones: sub-zones of bogharic (unwatered) and irrigated farming.

Despite their specific landscape, soil and climate features varying by vertical belts (which are devided into 4 groups), natural hayfields and pastures in different regions of the country are reliable source of high-nutritient and cheap forage. These are mainly classified as:

I. 500-1500 meters above sea level – the basis of this belt is compose of ephemers, ephemeroids and perennial long-rooted summer vegetative plants (wheat-grass, squirrel grass, bluegrass and wild-growing barley).

II. 1500 – 2200 meters above sea level – this belt is characterized by tree and shrubby vegetation and perennial grassy plants – big cereals and mixed-herbs. Herb stratum is rich and diverse enough. Widespread are hay plants, ferula tall grasses meadows of Himalayan type. Among ephemers are widespread bulbous blegrass, cocksfoot and uncina.

III. 2200–3000 meters above sea level – this belt is characterized by legume-grass vegetation and low-growing mixed-herbs in subalpine meadows. Summer is very short in here, three to four months. This is one of the main forage reserves of the country. Tree vegetation ends at the elevation of 2700-300 meters and the belt of grasses and meadows starts. This belt if rich of biodiversity of the following plants: Alpine alkaligrass, oxytrope, sheep fescue, uncina, bluegrass, Alpine catmint, fescue grass, *polygonum zeravshanicum*, euphorbia and many more.

IV. 3000–3800 meters above sea level – the belt of short grasses of typical cryophyte meadows, steppes, cushion plants and *oxutropis savellanica*. Oftenly can be seen buckwheat and pickpocket. At the most wetted habitats there are located sedgy- kobresian meadows, Alpine and Bukharian bluegrass, blowball, potentilla, sheep fescue and Litvinov bluegrass.

Mountainous landscape conditioning the seasonal character of vegetation served as a basis for transhumant system of cattle breeding which has formed in here. As is known, under practice of such system of cattle breeding in the form of pasture forage animals receive: yaks 80-90%; sheeps and goats 80–85%; horses 70–80% (herd farming – up to 90%); meat cattle of productivity about 65–70%.

The current condition of grazings by seasonal usethroughout a year can be classified into: winter, spring-autumn, summer and all-season:

1) Winter grazings are located nearby population centers, 500-1200 meters above sea level. The basis of this belt is composed of ephemers, ephemeroids and perennial, mainly spring-summer vegetative crops. The total area in the country equals to 699.0 thousand ha (from this amount 625.0 thousand ha is used by agricultural enterprises), including by regions: GBAO – 4.3; RRS– 129.4; Sogd oblast – 101.6 (101.6); Khatlon oblast – 557.5 (384.5) thousand ha.

Periods of use are from November until March, and duration of use is 120-150 days subject to region and location of the farm (during the Soviet Union times duration was 90-110 days). In majority of regions of South Tajikistan and Sogd oblast over 160 thousand ha are used throughout a year.

Depending on soil-climatic conditions, stock density and species of livestock the yield rate equals to 1.0–2.2 centner per ha (0.1–0.2 tonns per ha) at the margin of 0.7–2.65 centner per ha of dry fodder mass in various regions.

Specific density of grazed vegetation in absolute majority of the regions ranges from 35 to 40 percents.

Distance from population centers ranges from 0.8-1.4 to 4-5 km.

2) Spring-autumn grazings are elevated hills and foothills which are located at 900-1500 meters above sea level. These are characterized by tree and shrubby vegetation, pistachio tables with perennial herbs - cereals and mixed herbs, mainly dominated by spring-summer vegetative

plants. The total area in the country equals to 675.9 thousand ha (598.5 thousand ha), including by regions: GBAO – 44.0 (44.0), RRS – 154.4 (125.0), Sogd oblast – 238.0 (205.7), Khatlon oblast – 298.4 (267.7) thousand ha.

Periods of use are from March to April and from September to November depending on the region and location of the farm. Duration of use is 100-130 days (during the Soviet Union times – 90-110 days). In majority of rayons of the south region and Sogd oblast around 180 thousand ha are currently used throughout a year.

Depending on soil-climatic conditions, stock density and species of livestock the yield rate equals to 3.8-6.7 centner per ha (0.4-0.7 tonns per ha) of dry fodder mass.

Specific density of grazed vegetation in absoluty majority of the regions ranges from 45 to 55 percents.

Distance from population centers ranges from 2.2-2.8 to 30 km.

3) Summer grazings are located at the elevation of 2200-3500 meters above sea level. These are characterized by 2200–3500m high-mountainous, Alpian, sub-Alpian, mid-grass meadows and low-growing mixed-herbs. Natural vegetative cover is extremely rich and quite diverse. Summer high-mountainous grazgins are valuable because the beginning of vegetation of plants here matches with the period of ending of vegetation of ephemeres. Summer here is very short, three to four months. It is one of the main fodder reserves of the country. For its rational use it is necessary to introduce the driving-pasture system for livestock management.

The total area in the country is equal to 2081.3 thousand ha (1334.6 thousand ha). It should be highlighted that from present 1334.6 thousand ha of summer high-mountainous grazings 76.22% belong to farming enterprises. Devision of summer high-mountainous grazings by regions is: GBAO – 712.0 (475.3), RRS – 737.8 (365.7), Sogd oblast – 283.0 (205.7), Khatlon oblast – 167.4 (236.6) thousand ha.

Period of use is from June to August, duration of use is 80-90 days depending on region and location of the farm.

Depending on soil-climatc conditions, stock density and species of livestock the yield rate equals to 6.8-8.0 centner per ha (0.7-0.8 tonn per ha) to 10.3-12.8 (1.0-1.3 tonn per ha) of dry fodder mass. Natural vegetation cover of patures of natural boundaries “Miyonadu”, “Gundara”, “Khur”, “Yozgand” in Tavildara, “Hazorchashma” and “Kamrov” in Rasht, and “Tupchak” in Djirgital rayons are very rich and quite diverse, and according to recent unofficial data, as a result of more than 15 years of native sumer improvement (during which there was to grazing allowed on these lands), their current yield rate achieved 2-3 tonn per ha. It should be mentioned that according to information of Moscow Zootechnic Insitute’s expeditions by S.G. Azarov (1927) and professors of the Institute of Animal Breeding I.G. Lebedev (1954), S.I. Farsikhanov (1985) sheeps of meat-lard type of Gissar breed gain during grazing on summer high-mountainous pastures from 33 to 38 percents of mass, or 19 to 24 kg.

Specific density of grazed vegetation in absolute majority of the regions ranges from 60 to 65 percents.

Depending on the region remoteness of summer grazings from permanent winter grazings, farms and farmers is 200 to 600 km. Duration of passing from winter to summer grazings at average is equal to 3-4 weeks, during the Soviet Union times it was up to 7 weeks.

4). Yearlong ranges (used throughout a year) are mainly flatlands and adirs (hills of foothills) located nearby farms on the elevation level of 500 to 1000-1200 meters above sea level. In this belt there is a dominance of ephemeres, spring and summer vegetative plants. These grazings have very low productivity, are degraded up to 85-90%, are mainly transformed into fallow soils, and are poor in terms of botanical composition. The character of vegetation cover of this belt was greatly influenced by human activity. Population in rural areas has formed an opinion that these

pastures are appropriate for yearlong range of all types of livestock. One may agree with opinion of the absolute majority of rural population that these lands are not grazings but a good exercising area. One may say that more than 90% of these areas have fallen out of farming use long time ago, and that rehabilitation in the nearest future is not seen feasible since it requires heavy expenses and a lot of time.

Countrywise area equals to 400.0 thousand ha, including by regions: GBAO – 34.9 (3.0,) RRS – 151.9 (148.1), Sogd oblast – 6.8 (9.3), Khatlon oblast – 206.3 (199.7) thousand ha.

Period of use – yearlong, (duration of use) depending on climatic conditions of the year (snow cover), location of the farms and households these grazings are used during 310-320 days.

Depending on soil-climatic conditions, stock density and species of livestock productivity equals to 0.35-1.0 centner per ha of dry fodder mass.

Specific density of grazed vegetation in absolute majority of the regions ranges from 30 to 35 percents.

Distance to population centers is usually 0.5-2.0 km and sometimes can be 3-4 km.

Actual and optimal density of provisional livestock population (1 provisional head equals to 1 sheep) on a unit of area in various grazings suggests that actual density is several times higher than optimal.

Actual density of livestock population per unit of area of used grazings exceeds its optimal level:

- At average in the country: earlong ranges – 10.5 times, winter – 4.3 and spring-autumn – 3.1 times;

- In GBAO (respectively): within normal limits, 0.0; 3.3; and 19.3 times;
- In Sogd oblast: 162.8; 13.5; and 4.7 times;
- In Khatlon oblast: 162.8; 2.75; and 4.3 times;
- In RRS: 7.7; 3.8; and 3.3 times;
- In Gissar valley: 7.5; 3.8; and 3.2 times;
- In Rasht valley: 4.6; 0.0 and 1.4 times.

Actual density of summer grazings is a bit less than optimal except Kurgan-Tube zone of Khatlon oblast which exceeds the optimal density over 50%.

It should be mentioned that mountainous and high-mountainous summer grazings with good productivity are not fully used and, therefore, actual density in the country is less than optimal (5 heads instead of 2.5 heads), and in GBAO this index is 4.2 times, in Sogd oblast – 38.5% and in RRS – 2.2 times.

The Impact of Depletion of Biodiversity and Reduction of the Scope of Ecosystem Services on the Welfare of the Population

By virtue of diversity of natural settings flora and fauna of mountainous areas is extremely rich and diverse, and there are various recreational areas. However, man-induced impact on nature had serious influence on composition and distribution of flora and fauna in cultural landscape. Currently, protected areas hold 16% of the total area of Tajikistan, whereas in other countries of the Central Asian region this index does not exceed 5%. Considering unique resources of mountainous areas of Central Asia protected areas should hold significantly greater areas. However, areas which hold the status of ‘protected’ are actively used which downgrade their role and degrades living environment of flora and fauna on these territories. Income generated by rational use of tourism and recreational resources of Central Asia could be several times higher than that generated by agricultural or any other type of activities. Lack of infrastructure (roads,

including ropeways), modern hotels, and lack of relevant experience of local population are the main barriers for development of tourism and hunt in the mountains.

The main negative impact on the status of biodiversity and capacity of ecosystems in mountainous areas is caused by imrovement of social and living conditions, uncontrolled grazing, ore mining and building contractors (emissions into water and increase of volume of tailing damps).

Over the past few years mountainous areas with rich biodiversity are being actively explored by tourists. By estimates of environment conservation institutes for a propoer rest in mountains one tourist needs from 100 to 300 square meters of land, each tourist leaves up to 1 kg of solid wastes and "produces" up to 80 litres of polluted runoffs. All these are only related to pollution of the area, and do not take into consideration finewoods, pines, endemic plants which are oftenly cutted over, pulled up by the roots, and simply burned out by careless "nature lovers".

Big numbers of vacationers results in quick degradation of grass cover (not to mention those who like to collect flovers), sealing of soil, change of its features, mortality of shrubs and trees. There is possibility of poaching: cutting over of trees for tent legs or fire, illicit methods of fishing, etc.

Touristic and recreational territories are one of the essential sources of income for population of mountainous areas which are currently exposed to depletion because of irregulated use, petrescense, collection of herbariums of valuable plant species, trapping, etc. Experience of many countries indicates of advisability of combination of recreational and environment-oriented types of development of mountainous territories.

Mountain flora of Tajikistan contains valuable medicinal, decorative, fodder cultures many of which are endemic and common only for local wild flora. People living in this fragile ecosystem use it for their life-sustaining activities. Steady food supply becomes problematic due to increasing competition for limited resources of mountainous areas. Agricultural works and casual earning are not enough to safeguard normal food supply.

Illicit collection of wild flowers, immoderate provision of medicinal plants results in their extinction. Population collects wild-growing berries (sea-buckthorn, ashberry, barberries, currant, raspberries, hawthorn, etc.), mushrooms (more than ten species of edible mushrooms) and medicinal plants. Part of the local population has access to collection of walnut, wild apples, pears, apricots, plums, alycha, etc.

In some places collection of field flowers in the neighborhood of some population centers and near busy roads reaches big scale. Stocks of wild-growing medicinal herbs are under negative impact. Beyond the reserved areas collection of plants is conducted without consideration of natural resources, capabilities of preservation and regeneration of plant formations and is in need of state and public regulation.

Small part of the population is engaged in amateur hunt and fishery. Is some places poaching shooting and trapping of number of hunting species resulted in complete extinction of the latter.

By estimates of experts for the period from 1960s until the end of 1980s as a result of irregulated grazing productivity of high-mountainous ranges of Tien-Shan and Pamir reduced not less than 40%. One can assume with confidence that hydrophisycal conditions of sealed soul have significantly changed, and, consequently, so did conditions of drain formation.

Washed out is mainly soil layer. Significant areas of fertile lands fall out of service as a result of development and irrigational erosion which washes out fertile soil layer. Like this, during one watering of land in foothills 40 tonns per ha of soil is washed out. For one season this index increases up to 500 tonns per ha. Consequantly, over 8-10 years the entire plough layer can be washed out to a depth of up to 30-35 cm. Removal of soil due to grazing erosion equals to 100-750 tonns per ha for one season of grazing.

In the course of cross-border aspects it is appropriate to mention uncontrolled tourism, collection

of medicinal herbs, trapping of poisonous snakes, pouching, collection of pertified remains, vug, druse, rare invertebrates, etc.

Hence, the main cross-border issues for mountain ecosystems of Tajikistan are:

- Cattle overgrazing;
- Construction of roads;
- Natural disasters;
- Inadeaute farming management;
- Illicit deforestation; and
- Mining industry.

Degradation of mountain ecosystems can primarily influence health status of the population in such natural conditions. First of all, this will impact the ability to provide oneself with sufficient amount of food products (degradation of grazings, degradation of fruit and nut, as well as other vegetative resources).

At the same time it is evident that there is a need for continuation of comprehensive assessment of medical and geographical problems of mountainous territories linked, in particular, with development of sports, physical culture and ecotourism.

Overall, rational use of natural resources of mountainous regions in the sphere of tourism and sports creates favourable prerequisites for solution of social and economic problems linked to matching the demand on touristic conditions both for citizens and foreign guests of Tajikistan, creation of new and modernization of existing infrastructure of tourism and sports, and, as a consequence, imporved level of employment of population, improved international relations, prophilaxy and strengthening health of people.

Unregulated grazing and deforestation became causes of reduced area of habitats of many biological species, including rare and endangered. Besides that, change of composition of plant cover, dominance of non-edible herb species, and reduction of productivity of net biomass by 15-25% can be observed on grazing lands. Utilization of pesticides and chemicals in agriculture became the cause of toxic and chemical pollution of soil and ground waters on the area of more than 30 thousand ha on the south and north of the country.

Invasive and alien species can cause serious irreversible processes in environment on genetic and ecosystem levels. Especially vulnerable to alien invasive species are ecosystems which have been seriously disturbed by human activity. In man-made landscapes it is easier for alien species to adapt than for local communities. Specific class of invasive species is composed of species which have near relation among those among local biota. Such alien species can hybridise with local species and sub-species and become the cause of extinction of unique genotypes.

In composition of the country's flora there were noticed 2950 alien plant species from other natural and geographical areas. Among them there are beneficial naturalized – 2300 species, and harmful invasive species (parasites - 52 species, local weed plants - 650 species, parasitic fungus – 2000 species).

Under man-induced factors there is observed active moving of internal invasive species spread in various elevation belts of the country. One of the main factors of belts invasiveness is long-standing cattle crossing from winter to summer grazings and back. Together with this grazings become polluted with weed plants because of flexible and more adapted character of the latter. As a result of this such invasive plant species as thermopsis (*Thermopsis dolichocarpa*), bluet (*Centaurea depressa, C. jucea*), estragon (*Artemisia dracunoulus*), artemisia (*A. scoparia*), Jerusalem sage (*Phlomis bucharica*) and other become widespread.

Many invasive plant species when get into other communities and agricultural plantings

gradually progress. An example of this is a plant community of Paulsen sorrel (*Rumex Paulseniana*) in the belt of meadow vegetation. Another such species are cuscuta (*Cuscuta*), artemisia (*Artemisia*), marjoram (*Origonum*), thermopsis (*Thermopsis*) and others which degrade productivity of plantings and grazings.

In the composition of plant communities of Tajikistan there are imported and parasitizing big number of quarantine species. There are more than 50 plant species are parasitizing on cultural and decorative plant species from genus of cuscuta *Cuscuta*), broomrape (*Orobanche*) and cistanche (*Cistanche*) only.

On the territory of Tajikistan there are recorded about 740 species, 140 genus and 29 bloodlines of parasitic fungus, including 55 invasive species. Deceases of cultural plants can be equally caused by both weed plant species and fungus. Parasitic fungus when gets into plantings degrades productivity of all cultures. In conditions of Tajikistan widespread and the most pathogenic are *Erysiphe graminis, f.tritici, Ustilago hordei, U.avenae, U.bromivora, U.cynodontis.*

Tajikistan lacks specific research institutions which would focus particularly on alien and invasive species. Issues of introduction of alien species, research of their biological features, inter-relation of these species with local rerpresentatives of flora and fauna – all these are duties of research programs of the Institutie of Zoology and Parasitology, the Institute of Botanics of the Academy of Sciences of the Republic of Tajikistan, and secondary reseach departments of the Tajik Academy of Agriculutral Sciences. In the present time in Tajikistan there are only 24 experts who work on these issues, including 10 botanics and 14 zoologists.

<u>The main threats to biodiversity by alien species</u>:

- Disturbance of food chain in ecosystems;
- Displacement of indigenous species;
- Increase of number of rare and endangered species;
- Extinction of representatives of local fauna as a consequence of breeding of closely related species with alen species;
- Simplification (reduction) of structure of communities;
- Flare of contagious deceases.

For prevention and reduction of threats imposed by alien species in Tajikistan it is necessary to resolve the following tasks:

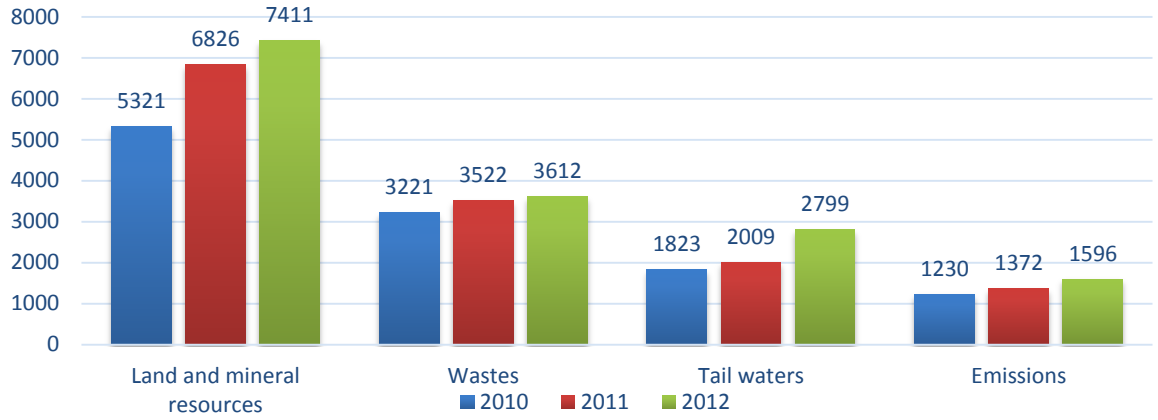
- Inventory of alien and invasive species;
- Monitoring and diagnosis of new alien species;
- Assessment of features of ecology and adaptation of particular species;
- Evaluation of degree of threat imposed by invasive species;
- Development of the data base;
- Development of the National Strategy and Action Plan on Alien and Invasive Species.

The process of transformation of biodiversity as a result of human ativity is an anthropogenic impact. As a matter of rule, this is one of the main factors influencing biodiversity which is taken as a basis for development of operative working programs and action plans, particularly, with consideration of those which have the stronger influence on ecosystems or are crucial.

Typically, various forms of human activity have direct and indirect impact which operates in several dimensions at once. That is why man-induced impacts are oftenly complex and are accompanied by synergetic effects.

Diagram 3

Increase of Damage to Biodiversity for the period from 2010 to 2012



The Government of Tajikistan has been developing a series of regulatory enactments on rational use of biodiversity. As an example, special tax for pasturage on natural grazings per cattle head has been introduced (great cattle and small cattle). Sources raised from pasturage tax are directed to support forestry management sector and development of SPNA. Sources raised from hunting tourism are directed to recover fauna monitoring stations, and during years with severe climatic conditions censuring of wild animals and additional feeding of animals and birds is being implemented on the account of commercial firms and international organizations.

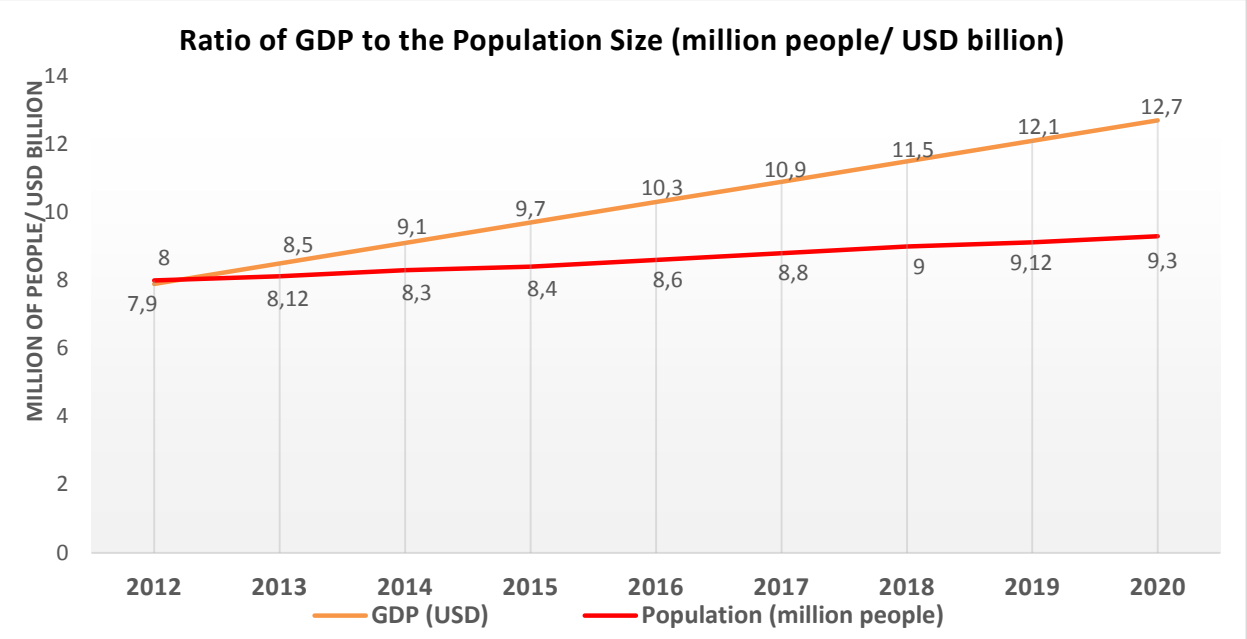
This issue has direct and indirect impact on environmental conservation activities, on agro-industrial sector, on socio-economic position of all segments of the population, on scientific and educational institutions, and, generally, on biological safety of the country.

The Government of the country and its executive and local bodies are concerned about resolution of this problem and take positive decisions when international organizations want to provide assistance. At the present time the Government lacks sources for implementation of numerous decisions, programs and plans on improvement of the status of biodiversity. In this regards, the Government of Tajikistan in the frames of signed Conventions and their Protocols, for the purpose of implementation of its obligations before the international community, and after signing of Nagoya Protocol, can complete some activities on preservation of biodiversity by means of international financial resources provided for preservation of biodiversity.

CHAPTER II. PERSPECTIVES OF CHANGES OF STATE OF BIODIVERSITY AND ITS IMPACT ON THE REPUBLIC OF TAJIKISTAN

In conditions of yearly growth of the population of Tajikistan by 2.2% and increase of their needs in products of biodiversity by 3-4 times it is assumed that significant amount of biodiversity will be involved into economic turnover. In regads to this the issue of forecasting of biodiversity status dynamics becomes particularly important. Accordingly, using the status of biodiversity for the period of 2009 as a baseline it is necessary to assess direction of change of the composition and the structure of biodiversity under different scenario of nature management, i.e. the degree of their involvement into economic turnover and the consequences of changes in environmental-economic aspect. Under increase of the population significant part of biodiversity will undergo changes in the composition and structure. It is necessary to mention that in conditions of change of needs of the population in biodiversity products approximately 2% of the global species diversity which is specific to Tajikistan will become subject to economic influence.

Diagram 4



Having said so, around 70% of the area of Tajikistan which refers to relatively not impacted by serious economic influences and which has preserved undisturbed ecosystems can be involved into economic turnover (see Diagrams 1.15, 1.16, 1.18). There is a possibility of serious increase of man-induced impact on valuable genetic resources on almost 20% of the country's territory. In order to reduce this relatively well-preserved capacity it is necessary to undertake counterveiling measures (see Diagram 1.16).

About 10% of the area of Tajikistan which is a habitat for 2/3 of the country's population is characterized by high degree of disturbance of natural ecosystems which also can undergo new stresses under inadequate management of natural resources.

Due to growth of economic activities over the past years transformation of natural ecosystems has tendency to expand. It is the reason of enhancement of erosion and soil degradation processes. Despite relatively well-being of ecosystems particular communities in them experience significant man-induced loads which can result in serious damage to natural ecosystems in the short term.

General tendencies of biodiversity transformation to a negative side in mid-mountains which are observed since 2000 can go down before 2010 because of adoption of necessary measures by the

Government of the country. After adoption of the measures by the Government the negative tendencies of the status of biodiversity in mid-mountains can gradually reduce until 2010. Reclamation of steep-side lands which are constantly get washed out is disturbing soil cover. Plowing and seeding activities are temporary suspended which resulted in decrease of strengthening natural disasters.

In the list of natural ecosystems which promote economic and social development there are mainly pasture, forest, aquatic and semi-aquatic ecosystems and related to these various biological resources. Agricultural ecosystems formed on the basis of natural ecosystems are also valuable in economic relation and their sustainability is directly depending on valuable species and genetic resources which are in need of biodiversity rehabilitation.

The practice of projects implemented by the Government and GEF on preservation and rational use of biodiversity (direct and indirect) has shown that only under compliance of elementary rules of collection of yield of fruits, medicinal plants and periods of haying it is possible to achieve the decrease of impact on biodiversity by up to 50-55% during the period of three years. This result was achieved in conditions of Dashtidjum reserved forest. Local population was reimbursed with fuel (for provision of yearly volume of coal). Together with this, local population has planted more than 150 thousand plant trees of wiuld congeners of fruits (pomegranate, fig, pistachio, *ziziphus jujuba*) on the area of 12 ha of cutted off forest. On the area of more than 90 ha of existing light forests there has been ensured preservation of seed regeneration and growth of genetic resources of wood species. At the present time this practice was expanded on the area of more than 1500 ha.

Loss of biodiversity habitats in mountainous areas implies a serious risk for the entire Central Asian region with a great parching desert zone. Mountainous ecosystems of Tajikistan unite more than 150 valuable plant formations significant part of which consists of forest trees with rich fauna of migratory species which safeguard the integrity of the ecosystems. In conditions of sparsely forested area such practice has great importance for environmental and economic balance.

Drastic cut of the areal of genetic resources of valuable species of mountainous floral diversity can be observed. For instance, at the present time, the areal of wild apple in Eastern and North-Eastern Tajikistan, has reduced by up to 40%. Further degradation of mountainous ecosystems as a result of reduction of the areal will inevitably lead to irreversibility of the process and inability of the ecosystem to autoregeneration. The area of this rare genetic specie is preserved in the form of distinct forest plots in the form of isolated “islands” and may be affected in conditions of developing economics. In regards to this, adequate measures are being adopted in order to guarantee the preservance of the area of all genetic resources of fruits till 2020 in accordance with Aichi Targets.

Over the past years, due to change of environmental situation the habitats of wild animals became drastically transformed. This resulted in significant change of the number of the latter. Many species of wild animals are rare and endangered, and are subject to stringent protection. These are whistling thrush, *marmota menzbira*, *hustrix indica*, red dog, brown bear, snow leopard, argali and others. In order to prevent further threat of loss of these species, a number of activities and program documents on reduction of the threat of loss of wild indangered species were adopted in the light of strategic goals. First of all, inspection and update of the Red Book of Tajikistan was conducted in accordance with classification of IUCN.

New anthropogenic effects which are related to soil devastation, development of negative processes (erosion, deflation, technogenic disturbances), pasture load (overgrazing, cattle driving, places of husbandry and watering, disturbances related to road degradation) can be the reason of threat of restructuring of the ecosystem. In regards to this, measures based on strategic direction on preservation of biodiversity, maintenance of saved and rehabilitation of disturbed ecosystems are being adopted.

As to the issues of integrated research of the status of mountainous geo- ecosystems, interdependence of dangeropus natural disasters, spatial-temporal variability of their activity, association of borders of spread of natural distractive disasters in those geographical points where soil and water-regulative mountainous ecosystems. Measures are taken in regards of their rehabilitation and decontamination. Without development of these aspects it is impossible to reach the assessment of the current status of natural environment, learn derivative laws of mountainous ecosystems and develop methods of forecasting and management of such.

The current critical state of affairs in the sphere of involvement of mountainous areas into economic turnover can be largely explained by longstanding practice of free-of-charge use of natural resources during administrative-command methods of economic management. Under such approach to management of natural resources neither user nor even owner of natural resources are not interested in rational use of "costless" resources. Such "costless" resources can and are used both by owners and by nature users in umlimited amounts for the sake of saving of other paid forms of production resources, achievement of at least minimal financial-economic results. In other words, under such management of natural resources the user is insured from any risks in advance. That is why hopes for essential improvement of the state of affairs in conditions of transition to market relations are related to effective use of the system of inter-related economic levers and incentives which form economic mechanism of paid use of natural resources of mountainous areas. One of the componenets of such mechanism is introduction of risk evaluation and management system for all types of economic activities in mountainous areas.

At the present time the perspective forms of economic activities which are able to essentially improve socio-economic situation in mountains could be: establishment of farming enterprises focused on production of livestock products, creation of family teams and producers' co-operatives focused on development of traditional industry, crafts and production of souvenirs for tourists; incentives and support of non-governmental organizations on the basis of local population which are focused on development and introduction of educational programs able to ensure restoration and preservation of national features of culture and support to environmental balance; collection and commercialization of medicinal plants; creation of small enterprises on processing of fruits and berries; development of beekeeping; mining and hydro-economic reclamation.

Practice of mountainous countries persuades that the most effective is a combination of recreational and environmental types of economic reclamation of mountainous areas.

Well-balanced touristic-oriented management of natural resources and sustainable development of mountainous areas is impossible without scientifically susbstantiated assessment of natural resources, development of routes and recommendations on recreational relamation of mountainous areas. Some irreversible changes such as shrinkage of the area of epibiotic plantings, disturbance of relief during blasting operations, construction works, extraction and processing of natural resources and other can be improved by the way of forest improvement and recultivation activities.

In the general complex of issues of mountainous areas one problem is probably the most acute – it is the problem of ensuring sustainable human life and activities in mountains. Specific features of this problem are typical for almost all countries. These are cellular nature and low popularity of mountainous settlements; low profitability of agricultural production and increasing poverty of the population; predominantly seasonal character of labour and hidden unemployment; degradation of mountainous settlements expressed in ageing and reduction of the expected life duration of the population, increasing steam of migration of the population from mountains (or to mountains, as in Tajikistan) to economically better developed valley areas; poorly developed infrastructure and detachment of mountainous population from centers of culture and life necessities; low level of participation of mountainous population in mountain resources

management and planning of mountainous areas development; traditionally high birth rate, increasing mortality rate (especially infant mortality).

Continuation of degradation of mountainous ecosystems will negatively impact socio-economic conditions of local population – residents of mountainous areas, and also residents of valley parts, since it will impact hydrological regime, which means it will impact farming. Loss of tree and shrubbery vegetation and pastures will force residents of mountainous areas to migrate to the valley part of the country.

The problem of ensuring of sustainable life activities in mountainous areas has the following features:

- Limitation and dispersion of natural resources;
- Low profitability of agricultural production;
- Predominantly seasonal character of labour;
- Degradation of mountainous settlements as a result of various natural processes and disasters; and
- Poorly developed infrastructure and detachment of mountainous population from centers of culture and life necessities.

At the present mountainous areas rapidly change in cultural, economic and natural resources aspects under the impact of development of transport and communications, greater integration with the economic of valleys and the entire world, growth of the population and development of tourism. Moreover, the structure of the population changes very often, in some places as a result of migration to valley town and city centers, in other areas – as a result of influx of new habitants.

Socio-economic factor includes food security, migration and political stability. Poor social groups oftenly do not have access to the most fertile lands, and settle with lands and resources which are mostly exposed to degradation. Poverty does not give them any other choice but to use, to the extent possible, present poor resources even if it leads to degradation of mountainous ecosystems.

In such conditions the problem of preservation of biodiversity and the Strategy on its preservation become top-priority among other plans of the country. That is why cooperation and registration of the issues of biodiversity in all main programs, plans of development and other initiatives are relevant.

NBSAP is focused on adoption of agreed decisions on use of biological resources and promotes harmonization of ideas of scientists, academic research and governmental directives for their implementation on the sites.

Forecast of Changes of Biodiversity

Natural factors and process of transformation of the status of biodiversity are appearing throughout the country, and one of the main is change of climate. Such factors are generally determinative and their prevention is not appropriate or feasible. These are taken into consideration upon development of program on preservation of biodiversity, e.g. development of activities on adaptation of valuable resources of agrobiodiveristy in conditions of climate chage (one of priority actions on preservation of biodiversity finance by GEF).

Processes of transformation of biodiversity as a result of human activity, i.e. anthropogenic effect. It is one of the main factors influencing biodiversity which is taken as a basis for development of operative working programs and action plans.

Over the past time anthropogenic effects on the territory of Tajiksitan are increasing and is expressed both by direct and indirect impact. The main types of expression of direct impact on biodiversity can be:

- Extensive system of cattle breeding resulted in uncontrolled and unsystematic year-round grazing on the same territories;
- Shortage of winter stocks of fodder forces the population to increase pasture forage days (periods of use and consequences of early cattle grazing);
- Low level of knowledge of farmers and cattle breeders about the system of cattle breeding and management of pasture resoucres;
- Underdeveloped infrastructure in rural areas (lack of roads, cattle-driving roads, medical services and poor access to veterinary service); and
- Many households and farmers do not have an opportunity to drive cattle to mountainous and high-mountainous summer grazings.

Under anthropogenic effects there can be observed active move of internal invasive species widespread in various elevation belts of the country. One of the main factors of inter-belt invasiveness is a longstanding drive of cattle from winter to summer pastures and back. At that pastures are getting polluted with weed plants because of flexible and better adapted character of the latter.

Forecast of Changes of Current Loads on Biodiversity

On the current stage of environmental-economic development of Tajikistan, the most vulnerable sectors are forest and pasture ecosystems. Examination of the past years has shown that because of increased loads by winter grazing in South Tajikistan the composition of short-grass savannah ecosystems has lost more than 15 species of high-productive legumes. Together with this, productivity of tall grass barley plant formations reduced by 2 centner per ha. The most vulnerable are forest ecosystems of arid zones. Areas of pistachio, almond and acer have significantly reduced (by up to 20 thousand ha). Thank to adopted measures, the area of reduction of forests is decreasing (see Table 14). Forest cover of areas destroyed in the past century by almost one half and preserved plantings damaged by cuttings are being regenerated. Even under selective cutting hydrophysical features of soil degrade, and under clean cutting soil dries out to the depth of up to 20-30 cm.

Despite that forests and shrubs in mountains play an important role in strengthening of lands, forests cover insignificant area of the country (4%). Great economic importance has the belt of pine forests because pine controls the flow of water system. Forests fall into 1st category, all of them perform environmental and soil protection functions, and cutting is strictly prohibited. However, over the past time because of lack of fuel we can observe cutting of trees and shrubs. Uncontrolled cutting of forests for heating and incorrect agrotechnical system of use of mountainous areas results in wash out of fertile soil layer and desertification of mountainous areas. According to estimates, over the past 10 years forest management has experienced significant damage.

Nut and fruit forests: the area has reduced by up to two times, provision of wood, nodule, fruits, and cattle grazing are still ongoing. Over the past 5 years it became possible to reduce the rate of degradation of forests and light forests by 60%. It is expected that by 2017 illegal cutting of forests will be absolutely stopped, and by 2020 by means of new plantings there will be conducted re-categorization of forests and, by this, the dynamics of increase of the area of forests will go up. Therefore, by 2020 the areas covered with forest will reach 0.5 million ha. By this time the real threat to unique genefond of epibiotic fruit forms, loss of soil-protective and water-regenerating functions, natural forest regeneration will be eliminated.

The reduction rate of pine forests under existing conditions can increase by 1-2%, however, under implementation of the program on forest regeneration and State Environmental Program the rate of forest degradation is decreasing by 5-7% and by 2020 will be completely stopped. For the past 50 years 36% of forests have disappeared, the area of light forests increased by 31%, progressive desertification of mountain slopes can be observed. In the area of spread of forests mudflows, avalanches, landslides became more frequent, floods became more intense and concentrated flow decreased.

Rates of forest regeneration are behind of deforestation rates. Rooting out, cutting and forest fires result in degradation of soil fertility, landslides and floods, changes in re-circulation of substances, climatic changes and extinction of many species of plants and animals.

The main reasons of deafforestaion are: use of wood for production of construction materials and furniture; use of woods as fuel; grazing of agricultural livestock. Forest plantings develop is going slow and regeneration is being implemented on insignificant scale, deafforestation is ongoing on account of loss of mature trees and, partly, of old-growth timbers. There are also forest fires, especially, in dry years. Fire-control is a difficult task because of cross-country terrain, insufficient provision with technical means of fire-fighting, transport, and communication tools.

For development of biodiversity the Government of the country has adopted necessary practical documents. These include:

- State Environmental Program for 2009 – 2019;
- State Program on Development of Specially Protected Natural Areas for 2005-2015;
- State Program on Cultivation, Collection, Processing of Medicinal Plants and Production of Medicines for 2005-2014;
- Forest Management Program of the Republic of Tajikistan for 2006-2015; and
- The Program on Reformation of Agriculture of the Republic of Tajikistan for 2012-2020.

In the frames of this project for development of biodiversity for the period of 2010-2012 there were implemented necessary practical activities, such as:

- The area of forest of state forest resources has increased by 108 thousand ha and is equal to 1776 ha, i.e. 6.5%;
- In comparison with 2010, in 2012 forest regeneration rates increased by 40.4%;
- Forest tending rate increased by 29.7%;
- Ensuring growth of tree plantings increased by 7.3%;
- Cultivation of tree plantings in tree nurseries increased by 10.1%, i.e. by 3 million 67-thousand pieces;
- Number of tree plantings for cultivation increased by 7% or by 204,000 piences; and
- The area of cultivation of medicinal plants increased by 5.6%, i.e. increased by 51 ha (see Table 14).

Table 16

The Main Activities on Preservation of Biodiversity of Forest Ecosystems for 2010-2012

#	Indicator Name	Unit	2013	2014	2015	Dynamics in percents for the past year «+» more, «-» less
1	The total area of state forest reserve	ha	1668	1668	1776	**+6,5**
2	Organization and regeneration of forests	ha	1196	1996	2803	**+40,4**
3	Forest tending	thousand ha	9,0	10,1	13,1	**+29,7**
4	Ensuring growth of tree plantings	%	61	64	68,7	**+7,3**
5	Forest pest control	ha	8000	9009	9171	**+1,8**
6	Preparation of lands	ha	1955.6	1996	2803,9	**+40,4**
7	Collection of seeds, tree plantings	tonn	22.4	23,2	24	**+0,8**
8	Cultivation of tree plantings in tree nurseries	thousand pieces	3590,0	3600,0	3670,0	**+10,1**
9	Tree plantings ready for planting and sale	thousand pieces	1870,0	1938,0	2074,0	**+7,0**
10	**Planting of medicinal and food plants (total, ha) including;**	**ha**	**900**	**935**	**951**	**+5,6**
	- Fetid gum	**ha**	**850**	**875**	**875**	**+1,6**
	- Pieplant	**ha**	**25**	**30**	**41**	**+6,4**
	- Anzur onion	**ha**	**25**	**30**	**35**	**+40**

Source: *The Committee on Environmental Conservation under the Government of RT*

For the purpose of preservation, regeneration and organization of new fruit forests and gardens in nurseries of forest management 3620 thousand of various tree plants are cultivated at average per year, and from this amount more than 2074.0 thousand are ready for planting. Part of tree plants are sold to other farms which at average equal to 0.8 – 1.0 million. Others promote the organization of more than 300.0 million ha of forests and gardens.

Table 17

Forest Productivity Stock for 2011-2012 (Within the Territory of State Forest Reserve)

#	Indicator Name	Unit	Period of Activity (2011-2012)			
			2012	**2011**	**In comparison with 2011 "+", "-"**	**"+" and "-" in percents**
1	Income generated by forests	thousand TJS	3098,0	2927,0	+171,0	+5,8
2	Forest products sales volume	thousand TJS	4320,0	4161,0	+159,0	+3,8
3	Provision of wood	cubic meter	9070	9016	+54	+0,6
4	Collection of fruits of wild-growing plants	tonn	140	124	+16	+12,9
5	Collection of medicinal plants	tonn	19	17,6	+1,4	+11,8
6	Brier	tonn	31	25	+6	+24
7	Dried fruits	tonn	148	131	+17	+13
8	Pistachio	tonn	55,6	0,0	+55,6	+100
9	Nuts	tonn	72,6	53	+19,6	+37
10	Bitter almond	tonn	14	11,1	+5,9	+27,3
11	Grain products	tonn	621,2	262	+359,2	+137
12	Collection of fodder cultivars	tonn	3999	2009	+1990	+99,1

13	Potato	tonn	197,4	109,8	+87,6	+80,7
14	Honey production	tonn	12,3	5	+7,3	+146

Source: *The Committee on Environmental Conservation under the Government of RT*

Loss of traditional agricultural cultures and species of local breeds of livestock reduce the capacity for preservation of genetic resources (*see section on genetic resources of agricultural ecosystems)* and use of respective benefits.

Analysis of Direct and Operating Mechanisms of Loss of Biodiversity

Annual average productivity of natural weight for 1 ha of fodder cultivars (alfalfa, barley, etc.) equals to more than 30-35 tonn. Herewith, productivity of natural weight for 36545 ha equals to more than 1,187.7 thousand ton which is not enough for keeping of more than 1.5 million small cattle or more than 198.0 thousand great cattle. Such amount of forage can be collected from cultivated area of more than 1.2 million ha. These facts indicate that reduction of area of cultivation of forage cultivars by 36545 ha will become the reason of degradation of more than 1.2 million ha of lands with 3 thousand species of vegetative diversity. Unfortunately, the recent restructurizations can aggravate implementation of proposed strategic objectives on sustainable preservation and rational use of biodiversity.

The direct consequence of these processes is reduction of species diversity with increase of the rate of plant species which are more resistant to grazing, extinction of epibiotic, endemic species, reduction of the areal of spread of economically-useful, including medicinal plants, increase of sparseness of shrubs up to their total disappearance. Especially great is negative impact from grazing on pine forest ecosystems.

Over the past years, due to lack of fuel forests are being actively cutted out. As a result mountain slopes are becoming bared, deposit of moisture in soil is going down, underground waters are reducing and land water runoffs are increasing, density and species diversity of plant stand are reducing, which aggravates the process of degradation of soil cover. In its turn, these factors intensify soil erosion and disturb hydrologica; regime of waters.

Areas with developed ore mining industry and areas affected by large manufacturing outfits are exposed to significant technogenic disturbance of natural status of bogharic lands and chemical pollution.

Soil degradation is also intensifying because of unsystematic recreation, organization of dumps around residential centers, impact of transport. Together with economic contraction all environmental protection actions were reduced to zero, while, anthropogenic load on natural resources, generally, increased as a result of internal migration processes and aggravation of life quality of the population.

The key factors of anthropogenic effects on natural ecosystems include: deforestation (industrial, sanitary and illegal cutting of forest); expansion of farm lands (on account of desertous-steppe submontane and aquatic-bog valley ecosystems); expansion of the net of ore mining enterprises; unsystematic cattle grazing; urbanization, expansion of communication net (roads, PTL, etc.); poaching, collection of medicinal materials, etc.

The process of extinction of number of vertebrate animals as a consequence of degradation of habitats and direct extirpation is especially noticeable on large mamals. First of all, reduction of areal and number of animals has affected representatives of hoobed and carnivores. Extinct carnivores include Caspian tiger and cheetah, and those which are close to extinction are – striped hyena, caracal, and Persian leopard.

One of unresolved issues which has impact on significant areas of arid zones of the Earth and which was transferred by humanity into third millennium is a process of desertification. There are two main groups of factors of coming into existence and development of desertification

processes – natural and anthropogenic, which in their turn can be sub-devided into internal and external, direct and indirect, respectively. Analysis of these data has shown that at the present time the most important of these for mountainous regions are economic activites which imposes significant risk of degradation on mountainous ecosystems. It should be mentioned that inside semi-desert and desert zones, which include mountainous ecosystems of Central Asia, desertification flow significantly more active because of internal instability of ecosystems where many natural processes undergo in extreme conditions. In such situation any anthropogenic interference, especially without prior consideration of natural features of the area, can act as an active process catalyzer.

The main indicators of desertification are reduction of productivity of plough lands, pastures and forest plots. It is caused by inconstant forms of human activity such as excessive land exploitation, excessive cattle grazing, deforestation and inadequate methods of irrigation. As a result of human activity more than 90% of the area of agricultural lands falls into the category which can be defined as prone to desertification. This category includes vast sites the bigger part of which is exposed to erosion and is used as pastures and tillage.

Development of erosion processes depends on a set of natural and anthropogenic factors. It is a result of impact of geological, geomorphical, climatic, soil-vegetal and economic conditions. The main reason of active soil degrataion in the zone of bogharic farming is reclamation of steep slopes, watershed areas of small rivers, ignorance of antierosion measures, etc. Loesses and loess loam which make up a great part of bogharic lands can be easily destroyed by flows of melted and rain waters.

In order to improve and ensure full identification of specificity of desertification of mountainous ecosystems it is necessary to: identify relevant criteria and indicators of desertification; identify monitoring sites; develop and compile basic and thematic operational maps of desertification; develop of datapool of cartographic and other relevant information.

Forecast of Changes of State of Biodiversity and its Consequences for the Republic of Tajikistan

Socio-economic conditions of the population of Tajikistan and, particularly, of population of mountainous areas, is seriously depending on the status of biodiversity. The basis for improvement of socio-economic conditions of households is cattle breeding, utilization of minor forest products, medicinal and food plants, home gardens, fruit gardens, cultivation of tree plants and agricultural cultivars, particularly, wheat, potato, gourds and, partly, vegetables. More than 64% of the population is engaged of this type of activities. There are almost no industrial sites in mountainous areas. Around 10% of the population works in government offices.

Table 18

Countrywise Dynamics of the Area of Wood and Fruit Cultivars for 2010 – 2012

Name	Unit	Totally in the Country			Difference between 2010-2012 (-;+)
		2010	2011	2012	
Total area	ha	120662	126417	132531	11869
- Gardens	ha	84258	88322	92594	8336
- Vineyards	ha	27317	28635	30019	2702
- Mulberry	ha	6205	6205	6205	0
- Citrus	ha	2366	2366	2366	0
- Mixed trees	ha	516	889	1347	831

Source: *The Committee on Environmental Conservation under the Government of RT*

Table 19

Dynamics of Trapping and Procurement of Some Species of Flora and Fauna

#	Name	2010	2011	2012
1	Bear	16	0	**16**
2	Blunt-nosed viper	0	0	**100**
3	Cobra	0	0	**100**
4	Argali	0	80 heads	**80 heads**
5	Dammar of ferule	200 tonn	220 tonn	**140 tonn**
6	**Liquorice**	**3000 tonn**	**3500 tonn**	**5000 tonn**

Source: *SO SPNA of the Committee on Environmental Conservation under the Government of RT*

Preservation of biodiversity is considered to be one of the most important environmental objectives of the country.

On the present stage in Tajikistan there is a relatively developed national environmental legislative base. It is represented in the form of the system of legal institutes, norms and regulations, and it develops with consideration of international agreements and conventions ratified by the country.

Legislation in the sphere of environment conservation is based on the principle of two-level system of legal regulation of environment conservation sphere. This principle involves state legislation and adopted in accordance with it normative legal acts, including on the level of local administration in accordance with established by legislation powers in the sphere of environment conservation.

Legislation in the sphere of environmental conservation covers quite a wide scope of environmental planning issues: preservation and utilization of land, water, biological resources, atmosphere air, landscapes, natural monuments, etc.

As key principles of environmental conservation, legislation establishes priority of environmental conservation and human health; it defines the policy with the aim to ensure environmental conservation; and, also, creates necessary legal regulatory framework for development of environmental legislation.

Key place in the hierarchy of legal acts in the sphere of regulation of natural management and environmental conservation belongs to **Law of the Republic of Tajikistan "On Environmental Conservation"** adopted in 2011. This law has replaced Law of RT "On Preservation of Nature" which was adopted in 1993. The Law "On Environmental Protection" is annually updated in direction of strengthening of control in regards of preservation and utilization of biodiversity.

Key issues of control, preservation and utilization of biodiversity are addressed in Laws of RT "On Preservation and Use of Plant Life" (2004), "On Wildlife" (2008), "On Special Protected Natural Areas" (2011), "On Biological Safety" (2005), "On Pastures" (2013), "On Collection and Rational Use of Genetic Resources of Cultivated Plants".

Law of the Republic of Tajikistan "On Preservation and Use of Plant Life" was adopted in 2004. Defines the principles of state policy in the sphere of preservation and rational use of flora, defines legal, economic and social basics in this sphere and is aimed at preservation and regeneration of flora.

Law of the Republic of Tajikistan "On Wildlife" was adopted in 2008 and has replaced the Law of the Republic of Tajikistan "On Preservation and Use of Wildlife" of 1994. The law regulates public relations in the sphere of preservation, rehabilitation and rational use of wildlife. The law establishes legal, economic and social basics of the sector and is aimed at preservation and rehabilitation of wildlife resources.

Law of the Republic of Tajikistan "On Special Protected Natural Areas" has replaced Law of the Republic of Tajikistan "On Special Protected Natural Areas" of December 13th, 1996. The law defines legal, organizational and economic basics of special protected natural areas (SPNA), defines their objectives, operation mode and zonation.

Law of the Republic of Tajikistan "On Collection, Preservation and Rational Use of Genetic Resources of Cultivated Plants" establishes legal basics of state policy in the sphere of genetic resources of cultivated plants and their wild congeners, and regulates relations in the sphere of collection, preservation and rational use of genetic resources for the purposes of operation of agricultural sector, ensuring foor, environmental and biological safety, implementation of academic and research, selective breeding, educational activities, and also for safeguarding of preservation of socio-cultural and historical heritage.

Law of the Republic of Tajikistan "On Biological Safety" was adopted in 2005. The law regualates activities on development, testing, production, import, export, release of engineered micro-organisms in the environment and market. The law is aimed at reduction of risks of adverse effects of genetically modified organisms on human health, biological diversity, environmental balance, and environmental status.

Law of the Republic of Tajikistan "On Environmental Expertise" was adopted in 2012 and has replaced the Law "On Environmental Expertise" of 2003. The law defines principles and the order of implementation of environmental expertise and is aimed at prevention of harmful effect of proposed economic and other activities on the environment and related to it social, economic and other consequences of implementation of the object of environmental expertise.

Law of the Republic of Tajikistan "On Environmental Education for the Population" was adopted in 2010. The law regulates legal, organizational, financial and economic principles of state policy in the sphere of environmental education for the population.

Law of the Republic of Tajikistan "On Environmental Monitoring" was adopted in 2011. The law defines organizational, legal, economic and social basics for ensuring environmental monitoring in the Republic of Tajikistan and regulates relations between bodies of state power, local administration bodies and citizens in this sphere.

Law of the Republic of Tajikistan "On Environmental Information" was adopted in 2011. The law defines legal, organizational, economic and social basis for provision of environmental information in the Republic of Tajikistan, promotes ensuring of rights of natural and legal persons for full, accurate and timely environmental information, and regulates relations in this sphere.

Forestry Code of the Republic of Tajikistan was adopted in 2011 and has replaced "Forestry Code" of 1993. Forest fund of the Republic of Tajikistan establishes the right for preservation of forests from fires, cutting and hunt on animals, preservation from pests and deceases harmful for forests.

Land Code of the Republic of Tajikistan was adopted in 1996. The code regulates land relations and is aimed at creation of conditions for rational use and preservation of lands, rehabilitation of soil fertility, preservation and improvement of the environment.

Law of the Republic of Tajikistan "On Land Reform" was adopted in 1992. The objectives of the land reform in Tajikistan are establishment of conditions for equal rights development of various forms of economic management of land, formation of mixed economy, rationa use and preservation of lands for the purpose of increased production of agricultural products.

Law of the Republic of Tajikistan "On Grazings" was adopted in March of 2013. The law manages public relations related to use of grazings. The law defines basic principles of pastures including key principles such as ensuring effective and integrated use of grazings, preservation of pastures and the environment.

Law of the Republic of Tajikistan "On Seed Breeding" was adopted in 2008 and has replaced the Law of RT "On Seed Breeding" of 2002. The law defines legal basics of activities on production and reproduction, processing, certification, commercialization of seeds and tree plants, and also of organization and implementation of registration of sorts and seed control.

Law of the Republic of Tajikistan "On Plant Quarantine" was adopted in 2009 and has replaced Law of RT "On Plant Quarantine" of 2001. The law defines legal and organizational basics in the field of ensuring plant quarantine and includes phytosanitary quarantine measures which promote preservation of plants from invasion, emerging and spread of pests, deceases and weed plants.

Law of the Republic of Tajikistan "On Fishery" was adopted in 2006. The law defines legal, economic and organizationl basics in this sphere for the purpose of global development, preservation and increase of fish stock, improvement of fish capacity of water reservoirs and meeting needs of the population in fish resources.

Law of the Republic of Tajikistan "On Beekeeping" was adopted in 2003. The law manages relations in the sphere of production of beekeeping products, preservation, use and reproduction of bee communities, their effective application for pollination of entomophilic cultivars, creation of conditions for improved productivity of beekeeping, and also plant cultivation, ensuring guarantees of protection of rights and interests of natural persons and legal entities engaged in beekeeping activities.

Law of the Republic of Tajikistan "On Mineral Resources" was adopted in 1994. The law defines legal bascis for assessment, preservation and use of mineral resources, and manages relations in this sphere. Limitation of use of mineral resources located on special protected areas is conducted in accordance with the status of such areas.

Water Code of the Republic of Tajikistan was adopted in 2000 and has replaced the Water Code of 1993. The objectives of the Water Code are preservation of state water fund and lands of state water fund for improved social conditions of the population and improved environment, preservation of waters from pollution, chokage, depletion, prevention and liquidation of harmful impact of waters, improved status and preservation of water objects.

State Ecological Program of the Republic of Tajikistan for 2009-2019 was adopted in 2009. The program is aimed at ensuring development of forest management acitivities, regulation of organization of hunt on the territory of hunting sectors; conduction of biotechnical activities on preservation and protection of wild animals and birds; inventory of fauna and maintenance of state cadaster of fauna; organization of ophidiarium, aviaries and nurseries for pullulation of animals which are listed in the Red Book; organization of cultivation area of medicinal plants; reconsideration of status of reserved areas, reserved forests and consideration of rationale of their re-profiling; organization of the net of micro-reserved areas and forests; maintenance of catalogue of unique natural sites and granting them status of protected areas, etc.

Mid-Term Plan of Implementation of Environmental Conservation Framework in the Repulbic of Tajikistan for 2010-2012 was adopted in 2010. The plan considers development of the order of registration of rare species of animals and plants, establishment of nurseries on cultivation of tree plants, and aviaries on pullulation and rehabilitation of wild animals and birds, construction of protective fence in SPNAs, promotion of electric energy supply to the population in nearby SPNAs, creation of buffer zones in reserved areas of Dashtidjum and Zorkul, regulatuion of economic activities in relevant zones, rehabilitation of quarantine service on preservation of forest ecosystems and development of monitoring system for forest ecosystems with utilization of remote sensing methods.

State Program on Development of SPNAs for 2005-2015 was adopted in 2005. The program was developed in accordance with the National Strategy and Action Plan on Preservation and Rational Use of Biodiversity of the Republic of Tajikistan, and implementation of the Law of the

Republic of Tajikistan "On Special Protected Natural Areas". The objective of the Program is to improve functioning of SPNAs of Tajikistan.

State Program on Development of Forestry Management in the Republic of Tajikistan for 2006-2015 was adopted in 2005. The main objective of the program is preservation, regeneration and effective use of forest resources.

National Action Plan on Environmental Conservation was adopted in 2006. The main objectives of the Action Plan for the mid-term perspective are:

- Development of the institutional capacity and informational systems necessary for ensuring long-term preservation of biological resources of Tajikistan;
- Safeguarding investments into specific projects which will use methods of conservation for resolution of root causes of loss of biological diversity.

State Program on Implementation of the Concept of Forecast Development of Legislation in Agrarian Sector and the Sphere of Environmental Conservation for 2012-2015 was adopted in 2012. The main objectives of the Program are perfectioning and strengthening the legal framework regulating relations in the sphere of agriculture and environmental conservation.

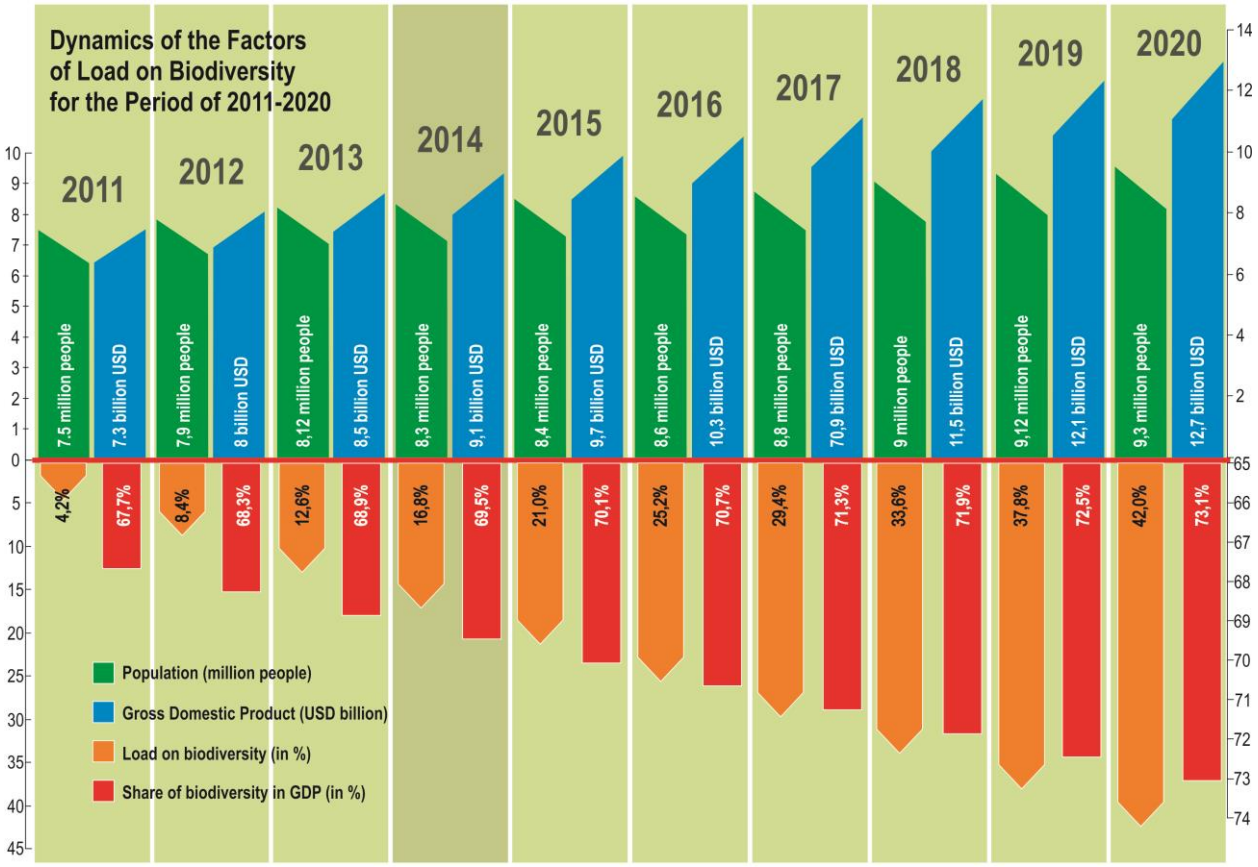
Program on Environmental Monitoring of the Republic of Tajikistan for 2013-2017 was adopted in 2012. The Program was developed in accordance with the Law of the Republic of Tajikistan "On Environmental Monitoring". The objective of the program is to conduct environmental monitoring including observation of the status of environment in the regions located in the sources of man-induced impact and the effect of such sources on the environment.

The Program on Development of Fishery Sector in the Republic of Tajikistan for 2009-2015 was adopted in 2008. The Program was developed with the aim to preserve, increase in amount, to improve genetic, productive qualities of fish and to ensure provision of the population with fish products and to create new jobs (see Tables 1.16., 1.17., 1.18).

Forecast of Dynamics of Changes Provided the Increase of Amount of Investments into Biodiversity and Ecosystems (on the basis of scientific uncertainty)

Thank to political and socio-economic stability in Tajikistan over the past years there are significant financial resources are being invested by the Government and international donors into development of economics, ecology and reclaimation of natural resources. Participation of donors' support and credits can be observed in almost all sectors. In such conditions, under increase of financial investments without consideration of environmental capacity of the territory and the volume of biodiversity, around 70% of the area of Tajikistan which was affected by serious economic impact and which has preserved undisturbed ecosystems can become affected by strong environmental loads.

Diagram 5



Block 1. This diagram shows the forecast of the dynamics of changes of GDP of Tajikistan and the input of biodiversity into the country's GDP. Presented data presents that from 2011 to 2020 in percentage ratio Tajikistan's GDP will increase from 6.5% to 10%, i.e. it will increase by more than 3.5% over 10 years.

The share of biodiversity in the country's GDP over this period will increase from 67.1% to 73.1%, i.e. it will increase by 6% over 10 years.

According to the forecast, for this period the population of Tajikistan will increase from 7.7 million to 9.3 million, i.e. it will increase by more than 1.8 million people or 360 thousan families over 10 years.

Considering socio-economic conditions of the country, population is seriously dependent on biodiversity, especially those 73.6% of the population which lives in villages and mountainous areas.

For this period (from 2011 to 2020) there is observed increase of the dynamics of the country's GDP per capita. According to the forecast, for this period country's GDP per capita will increase from USD 745 to USD 1661.1, i.e. it will increase by USD 916.1. In its turn, the share of biodiversity in the country's GDP per capita over this period will increase from USD 449.9 to USD 1214.3, i.e. it will increase by USD 764.4.

The forecast indicates that in order to stabilize the proportional ratio of biodiversity in the country's GDP composition it is necessary to annually develop and introduce political, legislative, educational, awareness, institutional, and practical measures on improvement of biodiversity management for more than 4.2% of the country's total GDP or USD 0.3 billion.

According to 10-year forecasts in order to stabilize the ratio of biodiverosty in the country's GDP it is necessary to implement activities for 42% or USD 2.3 billion.

The forecast indicates that under absence of measures on biodiversity management which would promote stabilization of ratio of biodiversity in the country's GDP the load on biodiversity will increase more than 42% or USD 2.3 billion from the country's total GDP.

Around 20% of the country's territory already experiences serious impact. So far, ecosystems located on these territories have preserved capacity which is necessary for compensation of man-induced impact.

Around 10% of the area of Tajikistan which is a habitat for 2/3 of the country's population is characterized by high degree of man-induced disturbance of natural ecosystems.

Due to increased economic activities over the past years, transformation of natural ecosystems has the tendency to expand, erosion and land degradation processes intensify. Despite relatively well-being of ecosystems some communities experience significant anthropogenic loads which can seriously damage natural ecosystems in the soonest time.

From the state budget in the frames of national programs and strategies resources are being allocated for implementation of focus projects on preservation of biodiversity, significant resources are being provided by international environmental organisations.

World Bank/GEF Project on "Preservation of Biodiversity of Reserved Forest Dashtidjum"

Objective: Demonstration and ensuring integrated approaches to preservation of globally important biodiversity on the territory of reserved forest Dashtidjum and support to the local population in implementation of environment-friendly economic activities compatible with biodiversity preservation goals. The global objective of the project is to support preservation of in-situ biodiversity of reserved forest Dashtidjum which has global importance.

Project coverage: Protected area of reserved forest Dashtidjum.

Project description: In two model areas (jamoats Dashtidjum and Yol) local communities have been implementing works which enable to balance income-generation (development of entrepreneurship) and preservation, regeneration, support functions of ecosystems and composition of biodiversity in such. Implemented activities on the basis of practical work experience and real generated income have started to develop new types of management of natural resources balanced with biodiversity preservation functions (for additional information see www.zakaznik.tj).

Progress made: Implementation of the project resulted in: improved technical, institutional and individual capacities on management of protected areas; strengthened control and monitoring system of rational use; creation of incentives for introduction of environment-friendly economic activities on the territory of the jamoats.

GEF/UNDP Project on "Preservation of Biodiversity of Gissar Mountains"

Objective: Improved efficiency of management and stability of three different protected areas located on southern slopes of Gissar Mountains, and, by this, to present models and to ensure duplication of experience gained on the entire territory of the national SPNA system.

Project description: Project activity includes work with main target communities and local authorities regarding the use of resources with the aim to define real plans on preservation of natural resources (see Component II) and then, by means of selection of top priority communities which produce the most significant negative consequences on the territory of three SPNAs, in the frames of the projct there will be undertaken pilot alternative activities on raise of the level of life-sustaining activities which propose options on achievement of the most stable life necessities with reduce of the negative impact on biodiversity.

Project coverage: Romit, Shirkent, Almay (three protected areas)

Progress made: Implementation of the project resulted in: increased efficiency of management in the three protected areas of the southern slope of Gissar Mountains and of sustainable use of lands, introduction of new management methods and strengthened capacity of SPNA; involvement of communities and stakeholders. New practical initiatives on alternative environment-friendly forms of management of natural resources nearby SPNA amd practical profit-generation were developed and introduced in model areas.

UNDP-GEF Project on "Sustainable Agrobiodiversity in Conditions of Climate Change"

Objective: Preservation of globally important agrobiodiveristy and its adaptation in conditions of climate change, and also introduction of agrobiodiveristy products into agricultural practices and policies on development of rural communities on the national and local levels in Tajikistan.

Project description: Using multi-faceted and innovative approaches the project has been for 4 years already and still is effectively promotes improvement of political and reulative frames on the issues of preservation of agrobiodiveristy, development and spread of adaptational measures on preservation of in-situ and ex-situ genetic resources and on strengthening of market capacity of local communities. Achievements and successful experience of the project cover the territory of 1.5 million ha of mountainous area and are being effectively introduced into local and national policies on preservation and adaptation of agrobiodiveristy.

Project coverage: Baldzhuvan, Shurobad, Rasht and Zeravshan.

Current progress: The project has implemented practical and educational initiatives on the area of 1.5 million ha and covered more than 360980 people, including through financial programs of the project (SGP and MLF) which had direct and indirect effect on more than 1122 households in 4 project rayons. In frames of the project there were created and regenerated in-situ and ex-situ gardens on the area of 52 ha, and area of grains was increased by 67.2 ha.

UNEP/GEF Project on "Support to the Republic of Tajikistan in Implementation of the National Biosafety Framework"

Objective: Support to the Republic of Tajikistan in implementation of the National Biosafety Framework in order to implement its duties as a party to UN Convention on Biological Diversity and Cartagena Protocol to it. Protection of biodiversity from possible negative consequences of LMO through ensuring safe transfer, processing, use and cross-border move of LMO. Another objective of the project is to develop Country Program, National Strategy and Action Plan on preservation and sustainable use of biodiversity.

Project description: In order to achieve the overall objective the project focuses on strengthening the capacity of Tajikistan in effective and full implementation of the National Biosafety Structure, which is in accordance with national development priorities, Cartagena Protocol and other international obligations.

Project coverage: National – Tajikistan.

Proposed progress: institutional and technical basics for implementation of obligations under Cartagena Protocol are established and strengthened, and the National Biosafety Program is introduced into effect. The process of biosafety information exchange is strengthened both on the national level and on the level of Biosafety Clearing House.

WWF Project on "Integrated Basin Management and Preservation of the Environment in Tigrovaya Balka. Basin of Amudarya River"

Objective: Preservation and rehabilitation of tugay forests in reserved area "Tigrovaya Balka".

Project description: In the frames of the project WWF creates the model of sustainable management of fresh water ecosystems in the reserved area in the basin of Amudarya river.

Project coverage: reserved area "Tigrovaya Balka"

Progress made: Measures have been implemented whch enabled to improve water-supply of the ecosystem in the reserved area, populations of rare species of animals and plants were rehabilitated on the territory of the reserved area, the area of Tigrovaya Balka was increased b 21 thousand ha in 2007 and by 100 thousand in 2008, technical and individual capacity on preservation and protection of local biodiversity was improved.

World Bank/GEF Project on "Development of Communal Agriculture and Management of Watersheds"

Objective: Development of soceities implemented by the Mountainous Societies Development Support Program - - MSDSP.

Project description: The grant has direct impact on support of project activities through application of approach of participation of society in introduction and distribution of sustainable practice of land utlization practice. This is implemented through ensuring access of communities to the necessary technical knowledge and materials (including access to high-quality seed material and tree plants) and by stimulation and development of capacity of independent individuals which provide services based on rayons with the aim of further supply of financing and support.

Project coverage: GBSO (Vanj, Darvaz and Rushan)

Current progress: The implementation of the newest initiatives was een launched on the area of three mountainous areas of GBAO – Vanj, Darvaz and Rushan with the aim of creation of successful model of repetition of practice in other watersheds in mountainous areas of Tajikisan.

"Support to Implementation of the Regional Action Plan on Environment in Central Asia" Project

Objective: Implementation of key aspects of the regional environmental action plan for Central Asia and creation of favourable conditions for its further implementation through capacity development and pilot projects in the sphere of management of land resources.

Description: Improvement of quality of the environment on the basis of sustainable land use in Central Asia through strengthening regional cooperation in the sphere of environment. The main goal is to implement certain key aspects, create regional capacity for replication and scaling of successful practices and approaches in this sphere.

Project coverage: Gissar and GBAO

Progress made: The mechanism of the regional cooperation on the issues related to regional management of environemtn was strengthened; support of decision making for the system of the regional environmental management was improved. Sufficient capacity for effective generation of information and applications on the basis of development of the system of Support to Decision Making was developed for sustainable development and management of land resources; participation of the civil society in the management of the regional environmental situation was improved, including participation in Interstate Commission on Sustainable Development of the Committee.

Demonstration of new approaches to protected rayons and to management of biodiversity of Gissar Range as a model for strengthening of the national system of protected areas of Tajikistan

Objective: Improved preservation of globally important biodiversity in Tajikistan through demonstration of new mechanisms and approaches to implementation of effective management of special protected natural areas and their natural resources.

Description: To increase efficiency and stability of management in the three selected protected rayons located on southern slopes of Gissar Range, and to ensure replication of the best models and practices onto other special protected areas.

Project coverage: Gissar region: reserved area, natural-historic park "Sherkent" and reserved forest Almosy, and nearby population centers in four rayons, namely, Vahdat, Gissar, Tursunzade and Shahrinav.

Progress achieved:

- The legal framework in the sphere of forestry management was improved, particularly, there were introduced recommendations and amendments were made into the Forestry Code of 1993 (revised version from 2.08.2011), and 2002 Law on Areas Protected by Law was replaced by the Law of RT on Special Protected Natural Areas (adopted in 26.12.2011).
- 4 nurseries were created on the total area of 4.75 ha, one in each jamoat. The biggest includes 4 ha of reserved forest on the territory of Tursunzade rayon where 240kg of seeds and 15000 of seedlings and tree plants were planted. Other support-receiving initiatives include: creation of medical center in Shahrinav (Almosy), provision of fresh water, organization of study trips to other JRC in Sogd oblast (Northern Tajikistan) and hosting of JRC from Sogd and Kyrgyzstan for excnahge of experience and knowledge.
- New alternative strategies of sustainable life inside and around SPNAs were introduced which promoted compensation of depleted national resources and reduction of scale of poverty.

Introduction and extension of effective methods of planning and management of protected areas of Tajikistan

Objective: Expansion of activities on improved efficiency of management in the system of protected areas of Tajikistan based on initiatives demonstrated in the frames of UNDP/GEF Project on "Demonstration of New Approaches to Protected Areas and to Management of Biodiversity of Gissar Range as a Model for Strengthened National "System of Protected Areas of Tajikistan".

Project coverage: 20 protected areas

Proposed progress: Legislative and regulatory frameworks in the sphere of management of SPNAs is strengthened; all SPNAs have individual management plans including financial instruments of planning; institutional and individual capacity of management of special protected natural areas is strengthened.

Preservation and use of agrobiodiveristy (fruit cultivars and their wild congeners) in Central Asia

Objective: Provision of farmers, institutes and local societies with knowledge, methodology and policy on preservation of globally important in-situ/ on farm fruit cultivars and wild fruit varieties in Tajikistan.

Project description: The project promotes sustainable development of agriculture, ensures food security and environmental stability. The project pays particular attention to traditional local sorts of fruit cultivars and their wild representatives growing in forests, and the ability to preserve diversity of these cultivars by farmers and society on particular landscape.

Project coverage: The entire territory of the Republic of Tajikistan.

Progress achieved: Assessment of the scale and level of diversity of target cultivars and respective traditional knowledge was conducted. Key farmers whose nurseries were used for increase of local sort of fruit cultivars and their wild sorts are identified, and demonstrational plots for publication of the informarmation on the web-site are identified. The format of

informational system for data collection is developed. Public awareness on importance of local agrobiodiveristy was raised through distribution of leaflets, through television and radio.

Rehabilitation and sustainable management of alluvial forests in Gorno-Badakhshan Oblast

Objective: Reduction of degradation of natural resources and increase of the level of life of the rural population.

Description: Demonstration and introduction of effective methods of forest use, application of new technologies for the purposes of sustainable use of natural resources.

Project coverage: GBAO

Progress achieved: Degraded plots of forest massives were rehabilitated; the control on livestock pasturage on the rehabilitated plots was strengthened. Price chain of forest products was strengthened for the purpose of creation of incentives for sustainable management of forest plots and generation of income by farm holders. Modern technologes of use of natural resources were introduced which promote preservation of biodiversity and improve welfare of the population.

Program on sustainable use of natural resources in the Central Asia

Objective: Management of pastures, forests and resources of wild nature on economically-viable, socially acceptable and ecologically stable basis.

Description: The project develops and implements new mechanisms of management and preservation of forest and pasture territories, sustainable and rational use of wild nature resources.

Project coverage: The entire territory of Tajikistan.

Progress achieved: Legal basis on sustainable use of forest resources was strengthened, new effective methods and technologies of use of natural resources were introduced, successful experience was gained beyond the borders of project territories, incliding neighbouring countries. Partner approach to management of pastures was adapted to local conditions and now can be integrated legally and institutionally. The program now works on transfer of sustainable approach to management of pastures in Tajikistan.

Project on Modernization of Hydrometeorological Service in the Central Asia

Objective: Reduction of risks related to weather and climatic events unfavourable for human life and economics through improved hydrometeorological and climatic services for economic development of the entire region.

Description: The quality of hydrometeorological and climatic services in the Central Asia is improving, cooperation between the national state meteorological services of the Central Asia in exchange of data, information and knowledge for is developing and strengthening for rehabilitation of the infrastructure and human capacity, risks of natural disasters are reducing, management of consequences of climate change and promotion of economic development of the entire region is improving.

Project description: Tajikistan.

Proposed progress: To achieve “satisfactory" level of Tajik Hydrometeorological Center in terms of technical support (compatible with the average technological level of НГМС in the member-countries of WMO); more reliable hydrometeorological and climatic prognosis directly promoting economic development of the Republic of Tajikistan, particularly, regarding development of agricultural, water management and hydroenergetics sectors, and counter measures to natural disasters and climatic changes; increased quality and expanded spectrum of

informational products provided in the form which is comfortable for user; the system of data and information exchange is improved, particularly, in regards of natural disasters on the regional level.

UNDP/GEF Project Third National Communication under UN FCCC

Objective: Provision of support to the Republic of Tajikistan in preparation and submission of the Third National Communication on Climate Change to the Conference of the Parties not included in Annex I (specified in the Articles 4 and 12 of the Convention).

Description: The project makes input into the global efforts on improvement of understanding of sources and drains of greenhouse gas emissions, of potentinal impact of climate change and identification of effective counter measures on achievement of final goal of UN FCCC, which provides "stabilization of the concentration of greenhouse has emissions into atmosphere on the level which would prevent dangerous anthropogenic interference into climatic system".

Project coverage: Tajikistan

Progress achieved: The project will make significant input into achievement of goals UN FCCC, and implementation of measures directed at environmental stability in Tajikistan. The project will also strengthen the mechanism of information transfer and strengthening of cooperation with the stakeholders among governmental and non-governmental organisations, society and private circles. The results of the project will prove authenticity of climatic risks to priority sectors (natural resources, national economics and population health) of Tajikistan. In its turn, such reliable base will be based on qualitative analysis in the Third National Communication and will provide opportunities for integration of adaptation methods and measures on reduction of greenhouse gas emissions in national programs and plans on development. On the other hand, reliable base will be fully used for preparation of other projects and programs on climate change and sustainable development.

The policy of the country in the sphere of financing of biodiversity and ecosystems is regulated by the Law of the Republic of Tajikistan "On State Budget". Generally, activities on preservation and regeneration of biodiversity are financed from the state budget, local budgets, environmental conservation funds, private funds and funds of international organisations. The quantity of resources is identified on the basis of activities and political documents such as the National Strategy and Action Plan on Preservation and Rational Use of Biodiversity of the Republic of Tajikistan, National Action Plan of Environmental Conservation, State Ecological Program, State Program on Develoment of Special Protected Areas, State Program on Cultivation, Collection, Processing of Medicinal Plants and Production of Medicines from Such, Program on Development of Forestry Management of the Republic of Tajikistan, and other national projects.

Financing of Environmental Conservation throught State Budget and Other Sources

For sustainable development of biodiversity (forests, SPNAs, preparation of human resources, academic work and other) there are yearly at average spent more than 19.66 million TJS from the sources of state and local budgets, environmental conservations funds, funds of international organisations and private sources:

- From state budget –8.4 million TJS;
- Environmental conservation funds, special funds of the CEP – more than 10.4 million TJS; and
- Private sources (individuals and farming households) – more than 0.86 million TJS.

At the expense of international organisations (direct and indirect projects) implementation of grant projects has been launched for the total amount of 49 million USD. In 2011 for environment-oriented projects it was spent around 19 million USD, in 2012 –30 million USD.

Under donors' support there are implemented significant volumes of financing for sustainable development of biodiversti (forests, SPNAs, preparation of human resources, academic work and other).

With the aim of strengthening the capacity on the issues of adaptation to climate change international organisations have allocated 50 milllion USD from the Adaptation Fund. In 2011 implementation of 5 pilot projects for the total amount of 19 million USD was launched which will promote (direct and indirect) adaptations of biodiversity to climate change.

Besides that, at the expense of the project on development of agriculture in Forestry Management Office of Gissar rayon there were cultivated 2 ha of forest which required 11 thousand USD.

Implementation of international projects for the total amount of 30 million USD was launched in 2012, including the project of the Wrold Bank on sustainable land use with the budget of 16 million USD.

Bilateral agreement was signed between the Governments of Tajikistan and Germany on implementation of 2 projects on sustainable forestry management for the amount of 10.8 million USD.

1. "Adaptation to Climate Change through Sustainable Forestry Management in Humid Spillway Basins" – 2.8 million USD.
2. "Adaptation to Climate Change through Sustainable and Multifunctional Forest Regeneration" – 8.0 million USD.

There is also FAO project on forest regeneration with the budget of 3.2 million USD.

Table 20

Financing of Environmental Conservation from State Budget and Other Sources for 2010-2012

(million TJS)

№	Funding Sources	2010	2011	2012	Dynamics over 2010-2012
1	State budget (excluding salaries)	7,9	8,4	9,7	**26,0**
2	Environmental conservation foundation and special sources	6,2	8,1	10,4	**24,7**
3	Private sources – total	19,32	21,86	24,1	**65,28**
	Including				
	Agriculture and forestry	0,32	0,86	1,1	**2,28**
	Industry	19,0	21,0	23,0	**63,0**
4	International organisations – projects on preservation of biodiversity	1,3	19,0	30,0	**50,3**
5	Investments into environmental conservation	9,95	10,3	11,1	**31,35**
	Total:	**63,99**	**89,22**	**119,3**	**382,21**

Source: *The Committee on Environmental Conservation under the Government of the Republic of Tajikistan*

CHAPTER III. NATIONAL STRATEGY AND ACTIONA PLAN ON PRESERVATION OF BIODIVERSITY: IMPLEMENTATION AND ENSURING CONSIDERATION OF BIODIVERSITY TOPICS IN PUBLIC SECTORS AND CIVIL SOCIETY ORGANISATIONS

The strategy of preservation of biodiversity for countries with predomination of the agricultural sector ensures sustainable development and guarantees socio-economic and environmental stability of nature and society.

The main principles of NBSAP correspond to requirements and methodology of all-European and Asian conceptual approaches. Acceptance of these principles demonstrates the link between NBSAP and other similar strategies and indicates that approaches of the Republic of Tajikistan match the approaches practiced in other countries.

The strategy corresponds to the principles stated in the Convention on Biological Diversity which ensures indentity equivalence of strategical directions with other countries and represents coordninated on the international level scheme on preservation of biodiversity.

The main objective of the Strategy is preservation and rational use of biological diversity and preservation of ecosystems for the purpose of sustainable socio-economic and environmental development of the Republic of Tajikistan.

Other objectives of the Strategy are:

a. Integrated socio-economic evaluation of national biological resources;
b. Regeneration and ensuring preservance of the genetic fund of plants and animals;
c. Preservation of *in-situ* and *ex-situ* biodiversity;
d. Ensuring biological safety of the country; and
e. Sustainable use of biological resources for poverty reduction and improved welfare f the population.

Goals of the Strategy propose implementation of consequent and task-oriented actions in accordance with timeframes and amounts of financing.

State-wide pricniples of development and implementation of the National Strategy and Action Plan on biodiversity:

- Decisions are based on qualified research, practice and information, with consideration of social and economic issues.
- Access or transfer of certain technologies should support environmental conservation and its sustainable use.
- Active participation of society and support to the measures on preservation of biodiversity are essential; strengthened activity on rising of awareness of the population.
- Responsible officers of the Strategy must coordinate and negotiate their actions within and between the projects.
- Implementation process of the strategy must be transparent with easy and clear access to information, including financial information.
- Activity must be effective, including in regards of costs.
- Activity must integrate and be constant – with continuation of different steps.
- Adequate technologies and methods must be used for implementation of the activity.
- Areas and status of natural ecosystems shall be preserved and regenerated.

- Priority must be given to endemic species.
- Wherever possible activity must be based on local traditions and knowledge.

The main goals of the National Strategy are:

- Creation of economic mechanism which corresponds to preservation and rational of biological and landscape diversity.
- Attraction of internal and external investments to support preservation and rational use of biological diversity.
- Ensuring sustainable development and rational use of the country's biodiversity on the level of ecosystems, species, intraspecific groups, useful ancestral forms.
- Identification of the country's needs in utilization of biodiversity based on the country's priorities and with consideration of country's features.
- Identification of the mechanism and method of rational use of biodiversity and options for its preservation by government structures, institutes and organisations.
- Identification of position of the society and strengthening of its role in preservation of biodiversity.
- Introduction of input into implementation of the state strategy on poverty reduction.

Adoption of the Strategy for the following 10 years will create pre-conditions for ensuring implementation of obligations under the Convention on Biological Diversity.

Objectives of the Republic of Tajikistan in the Sphere of Biodiversity in Accordance with Aichi Targets

National objectives and goals of the Republic of Tajikistan are developed in accordance with country's priorities and Global Targets and Strategic Plan on Biodiversity for 2011-2020 and include 5 strategic goals and 20 targets. Targets are devided into short-, mid- and long-term.

STRATEGIC GOAL A. ADDRESS THE UNDERLYING CAUSES OF BIODIVERSITY LOSS BY MAINSTREAMING BIODIVERSITY ACROSS GOVERNMENT AND SOCIETY

National goal A: By 2020 to include biodiversity preservation topics into working programs and plans of state and public organisations as one of the key aspects of sustainable development of the Republic of Tajikistan.

Target 1. By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.

1.1. The population of Tajikistan is aware and provided with educational and awareness-raising materials on the level of jamoats about importance of indicative (dominant and baseline) biodiversity species;

1.2. By 2016, at the latest, by decision of jamoats measures are adopted in regards of preservation of unique components of biodiversity (plant and animal species, their communities and ecosystems, particularly, local genetic resources of fruits);

1.3. By 2018 in schools must be created museums of biodiversity and live collection plots of local fruit genetic resources;

1.4. To make banners and posters about rare endangered species of plants and animals, and also electronic graphic maps of biodiversity; and

1.5. Courses on biodiversity education are introduced into academic programs of general education institutions and institutions of higher education, 2015-2020.

Target 2. By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems.

2.1. Development of eco-economic classification of biodiversity no later than 2016;
2.2. Evaluation and introduction of value of biodiversity into the system of governmental accounting (the State Committee of Statistics) of RT no later than 2018;
2.3. Creation of multi-level system of collection and evaluation of data on the status of biodiversity no later than 2017; and
2.4. Development of the mechanism of introduction of the society into the process of decision making on the issues of preservation and sustainable use of biodiversity and management of SPNAs, by 2017.

Target 3. By 2020, at the latest, incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio-economic conditions.

3.1. By 2019, at the latest, to develop the system of incentives for the population residing in the zones of habitat of valuable types of foresters and, mainly, fruit genetic resources;

3.2. Development and transfer of the cartographic system to local authorities with indication of coordinates of habitats of rare endemic species of plants and animals, and also preservation of their habitats;

3.3. Development of the system of incentives for the population residing in the zones of habitat of valuable foresters and, mainly, fruit genetic resources, and also preservation of habitats of endemic animal species.

3.4. Development of proposals on formation of the eco-economic mechanism of incentives for preservation of biological diversity and sustainable functioning of ecosystems on the basis of target budget financing;
3.5. To conduct state inventory of the land with assessment of importance for biodiversity, by 2019;
3.6. To conduct analysis of the current system of cooperation between governmental structures on the issues of environmental conservation and rational use of natural resources, during 2014-2017; and
3.7. To introduce the practice of incentives for introduction of the methods of "green economy"; gradual transition to environment-friendly and power efficient technologies, during 2014-2016.

Target 4. Parliament, Government of the country and local authorities strengthen the legislation on the national, local and sectorial levels and adopt measures for sustainable regulation of use of natural resources, and mainly, biological resources.

4.1. Development of the system of legal regulation of relations between users of natural resources and environmental conservation bodies with the aim of sustainable preservation and use of biological diversity;

4.2. Local legislative bodies during their sessions discuss and take decisions on obligations under the Convention on Biological Diversity; and

4.3.Local bodies of state power on their sessions listen to the report of the users of natural resources and give their evaluations, take decisions on rational use of natural resources.

STRATEGIC GOAL B. REDUCE THE DIRECT PRESSURES ON BIODIVERSITY AND PROMOTE SUSTAINABLE USE

National goal B: Reduction of biodiversity loss rates in natural ecosystems including xerophytic lightwoods and savannas, absolute termination of forest cutting in habitats of genetic resources; introduction of incentives for stimulation of preservation of biodiversity.

Target 5. Introduction of incentive mechanisms in preservation zones of natural habitats of biodiversity, particularly, genetic resources and especially valuable species for the purposes of food security, medicine and selective breeding.

5.1. Provision of the population residing in the zones of natural habitats of biodiversity (flora and fauna) with fuel and construction materials;

5.2. Prevention of extermination of valuable biodiversity species (up to 60%) of their total area and number of indicative and common animal species;

5.3. Continuation of forest regeneration, running of forest regeneration works until forest communities are formed, i.e. registration and transfer of regenerated forest to better formed categories;

5.4. Creation of living collections of forest genetic resources in forest sites;

5.5. By 2020, at the latest, to conduct fieldworks and inventory of forests and light forests;

5.6. Introduction of the special regime of use of forest recources and collection of forest products in walnut and pistachio forests; and

5.7. Regulation of number of animals on the territory of winter pastures and update of cartographic materials for summer pastures at least after 10 years, and for actively used winter pastures – after 5 years.

Target 6. Regulation of use of natural resources, strengthening of control, establishment of the regime of use of natural resources in water conservation zones and belts in aquatic and semi-aquatic ecosystems with presence of local fish species, aquatic and limnetic animal species, including rare endemic species, including their habitats and spawning sites.

6.1. Prevention or reduction by up to 50% of entry of foul waste waters into ecosystems inhabitated by rare endemic fish and other aquatic animal species;

6.2. By 2020, at the latest, to develop cage culture methods of fish re-production in rivers with dams and hydraulic structures;

6.3. By 2020, at the latest, to improve fish protection structures in water reservoirs with hydraulic structures; and

6.4. Assesment of the status of fish resources in natural and man-made water reservoirs by types of ecosystems and mountainous natural zones.

Target 7. Sustainable management of land use with consideration of representative preservation of biodiversity, and ensuring sustainable preservation of migration channels and diversity in accordance with approved national and regional eco-net.

7.1. Expansion of the buffer zone and migration channels of the reserved area Tigrovaya Balka for the purpose of preservation of и коридоров миграции заповедника Тигровой балки в целях сохранения aquatic-boggy lands;

7.2. Re-structuring and zonation of the reserved area Romit and strengthening of protection of the area's first-order middle;

7.3. Inclusion into land cadaster of the zone of eco-net and eco-rayons as individual categories in accordance with Econet schemes; and

7.4. By 2017 to include the issues of landscape biodiversity preservation into land organization plans.

Target 8. By 2020, at the latest, to identify and conduct inventory of aquatic ecosystems of Tajikistan by geographic zones and natural belts, to conduct assessment of the level of their vulnerability, and to adopt measures on reduction of the level of biogenic substances for safe state of biodiversity.

8.1. Reduction of the level of wastes and pollution of the atmosphere and biogenic substances in water zones of reserved areas and SPNAs, in general;

8.2. In the zones of irrigated farming, by no later than 2018, to rehabilitate the system of collector and drainage net of water conservation zones and belts of major rivers of Tajikistan;

8.3. To improve resistance of ecosystems and to increase the input of biodiversity into accumulation of carbon for promotion of mitigation of climate change consequences through rehabilitation of desert and light woods ecosystems; and

8.4. Strengthening the control of transport systems on international traces which directly cross through SPNAs.

Target 9. By 2020, at the latest, invasive and alien species are registered, classified, and identified for the purpose of elimination of their threat to the local biodiversity, and measures on regulation of paths of their motion and introduction are developed.

9.1. Identification of root causes of development of invasive species in different natural belts and ecosystems;

9.2. To develop the list (cadaster) of the most dangerous invasive and acclimatized species by 2016;

9.3. To develop the system of combating invasive species, including sanitary and phytosanitary standards by 2017; and

9.4. To develop management plans on reduction of the threat of invasive species for wild animals and wild congeners of cultivated plant species.

Target 10. This target is not relevant for Tajikistan since it does not have access to sea.

STRATEGIC GOAL C. TO IMPROVE THE STATUS OF BIODIVERSITY BY SAFEGUARDING ECOSYSTEMS, SPECIES AND GENETIC DIVERSITY

National goal C: Strengthening and improvement of protection of ecosystems and species diversity, particularly, genetic resources of wild congeners of cultivated plant species and their form diversity.

Target 11. By 2020, at the latest: To improve and strengthen preservation and rational use of biodiversity in order to ensure optimal provision of ecosystems services, particularly, high-mountain cryophyte, low-mountain sand-desert ecosystems, xerophyte light forest ecosystems, savannah ecosystems. Therewith, mesophile broad-leaved walnut ecosystems have top priority.

11.1. By 2015 it is necessary to conduct typologic and inter-typological classification of ecosystems and to develop research on establishment of their capacity for various scenarios of economic ecosystems services;

11.2. By 2020, at the latest, to develop management plan for all ecosystems with consideration of intensity of ecosystem services;

11.3. To develop indicators of sustainability of ecosystems status;

11.4. To establish by law the regime of regulation of ecosystems services in the zones of habitat of wild congeners of wood fruit genetic resources; and

11.5. Development of touristic activities on the territory of SPNA of the Tajik National Park, including other (Shirkent, Sarikhosor) and distribution of profits from use of biodiversity, for enhancement and preservation of biodiversity.

Target 12. By 2020 to conduct full inventory, cartography and conditioning of habitats of and sites of rare species of biodiversity which are under the threat of extinction, and to develop mechanisms of rehabilitation and prevention of the threat of reduction of species and populations, to define the status of their preservation and use.

12.1. Development and integration of the system of data base with support of cartographic materials for implementation of monitoring and conduction of rehabilitation measures on preservation of valuable ecosystems;

12.2. By 2020, at the latest, to rehabilitate sand-desert haloxylon ecosystems on the area of 1200 ha;

12.3. Constant maintenance of the Red Book of the Republic of Tajikistan no less frequently than once in 10 years from the date of publication, the latest edition is planned for 2014;

12.4. Development of at least 25 action plans on particular ecosystems and priority plan and animal species; and

12.5. Development of restrictive measures for conduction of economic activities in accordance with Econet scheme.

Target 13. By 2020 to develop e-catalogue (album) of genetic resources of the main plant and animal species, their wild congeners, assessment of valuability of genetic resources by regions and ecosystems sectioned by ecologic districts, ecosystems and their importance for the global, regional, national and local biodiversity.

13.1. Inventory and identification of habitats of genetic resources and the status of protection of their use in conditions of natural vegetation and spread;

13.2. Building of capacity for implementation of Nagoya Protocol;

13.3. Establishment of stool-beds in ex-situ and in-situ on farm conditions and development of the map of their habitat; strengthening the capacity on the level of jamoats;

13.4. Introduction of local communities into agricultural practice and for vulnerable population stratums the selection of adapted to climate change sorts and forms of genetic resources, development of the market and increase of the volume of profit from genetic resources and ecosystem services, 2018; and

13.5. Development of normative legal acts on preservation and rational use of genetic resources of plants.

STRATEGIC GOAL D. ENHANCE THE BENEFITS TO ALL FROM BIODIVERSITY AND ECOSYSTEM SERVICES

National goal D: Capacity building and enhancement of measures on rehabilitation of mountain-steppe, mountain-meadow, savannah ecosystems for improved productivity of and social role of biodiversity and ecosystem services, increase of the amount of income sustainably generated by ecosystem services and traditional technologies.

Target 14. By 2020 to specify representativity of the ecosystems included into the list of SPNAs; to conduct assessment of ecosystems by the level of valuability for ecosystem

services; measures are taken to rehabilitate the most valuable ecosystems supporting ecosystem services.

14.1. Registration of population of valuable indicative species of biodiversity is undergoin on the territory of SPNAs and beyond, as well as assessment of their ratio and status;
14.2. Development of the system of evaluation and monitoring for regeneration of valuable ecosystems and ecosystem services, in general;
14.3. By 2020 to expand the area of valuable forest resources for at least 1000 ha on account of lands of State Forest Fund and State Land Stock Fund with broad engagement of households into development of forestry;
14.4. To develop and adopt the National Stragety on Rehabilitation of Degraded Lands; to rehabilitate no less than 5% of degraded lands by no later than 2017; and
14.5. To develop the system of small grants, low-interest loans and microcredits for projects on preservation of biodiversity, 2016-2017.

Target 15. By 2020 to improve resistance of the ecosystems and to increase the input of biodiversity into accumulation of carbon through preservation and regeneration of valuable natural mountainous ecosystems, rehabilitation of restructurised ecosystems by at least 15% which will promote mitigation of consequences of climate change and adaptation of biodiversity and combating desertification.

15.1. Increase of the area of local ecosystems and sprigging of the sites of clean felling of forests (mid and low-mountains) through rehabilitation of haloxylon forests, pistachio forests, walnut forests and other wild-growing fruit cultivars in Southern, Central Tajikistan and on the territory of Samgar-Asht massif;
15.2. Implementation of the projects on creation of forests and sustainable development of mountainous forests and land resources in conditions of climate change on the area of 30 thousand ha, 2014-2017; and
15.3. Rehabilitation of *ceratoides* and construction of canals in desert territories of cryophyte high-mountain ecosystems on the area of up to 2000 ha beginning from 2015 until 2020 for mitifation of consequences of climat change.

Target 16. To develop the concept of implementation of goals and targets stated in Nagoya Protocol and establishment of governmental working group. By 2017 to develop the mechanism safeguarding the access to genetic resources and joint distribution of profits in accordance with requirements of the Convention on Biological Diversity.

16.1. Development and implementation of educational and briefing programs on the issues of use of genetic resources and gen-enged activities;
16.2. Introduction of the topics of genetic resources and gen-engineering into programs and training aids of special-oriented, specialized secondary schools and higher educational institutions, 2015-2018; and
16.3. Organization of the system of access and regulation of access to genetic resources in the country for exchange of germoplasm and conservation of the data base of genetic resources.

STRATEGIC GOAL E. ENHANCE IMPLEMENTATION THROUGH PARTICIPATORY PLANNING, KNOWLEDGE MANAGEMENT AND CAPACITY BUILDING

National goal E: Strengthening of capacity, enhancement of activiteness of sectors and society in mobilization of financial resources for effective preservation of biodiversity and stability of ecosystem services.

Target 17. By 2015 the Republic of Tajikistan will develop and adopt NSACPB, and will accept as a political instrument effective joint and updated National Strategy and Action Plan on PReservtaion of Biodiversity; by 2020 to launch its implementation.

17.1. Development of the series of programic and planned legal and directive documents on the integration of various sectors of state and public organisations, rapprochement of their positions on joint implementation and support to preservation and sustainable use of biodiversity and ecosystem services;
17.2. Integration of biodiversity preservation issues into administrative-legal, economic-financial sectors of the country; and
17.3. Assessment of the input of biodiversity into the country's economics and increase of financial streams for sustainable preservation and use of biodiversity.

Target 18. By 2020 traditional knowledge, novations and practice of native and local communities which are important for preservation and sustainable use of biodiversity and use of biological resources are included into legal-regulative documents as a mechanism of sustainable preservation and use of biodiversity in accordance with the national legislation and UN Convention on Biological Diversity.

18.1. To conduct review and analysis of the relevant capacity of knowledge and traditional technologies present in the country, 2016;
18.2. To develop normative and administrative measures on protection of the rigths of local communities for technologies, traditional knowledge and practices, 2016;
18.3. To develop the strategy on strengthening the capacity on preservation of traditional forms of biodiversity, increase of production of biodiversity items destined for internal and external markets (mulberry, brier, buckthorn, oleaster, fig, *ziziphus jujuba*, alycha, hawthorn, medicinal plants);
18.4. Support by the government of traditional knowledge, novations and practice of local communities in use of biodiversity and ecosystem services, organization of traditional household productions;
18.5. To strengthen social protection of local communities and vulnerable sectors of the population through the volume of profits from use of biodiversity resources and ecosystem services;
18.6. To safeguard preservation and use of traditional knowledge and increase the ratio of local community in profit sharing, promotion of traditional knowledge and practices of local communities on preservation and sustainable use of biological diversity, 2015-2020; and

18.7. To ensure protection of no less than 10 holy places with consideration of national traditionals, spiritual values and undisturbed biodiversity.

Target 19. By 2020 to modernize the scientific basis and technologies related to biodiversity, its cost estimate, value and functioning of ecosystem services; widespread use, transfer and application of knowledge, information on their status and trends in this sphere, changes, and consequences of its loss.

19.1. To develop the system of advanced vocational training for school teachers of biology and also biology experts working in scientific organisations;
19.3. To develop and publish textbooks and training aids on biology and present-day biological disciplines for general and higher education institutions;
19.4. To create conditions for, and to coordinate the integration of the results of scientific and research works into political, legislative , practical and institutional frameworks in the sphere of preservation of genetic resources, rare endangered species of major indicative species of animals;
19.5. To strengthen the coordination between biological scientific institutions of the Academy of Science of the Republic of Tajikistan, general and higher education institutions; and

19.6. To keep improving the training of the personnel of the highest qualification in research and science institutions and higher education institutions, including through exchange of experience and postgraduate study programs with other countrues.

Target 20. By 2020, at the latest, mobilization of financial resources for effective implementation of the Strategic Plan in the sphere of preservation and sustainable use of biodiversity for 2011-2020 must be significantly expanded in comparison to the current rates, from all the sources and in accordance with generalized and agreed process in the frames of the Strategy on mobilization of resources.

20.1. To safeguard budgetary funding of the activities on preservation of biodiversity and to include target funding of specific activities aimed at preservation of environment-forming ecosystems (forests, gardens, savannahs, steppes, aquatic, etc.) into the National Strategy and Action Plan on Preservation of Biodiversity; and

20.3. To develop and attract international technical, consultative and financial assistance for the implementation of projects on preservation and sustainable use of biological diversity.

Revised National Biosafety Strategy of the Republic of Tajikistan

From the moment of submission of the NBSAP of 2003 the main situation in Tajikistan described in the document has changed, and, therefore, NBSAP is subject to revision due to various reasons. One of them is that the document was developed many years ago and needs to be updated because of new priorities in the sphere of biodiversity. Moreover, the Strategue Plan of Preservation of Biodiversity for 2011-2020 and Aichi Goals have set new tasks and goals on preservation of biodiversity which have to be considered in the updated NBSAP.

In accordance with requirements of the UN Convention on Biological Diversity and the Strategic Plan on Biodiversity, the main aspects in development of the Strategy are:

- Analysis and identification of the main threats to the components of biodiversity;
- Collection and assessment of data for monitoring;
- Identification of the processes and types of activities posing a threat to biodiversity;
- Assessment of the possible economic consequences of sustainable use of biodiversity;
- Cost estimates of biological resources;
- Assessment of top-priority measures related to protection and sustainable use of biodiversity; and
- Consideration of biodiversity on various sectors or mainstreaming.

The process of research, including development of the informational data base and collection of the baseline data on biodiversity and its status, forms the basis of planning of protection of biodiversity which must ensure implementation of the actions on fulfilling of provisions of the Convention on the national level.

In the process of planning it is considered not only the necessity of inventory and monitoring of biological resources, but also the need in economic expenses appearing as a result of implementation of activities related to biodiversity. This is a precondition for development of the adequate practical mechanisms for getting the assessment of economic expenses and benefits related to biodiversity.

Informational basis of the Strategy is also an analysis of the influence of internal and external factors of risk for biodiversity.

The Procedure of Revision of the National Biodiversity Strategy and Action Plan

In the process of developing of the Strategy, the national priorities have been set on the basis of the analysis of the wide range of information. The main analysis of the status of biodiversity was

assessment of its internal capacity with consideration of assessment of the legal framework, availability of informational nets, and organizational capacity.

Another factor that was considered in the process of developing of the strategy was the country's potential of rational use of its biotical wealth. With consideration of natural and historical conditions of the development of biodiversity and the current conditions of its components and in the frames of the National Strategy it is necessary to take effective measures on the following priority directions:

- Establishment of the inter-institutional coordination bodie for management of biological diversity in the frames of single state policy;
- Improvement of the scientific and research basis on preservation of biodiversity and biosafety;
- Improvement of the system of management of the existing special protected natural areas of various levels and creation of new ones which would create environmental framework for organization in future of sustainable use of biodiversity;
- Preservation of *in-situ* and *ex-situ* biodiversity;
- Creation of the system of biological monitoring and development of the electronic Base and Bank of Data on Biodiversity;
- Rising of awareness among the wide range of the public;
- Harmonization and practical activities for the goals of preservation and sustainable use of biodiversity and ecosystems;
- Development of the economic mechanism which would promote preservation and rational use of biological and landscape diversity;
- Attraction of internal and external investments for support of preservation and rational use of biological diversity;
- Ensuring sustainable development and rational use of tbe country's biodiversity on the level of ecosystems, species, intraspecific forms, useful inherited forms;
- Identification of the country's needs in use of biodiversity based on state priorities with consideration of the country's features;
- Identification of the mechanism and method of rational use of biodiversity and the options for its preservation on behalf of the governmental structures, institutions and organisations;
- Identifications of the place of society and enhancement of its role in preservation of biodiversity;
- Making an input into implementation of the State Strategy on Poverty Reduction.

Specified main priority directions of the National Strategy are the basis for development of the Action Plan on Preservation and Rational Use of Biodiversity of the Republic of Tajikistan.

Brief Summary of the National Biosafety Strategy and Action Plan

Content of the National Strategy and Action Plan on Preservation of Biodiversity of the Republic of Tajikistan is developed in accordance with guiding principles, decisions and recommendations of the Conference of Parties to the UN Convention on Biological Diversity. It includes:

CONTENT

1. Introduction

- Background information (objective of the strategy, objective of the action plan, stages, etc.)
- Mandate of the country, President, Government, Parliament, National Center on Biodiversity and Biosafety

- The process of update
- Methodology used
- New principles and actions
- Structure of the document

2. Concept and Importance of Biodiversity of Tajikistan

- The framework for preservation of biodiversity
- The principles of monitoring and supervision (the systems of control and monitoring)
- Importance of biodiversity for development and economics of the country

3. Biodiversity in the International Context

- Global trends
- Interrelation between biodiversity of Tajikistan and the global biodiversity
- International agreements
- Strategic plan on biodiversity

4. The State of Biodiveristy of Tajikistna

- Species diversity
- Ecosystems and habitats
- Genetic diversity

5. Evaluation of Achievements on Implementation of the National Action Plan on Biodiversity (Past Experience on Preservation of Biodiversity)

- Preservation of species
- Preservation of species' habitats
- Protection of genetic diversity

6. Mainstreaming (Achievements on Preservation of Biodiversity in the Relevant Spheres)

- Spatial planning and development of residential centers
- Forestry
- Agriculture
- Research
- Education
- Production of services/trade and consumption
- Tourism, sports, recreation, hunt
- Transportation

7. The Concept of Preservation of Biodiversity

- Mission
- Strategic goals
- Activities
- Monitoring and supervision

8. Strategic Goals

- Goals, objectives, activities and brief rationale
- Indicators and control mechanism

9. From Goals to Actions

- The strategy of implementation of activities on preservation
- Cooperation and partnership
- Integration of NBSAP into the national policy
- Impact on the environment, economics and society
- Financial and human resources
- Integration, monitoring and evaluation

Annex

- About the country
- Territories of valuable BD/ABD
- Table of conversion to Aichi Goals and national goals and targets

List of Acronyms
Glossary

The main directions of the National Action Plan on Preservation of Biodiversity of the Republic of Tajikistan include only the list of directions generalizing the groups of specific actions on implementation of the National Strategy.

Preservation of biodiversity requires both rational use of biological resources and integration of the policy of sustainable development into management of the ecosystems, and taking under protection by the Government of indicative and unique natural sites. For this purpose there were adopted general and specific principles on preservation of biodiversity acknowledged in the majority of the countries worldwide.

The components of the Strategy were systematized in accordance with the period of implementation: short-term – less than 5 years, mid-term – up to 10 years, long-term – more than 10 years. Implementation of many components of the Strategy on geo-systemic level requires no less than 10 years, on ecosystems level – from 5 to 10 years, on the level of components related to protection of species, preservation of genetic fund and preservation of *ex-sity* species – up to 5 years.

For implementation of Aichi Goals there were developed national targets which cover all issues related to global targets. In the action plan of NBSAP there will be identified the main executors and sources of funding. Funding for implementation of NBSAP will be partly covered by existing sources. However, for implementation of wide rang eof activities planned for the next 5 years it is necessary to revise existing financial mechanisms and to search for new sources of funding. These measures will ensure increase of investments from various sources and will enable NBSAP to become from well-developed plan into self-sustaining process.

CHAPTER IV. THE MAIN MEASURES ON IMPLEMENTATION OF THE UN CONVENTION ON BIOLOGICAL DIVERSITY AND ACHIVEMENTS IN PRESERVATION OF BIODIVERSITY FOR THE PERIOD OF 2009-2013

For purposes of implementation of the national planning on preservation and sustainable use of biological diversity and for implementation of the undertaken obligations under the Convention there was developed the National Strategy and Action Plan on Preservation of Biodiversity of the Republic of Tajikistan.

In the context of the efforts made by the Government in the direction of preservation and sustainable use of the national biodiversity there were also developed and adopted the following documents:

- National Action Plan on Environmental Conservation (NAPEC)
- Environmental Conservation Framework until 2015
- State Environmental Program for 2009-2019
- Management Plan for Dashtidjum Reserved Forest and Tigrovaya Balka Reserved Area
- Eco-Nets Development System of the Republic of Tajikistan on the Basis of ECONET
- State Program on Development of SPNAs for 2006-2015
- State Program on Forestry Management for 2105
- Strategy of Transition of the Republic of Tajikistan to Sustainable Development
- National Strategy of Development of the Republic of Tajikistan until 2015
- Poverty Reduction Strategy for 2001-2003, 2007-2009, 2010-2012
- National Action Plan of the Republic of Tajikistan on Mitigation of the Consequences of Climate Change
- Program on Imporvement of Provision of the Population of the Republic of Tajikistan with Clean Drinking Water for 2008-2020
- State Program on Assessment and Preservation of Glaciers of Tajikistan for 2010-2030

- Recommendations on Implementation of Work Program on SPNA CBD

Every year the report on preservation of biodiversity of RT and series of other strategic documents and programs is submitted to the Government of RT. The Government has adopted a number of laws and regulatory acts governing the issues of biodiversity and environmental conservation: the Law of RT "On Pastures", "On Genetic Resources", "On Biological Economic Management", and others.

In actual fact, these documents recognize importance of stable, healthy and clean environment for successful economic development, and also dependence of survival of humanity from vitality of biosphere. The programs call for balance between economic interests and bearing capacity of the environment.

The main tasks on preservation and improvement of the environment, and training of everyone on importance of rational use of natural resources and the best ways to achieve it are defined which include the necessity for integration of all sectors of society (Government, private sector, non-governmental organizations and wide public).

Corresponding Measures Taken for Implementation of the Convention on Biological Diversity (2009-2013)

One of the first steps of the Parties to the Convention in its implemetation, including Tajikistan, is activity of the governments on creation, development and attraction of the necessary structural capacity (institutional and human resources). For implementation of the obligations under CBD there are involved many state bodies, research and science institutions, public and non-governmental organizations, which compose the main structural capacity for implementation of CBD on the national level.

CBD goals are also reflected in various other sectors, programs, plans, state strategies. The main bodies of state regulation which are involved in the process of resolution of the issues of biodiversity preservation to one extent or another are Majlisi Oli (Parliament of RT), the Government of RT, the Committee on Environmental Preservation, the Academy of Sciences, the Ministry of Agriculture and Tajik Academy of Agricultural Sciences (TAAS), SO of Hydrometeorology of CEP, the Ministry of Economics and Trade, the Ministry of Justice, the Ministry of Finances, RDC ICSD, REC CA and some other organisations.

The Government of the country ensures legal regulation of relations between users of natural resources, and protects biodiversity. The Government, particularly, through its competent authorities performs direct control of the national resources and national economics. Maintenance of such control must constantly get better in terms of quality and efficiency.

The process of development of the National Strategy and Action Plan on Preservation of Biodiversity is implemented under supervision of the Committee on Environmental Conservation, the Ministry of Agriculture and the Committee on Land Tenure Regulations. The process of implementation of NBSAP is provided by all stakeholders and partners of the country. Coordination of works, evaluation of the progress and development of the report to the Government are assigned to the special body in the Republic of Tajikistan – the National Center on Biodiversity and Biosafety which is headed by the National Focal Point on Biosafety of the Republic of Tajikistan.

Each year NCBB ensures cooperation of all state and public bodies in the country, works with donors and presents proposals on investments and priority projects for upcoming steps. The process of development of the report is transparent and is available to all stakeholders. There are 5 steps in this process.

The main steps and stages of achievement of NBSAP goals:

1. Assessment of activities and initiatives implemented by various ministries, institutions, organisations in accordance with priority goals of the Action Plan to NBSAP.
2. All the data is entered into the special data base of NCBB for registration of the status of the national biodiversity and for analysis of the working process on NBSAP.
3. Assessment of collected data.
4. Development of a report to the Government of RT with proposals on the following priority activities on biodiversity.
5. Further, development of working plans and projects in accordance with strategic plans and priority issues of biodiversity.
6. Development of reports and presentation of these to the partners, submission to the Government of RT.
7. For the purpose of development of new initiatives on implementation of NBSAP, NCBB initiates and implements workshps, trainings, working meetings with partners for harmonization and understanding of subsequent goals of NBSAP and successful implementation of such.

NCBB constantly conducts work on integration of biodiversity preservation topics into other state plans and programs, and sectorial initiatives, concepts, programs and plans of environmental regulation and development (CBD Articles 6a, 6b). It is particularly important in regards of water sector, forestry and agriculture, energetics, city planning and other. For more effective functioning of all systems in the frames of CBD Tajikistan uses the mechanism of financing in the frames of the Convention for the national implementation of CBD (CBD Articles 8m, 9e, 20.1) and, at the same time, fulfills its obligations on payments of contributions into the Convention.

Initiatives undertaken by the Government of Tajikistan in political, legislative and economic aspects on improvement of the environment have created favourable conditions for development of SPNAs and implementation of measures on rehabilitation and preservation of biodiversity. Actions proposed in NBSAP aimed at improvement of the institutional, legislative, educational and scientific basis in the system of the state environmental structure, and also reorientation of use of natural resources onto environment-friendly forms of economic activities, including mountain tourism and recreation, can significantly promote poverty reduction and preservation of the unique biodiversity of Tajikistan.

The National Strategy and Action Plan on Preservation and Sustainable Use of Biodiversity was adopted by the Decree of the Government of Tajikistan from September 1st, 2003. NBSAP is focused at five strategic goals: (1) economic and social assessment of the national biological resources; (2) regeneration and preservation of the genetic fund of plants and animals; (3) *ex-situ* and *in-situ* preservation of biodiversity; (4) ensuring of biological safety of the country; (5) sustainable use of biological resources for the purpose of poverty reduction and impoved quality of life. Fifteen priorities for biological preservation were identified, including creation of the national eco-net and preservation of each ecosystem of Tajikistan, including in-situ and ex-situ preservation with key actions defined in addition to all of the priorities.

Tajikistan recognizes the need and implements the revision process of NBSAP, establishes national goals in accordance with Aichi Goals, development of economic mechanisms which enable implementation and effective integration of activities of non-governmental organisations and private sector into action.

Connection between the Measures Adopted and Results of the Status and Trends in Biodiversity Sector, and Its Consequences for the Welfare of People

At the present time national programs on development of SPNAs cover 22% of the country's territory. Among these is ECONET program which prescribes reorganization and expansion of SPNA system through creation of buffer zones and also other zones of use of natural resources in addition to development of the special action plan defining duties and deadlines for implementation of activities. Plans on establishment of new natural parks and expansion of already existing are at the stage of implementation. At the present time more than 10-15% of species diversity of animals and plants and 5-7% of species diversity of genetic resources are preserved in SPNAs.

Management plan on preservation of flora and fauna biodiversity in SPNAs highlights multi-level monitoring of indicative species of flora and fauna in this region. In the course of development of the plan assessment of biodiversity was conducted. Those who are engaged in development of the management plan revised the principles of use of natural resources, property rights and lease of forest resources. Information on duties of users of natural resources and dependence of the local population on natural resources in various oblasts was collected in cooperation with local administrations and communities which play an important role in implementation of project activities. Besides that, in cooperation with the Global Forest Coalition (GFC) three model areas were assessed for identification of the fundamental reasons of deforestation in Tajikistan. These results were presented at the national workshop which, for the first time in 20 years, considered the main reasons of degradation of the mountainous forest ecosystems and its relation to socio-economic development of rural areas.

Efforts on preservation of biodiversity in Tajikistan include both in-situ and ex-situ preservation. In-situ preservation is going in SPNAs but without specific programs on the sites. Ex-situ preservation of plant species and genetic diversity is implemented in a number of botanical gardens and centers which exist in the country including in the Central Botanical Garden of the Tajik Academy of Sciences, Pamir Botanical Garden and Botanical Station in Varzob mountains. "Bogparvar" Center conducts research on development of plant nurseries on preservation of valuable genetic resources of wild fruit trees in their distribution areas. Development of such private nurseries through the Small Grants Program of the Global Environment Fund (GEF) turned out to be profitable for private entrepreneurs and also attracted interest among local entrepreneurs. Another program that was established is communities program on forest regeneration. In "Tigrovaya Balka" SPNA was created the center of ex-situ preservation of Persian gazelle using "Karatag" methodology of State Department on Forestry Management which is engaged in relocation of Bukharian deer in aviary conditions.

Various projects have been implemented in order to raise awareness on importance of preservation of biodiversity resources and in regads of the role and functions of local administration bodies and rural population in the implementation. Over the past several years interest to the issues (for instance, to energy-saving strategies) has increased as a result of information campaigns and training presented by NGO to the population of the country. Specific educational, informative and awareness-raising programs for farmers on genetic value of wild fruit trees conducted by "Bogparvar" Center have also promoted rising of awareness on preservation of valuable biodiversity of agricultural ecosystems. Plans also consider expeditions to the parts of the Central Asian, including Tajikistan, for identification and collection of rare and endangered local species of plants and support to genetic diversity.

Input of the Republic of Tajikistan into implementation of priority programms and cross-cutting issues of CBD

The National Strategy on Preservation of Biodiversityof Tajikistan was developed in accordance with recommendations of articles of the Convention on Biological Diversity.

In conditions of Tajikistan not all the articles, thematic areas, programs and cross-cutting issues of the Convention can be applied. For instance, there are no mangrove forests, coral heads tropic and sub-tropic forests, real deserts South Seas;

Even in the frames of the Annual State Report on Environmental Conservation it is not possible to unite all the achievements and limitations in the sphere of environmental conservation.

The present National Report provides an opportunity of synthesis of implementation of obligations of RT under specific articles of the Convention. The general evaluation of the degree of priority of the CBD articles for Tajikistan is presented in the Table 21.

Table 21

Evaluation of the Degree of Priority of Fulfilment of Duties under Specific Articles of the UN Convention on Biological Diversity in the Republic of Tajikistan

Article/Provision/Program of Works	Priority Level		
	High	Mid	Low
a) Article 5 – Cooperation	x		
b) Article 6 – General Measures for Conservation and Sustainable Use		x	
c) Article 7 – Identification and Monitoring		x	
d) Article 8 – *In-situ* Conservation	x		
e) Article 8(h) – Alien Species		x	
f) Article 8(j) – Traditional Knowledge and Relevant Provisions		x	
g) Article 9 – *Ex-situ* Conservation	x		
h) Article 10 – Sustainable Use of the Components of Biological Diversity		x	
i) Article 11 - Incentives			x
j) Article 12 – Research and Training		x	
k) Article 13 – Public Education and Awareness		x	
l) Article 14 – Impact Assessment and Minimizing Adverse Impacts		x	
m) Article 15 – Access to Genetic Resources		x	
n) Article 16 – Access to and Transfer of Technology	x		
o) Article 17 – Exchange of Information	x		
p) Article 18 – Technical and Scientific Cooperation		x	
q) Article 19 – Handling of Biotechnology and Distribution of its Benefits			x
r) Article 20 – Financial Resources		x	
s) Article 21 – Financial Mechanism		x	
t) Biodiversity of Agriculture		x	
u) Biodiversity of Forests		x	
x) Biodiversity of Arid Subhumid Lands		x	
y) Biodiversity of Mountainous Areas		x	

Direct impact of particular activities implemented in the frames of the National Strategy in regards to implementation of the articles of the Convention can be evaluated as:

Article 6 – General Measures for Conservation and Sustainable Use

- The National Action Plan and Program on Preservation of Biodiversity is developed;
- The National Action Plan on Environmental Conservation is developed;

- Projects are implemented on: protection and conservation of biodiversity of aquatic-boddy lands and tugay ecosystems in Tigrovaya Balka reserved area, on conservation of rare species – Bukharian deer, Persian gazelle, pheasant, markhoor, etc.

Article 7 – Identification and Monitoring

- The system of state eco-monitoring and sectorial forms of tracking of particular components of biodiversity are functioning;
- In the frames of scientific programs conducted by academic and university science, inventory of particular components of biodiversity components of the country and particular rayons is under implementation;
- Annually tens of reports on systematics, taxonomy, floristry and faunistry, reviews of flora and fauna of specific regions and assessment of the status of biodiversity are published.

Article 8 – *In-situ* Conservation

- For the period of development of the National Strategy the area of SPNAs increased by over 22% from the country's total area. New SPNAs were established and the area of Tigrovaya Balka reserved area and the Tajiki National Parl, which was introduced into UNESCO World Herritage List in 2013, was expanded;
- The Program on Development of SPNAs is in force until 2015;
- SPNA Eco-Net was developed in accordance with the regional project on ECONET;
- The Red Book of Tajikistan is under revision for its second edition.

Article 8(h) – Alien Species

- It was the National Strategy that paid attention to the acute problem of invasion of alien species in Tajikistan, particularly, to the situation in the rivers of Southern Tajikistan, Pyandj and Amudarya which were invaded by alien fish specie – snakehead which came from the rivers of Uzbekistan and which threatens rare fish species;
- Several scientific workshops and conferences were were conducted on assessment of the situation with invasive alien species, scientific summaries, academic articles and materials focused on the issue were published; the topics of scientific research were expanded.

Article 8(j) – Traditional Knowledge and Relevant Provisions

- With the support of international funds, primarily, GEF, in a number of regions of Tajikistan there were implemented projects focused on integration of complex management of ecosystems on the local level and conservation of traditional knowledge in the sphere of use of natural resources (in the reserved area of Dashtidjum of Southern Tajikistan and in Gissar Mountains of Central Tajikistan).

Article 9 – *Ex-situ* preservation

- New methods of ex-situ preservation of biodiversity in Tajikistan are developing, including creation of labarotory genebanks (cells, tissues) and natural genebank (collections) for preservation of rare threatening species;
- Tajikistan has signed Nagoya Protocol and carries out work in these sphere with botanical gardens, selective breeding stations; constant exchange of materials between Russia and Euroean countries is ongoing; experiments on re-introduction of species into nature are conducted;
- In the frames of GEF Project on Ex-Situ Preservation of Agrobiodiversity there were conducted significant collection and stock gardens of valuable plant species;
- There is certain progress in regards of ex-sity preservation (captive propagation) of some mamal and bird species.

Article 10 – Sustainable Use of Components of Biological Diversity

- Progress in this sphere is not very evident as in regards of other articles of the Convention; but, overall, adoption of the Law of RT "On Fish Culture, Fishing Inductry and Conservation of Fish Resources" (19.09.2013, #1021) there have appeared legal grounds for transition to sustainable use of aquatic bioresources;
- The National Strategy has inititiated the process of transition of the country's forest sector to sustainable use of forest resources with orientation on conservation of forest biodiversity; precisely after adoption of the Strategy there have happened drastic changes in forest management.

Article 11 – Incentive Measures:

- Development and improvement of the legal framework and law enforcement after 2008 (there were adopted the new Forest and Water Codes, the Law "On Fish Culutre, Fishing Industry and Conservation of Fish Resources" (2013) and other; there were developed draft laws "On Pastures", "On Preservation of Genetic Resources of Plants", "On Biological Economic Management, etc.);
- Improvement of state regulation in the sphere of use of biological resources (including the system of payments and fines for excessive use of biological resources); control and detection of violations in the sphere of protection of biodiversity (in certain regions the number of environmental offences in this regards has raised from 3 to 5 times).

Article 12 – Research and Training

- Training of personnel for identification of systematics and taxonomy in preservation and sustainable use of biodiversity is most fully presented in the training process of biological departments of the Tajik National and Pedagocial universities which have courses on ecology and biodiversity integrated in their educational programs;
- Tajik higher educational institutions prepare 1000 ecology specialists each year, including those specialized on various topics (over the past three years this number has raised over 2 times);
- In the line of international research programs implemented in the frames of grants of international donors by the Russian representative office of the World Fund on Wild Nature and non-governmental organisations there were conducted scientific conferences for youth and excursions to the country's SPNAs.

Article 13 – Public Education and Awareness

- Environmental education in the country started to cover all age groups of the population – from with schoolchildren and up to those who improves their professional training; there are many environmental NGOs in the country, summer environmental camps; in reserved areas and national parks there are conducted excursions and training activities;
- Educational and informational quarterly journal "Tabiat" is published, in which there are regularly published materials on ecological education in the area of preservation of biodiversity;
- CEP publishes monthly newspaper "Navruzgoh" which contains articles on ecology, biodiversity issues;
- On the national television and radio there are periodicaly broadcasted programs on ecology and biodiversity which tell the public about uniqueness of biodiversity of Tajikistan;
- The National Center on Biodiversity and Biosafety annually conducts workshops, scientific conferences and trainings on various topics of biodiversity and biosafety.
- Booklets, stands, handbooks on biodiversity and SPNAs of Tajikistan are published.

Article 14 – Impact Assessment and Minimizing Adverse Impacts

- After adoption of the National Strategy into the assessment of impact of major projects on the environment and their environmental assessment there are now included the issues of preservation of biodiversity;
- Under the CEP there is a department of Environmental Monitoring duties of which include conduction of environmental monitoring of objects and their impact on the environment;
- The Government has adopted the Law "On Environmental Monitoring" (from March 25th, 2011, #707) which defines organizational, legal, economic and social grounds for implementation of environmental monitoring and regulated the issues of the monitoring – the complex of measures on conduction of observation, assessment, prognosis of the status of particular components of the environment, natural territorial complexes (geo-systems), natural and natural-anthropogenic objects.

Article 15 – Access to Genetic Resources

- The Law "On Genetic Resources of Plants" was adopted in Tajikistan (August 1st, 2012, #892) which regulates relations in regards of collection, preservation, research and rational use for the purpose of maintenance of the agricultural sector, ensuring food, environmental and biological safety;
- In accordance with recommendations of the National Strategy there were conducted international conferences "Conservation of Genetic Resources" (Dushanbe 2011) and "Biodiversity and Its Importance in Environmental-Economic Development of Tajikistan" (Dushanbe 2013): thematic reports and articles about genetic resources of plants are developed;
- In the frames of GEF/UNDP Project "Sustainable Agrobiodiversity in Conditions of Climate Change" there was implemented a number of important events on in-situ and ex-situ conservation of genetic resources.

Article 16 – Access to and Transfer of Technology

- In Tajikistan there are applied technologies in the sphere of preservation of biodiversity on conservation of rare and endangered species, sub-species and populations, including markhoor, Persian gazelle, Bukharian deer, pheasant, etc.; on keeping and captive propagation of rare and endangered species on the basis of specialized nurseries in reserved forests and reserved natural areas.

Article 17 – Exchange of Information

- The system of exchange of information was established in Tajikistan in the sphere of conservation of biodiversity which creates the nest of portals and web-sites of state ministries, services and agencies and their territorial subdivisions, scientific organisations, including institutes and centers of the Academy of Sciences of Tajikistan, public organisations.
- By the NCBB there were developed the national web-sites on biodiversity and biosafety clear houses of the Republic of Tajikistan which periodically lighten the issues of biodiversity and biosafety.

Biodiveristy of Agriculture

- Works on inventory of achievements of selective breeding have started, registries of achievements of selective breeding in the sphere of crop and animal husbandry are developed;

- The National Center of Genetic Resources under the Academy of Agricultural Sciences is in operation, and it ensures preservation of genetic resources of agriculture, development of the data base on genetic resources of cereals and fruit cultivars;
- State Program on Development of Agriculture until 2015 is under implementation.

Biodiveristy of Forests

- The issues of forest biodiversity are listed in the Concept of Sustainable Use of Forest Resources;
- Approved by the Government of RT "The Program of Development of Forestry of the Republic of Tajikistan until 2015" which dedicates specific parts to preservation of forest biodiversity is under implementation.

Challenges to Effective Implementation of the CBD

One of the main challenges to implementation of the Convention is insufficient efficiency cooperation between ministries, agencies, organisations and insufficient transparency of actions in various regions of the country. Besides that, the policy in the sphere of biodiversity is almost absolutely not getting improved and that is why even capacity of relevant NGOs focusing on preservation of biodiversity is not developing well enough and not improving their capacity. Over the past 5 years for the purpose of restructuring of governmental agencies the scheme of management of environmental protection institutes and bodies has changed 3 times, which had highly negative impact on abovementioned issues.

Insufficient awareness of newly appointed officers, weak infrastructure, low level of knowledge of human resources promoted misunderstanding of harmonization of programs of environmental stability and conservation of biodiversity. This resulted in mass violations of environmental legislation in almost all regions of the country (cutting of forests, illegal hunt, excessive collection of medicinal and food plants for export to other countries, etc.) Inadequacy of management resulted in stagnation in environmental bodies and disunited other partners in regards of environmental initiatives. Inadequate activity of law-making and poor development of by-law which are supposed to improve mechanisms of implementation of legislation on preservation of biodiversity, prevent proper dialogue and cooperation between executive ministries and agencies during adoption of important environmental decisions.

Unfortunately, at the present time in the country there is no mechanism of adoption of incentive measures and programs. This challenges implementation of many initiatives on preservation of biodiversity and on planned priority of works.

Efficiency of Implementation of the CBD in the Republic of Tajikistan and Consideration of Biodiversity Topics in Respective Sectorial and Inter-Sectorial Strategies, Plans and Programmes

Over the past time in Tajikistan the topics of biodiversity find greater reflection on sectorial and inter-sectorial levels.

The Government of RT has adopted environmental program approved by Decree of the Government of RT by 27.02.2009, #123, which is a state document identifying the main directions os stable development of the society, support to the balance between natural resources and their users, organization and coordination of relations between users of natural resources and the nature, healthy development of the society, rational use of natural resources and also the ways of regeneration of destructed environmental space. Implementation of proposed by the Program measures provide opportunities to resolve the issues of rational use of natural resources

and conservation of the environment, because there are still unresolved environmental issues in the society.

Implementation of the Program is considered for transition of the country to the period of sustainable development, increased socio-economic level with attraction into turnover of new large-scale natural resources (lands, air, plants, forests, mineral resources).

The program includes special part on "Preservation and Regeneration of the Environment" which sets the goal to preserve and regenerate landscape and biological diversity which would be enough to support ability of natural systems for self-regulation and correction of the consequences of human activities.

Exactly this target is listed in the sectorial legislation regulating specific forms of use of natural resources (fishing industry, forestry, etc.) and also into mid-term strategy of work of CEP responsible for development and implementation of the state policy in this sphere.

The most comprehensive review of the issues of preservation of biological diversity and formation of the policy of sustainable use of biological resources are considered during formation of development policy in forestry management and fishery sectors. In other spheres, such as agriculture, industry, tourism and other, consideration of biodiversity topics is not comprehensive, and the first steps on attraction of attention to such issues are made.

Consideration of Biodiversity Topics in the Poverty Reduction Strategy and Other Key Tools of Crosscutting Policy, and in Operation of Various Sectors of the Economy

On the national level in 2005 in Tajikistan for the purpose of increase of the level of living of the population the Government of Tajikistan has adopted the long-term strategy of development of the Republic of Tajikistan for the period until 2015, and developing from it mid-term Poverty Reduction Strategy for 2010-2012. The strategy represents mid-term socio-economic program for development of the country.

It contains concrete actions aimed at improvement of the quality of life and welfare of the population, promotion of economic and social development, and reduction of the level of poverty in the country. The Poverty Reduction Strategy consists of three parts: functional, production and social, each of which is devided into 4 sub-parts aimed at development of the economics and improvement of life of the population.

Consideration of Biodiversity Topics in the Mechanisms of Inter-Agency Planning

Integration of Biodiversity Preservation Topics into Strategies, Plans and Programmes

Tajikistan in its policy on preservation of biodiversity constantly highlights the importance of cooperation and coordination of actions with other organisations, conventions, initiatives and processes, and also with actors in all main groups for implementation of the Convention's goals.

At that, inter-agency and inter-sectorial cooperation on intrastate level is not enough effective in Tajikistan. Coordination of works between bodies working in the sphere of rational use of natural resources, preservation and sustainable use of biodiversity is very limited. And weak development of by-laws which regulate the mechanisms of implementation of laws challenges adequate dialogue and cooperation between executers (ministries, agencies) in consideration of important environmental issues.

Innovative ideas developed by research institutes in the sphere of environmental conservation and use of natural resources are poorly integrated. Therefore, scientific cooperation of even inter-sectorial institutes is also limited and not sufficient. However, it is necessary to constantly strengthen and renew all the aforementioned forms of cooperation.

Inter-sectorial cooperation on implementation of top-priority activities falls under annual revision by the NCBB. The Center submits analytical report to the Government of the country for evaluation and confirmation of further priorities in preservation and sustainable use of biodiversity in the country. Other forms of cooperation have also developed over the past years and became more productive.

NCBB actively develops cooperation with international organisations registered in Tajikistan, and constantly promotes registration of interests in preservation and sustainable use of biodiversity in work of all relevant sectors. NCBB works in cooperation with other national coordinational centers and scientific institutions, including with those acting in the frames of relevant conventions.

Consideration of Biodiversity Topics in Forestry Management

The main legal acr in the sphere of forestry management which considers biodiversity of forests is the new Forestry Code of RT (by May 15th, 1997 with amendments and additions in 2008) and adopted Program on Development of Forestry Management until 2015 (by October 31st, 2005, #396). In these documents biodiversity topics are considered in the articles regulating protection of rare species, establishment of protective forests and special protected forest areas.

In accordance with Forestry Code of RT the main powers in the sphere of forestry relations are granted to forestries, including the main territorial management units in the sphere of forestry and urban forests. In such a manner, it proposes the system of measures on balanced decentralization of management of forest resources and on drawing of management of forestries to forest habitats.

Despite numerous corrections of the text of the Forestry Code, according to opinion of many public organisations, the Forestry Code has number of essential shortages in the part of preservation of biodiversity. For implementation of Forestry Code there was adopted number of regulatory acts and some of them contain parts on preservation of biodiversity.

Consideration of Biodiversity Topics in Agriculture

In the present time in Tajikistan specific issues of agricultural practice, development of agricultural areas and use of lands for agricultural production are mainly regulated by the Land Code and agricultural legislation. Issues of biodiversity preservation and use of biological resources are regulated by the legislation on environmental conservation (including legislation on flora and fauna), Program of reform of agricultural sector of the Republic of Tajikistan for 2012-2020 (#383 by August 1st, 2012).

In land, agrarian and town-planning legislation there are almost no consideration of biodiversity preservation issues. Environmental legislation of the country has poor consideration of specificity of agricultural lands and issues of preservation of biodiversity on such.

The current Land Code of RT (by December 12th, 1997, #498) with amendments and additions declares environmental-friendly character of land legislation.

Legal framework contains norms which limit the holder of the rights on land plot from the lands of agricultural designation to resign from use of his/her plot for the period of more than 3 years. Such prohibition in conjunction with limitation on target use of land plots significantly limits the ability to preserve biodiversity on temporarily unused agricultural lands.

Possibility of targeted actions on preservation of biodiversity in agricultural areas dependes on presense and adequacy of capabilities of legal regulation of land use from the lands of agricultural allocation and determination of their fate.

Issues of biodiversity preservation are poorly considered in the state agrarian culture and have not found reflection in agrarian legislation. To some extent, such issues could be only related to preservation and reproduction of natural resources used for needs of agricultural production.

Return into the turnover of unused agricultural lands will make great impact on biodiversity which is now dependent on these areas. Such impact can have both negative and positive effects.

Consideration of Biodiversity Topics in Development of Tourism Sector

In the tourism sector the issues of biodiversity preservation are being successfully resolved in the direction of development of eco-tourism, improvement of environmental education and awareness (particularly in SPNAS). Development of the system of touristic services is also a perspective direction.

Eco-tourism in Tajikistan is not developed, but in the frames of some projects, for instance, the Project on Preservation of Biodiversity of Gissar Mountains and the Project on Preservation of Biodiversity of Dashtidjum Reserved Forest, there was some initial progress achieved which did not, however, bring any significant results.

The Government has adopted the State Program of Tourism Development for the Period of 2010-2014 which defines the strategy, main directions, priorities, goals and mechanisms of implementation of the state policy in the sphere of development of tourism for mid-term period.

In the frames of implementation of the State Program it is plannted to annually increase the number of tourists entering into the country by up to 50 thousand men. Effective implementation of the Program will result in increased attractiveness of the national touristic product and will promote introduction of the Republic of Tajikistan into the system of the global market of touristic services. There also will be created prerequisites for strengthening of touristic industry which can become one of the profitable sectors of the country's economics.

According to statistical data the income generated by tourism has doubled in 2012 when 245000 foreign tourists have visited Tajikistan and the income generated from this amount was equal to 2.2 million USD.

The Main Tools of Inter-Agency Cooperation on Implementation of the CBD (Ecosystems Approach, Assessment of the Consequences and Strategic Environmental Assessment with Consideration of the Aspects of Preservation and Sustainable Use of Biodiversity, Spatial Planning, etc.)

Based on the main priority directions of the National Strategy on Preservation and Rational Use of Biodiversity, the Action Plan considered implementation of first-priority tasks related to strengthening of protection of vulnerable diversity of plants, animals and microorganisms, and also improvement of the system of management of SPNAs which are the leading objects in *in-situ* preservation of biodiversity and regeneration of disturbed ecosystems and biological resources.

Activities included in subsections of this Chapter promote gradual reorientation and improvement of the policy and legislation on biodiversity to balanced development of the main components of biodiversity on biospheric, geosystems, ecosystems and species levels. These ensure reduction of the level of poverty through improved status of biodiversity and its rational use.

The Action Plan is developed to achieve the main goal of the Strategy on preservation of biological and geographical diversity. The Plan consists of many sub-plans on individual targets (for instance, creation of eco-net, preservation of forest ecosystems), each of which is developed in accordance with special activities in 4 areas: legislative and institutional frames, territorial planning and preservation of biodiversity, research and monitoring, supply of information and training activities.

Intranational Level Cooperation in the Process of Implementation of the UN Convention on Biological Diversity, UN Framework Convention on Climate Change, UN Convention to Combat Desertification, and Other Relevant Convention.

The Council of Coordinators of the Three Conventions was established in Tajikistan which helps to harmonize working program and implements the consulting process on the main directions of cooperation in the frames of the three conventions. However, this cooperation can be hardly evaluated as satisfying. It can be primarily reasoned by the fact that on the level of Secretaries of the Conventions there are still ongoing activities on negotiation coordination of activities, future intentions, and possibilities for joint actions are still under research. However, work on specific coordination actions is not enough, which has even greater effect on cooperation inside the country.

Lack of inter-agency coherence in approaching the implementation of signed agreements on cooperation also does not improve the performance of environment conservation activities. Signed agreements and programs of joint works do not harmonize with the programs of development and are not the tool for implementation of the national environmental policy, including in the process of taking of important decisions.

Practice and Progress of the Republic of Tajikistna in the Regional and Global Cooperation in the frames of the CBD

Tajikistan is actively involved in a number of activities on the regional level, particularly, with other Central Asian countries of the former Soviet Union. Over the past ten years these countries have developed series of joint activities on environmental conservation including preservation of biodiversity.

Namely, over the past 2 years, including with participation of the NCBB, there were constantly conducted meetings and consultations, number of memorundums were signed on cooperation and joint implementation of projects and initiatives. In 2006-2008 there were conducted 5 international missions, 4 international workshops and series of meetings and discussions in the frames of ENVSEC program (Environment and Security Initiative). Regional meetings on a high level between the Republic of Tajikistan and the Islamic Republic of Iran resulted in signing of agreements on cooperation in the sphere of environmental conservation. Two eco-missions were conducted in border areas of Tajikistan and Afghanistan, inter-state cooperation between environmental bodies was established, priorities for cross-border resolution and joint works were identified. This area of cooperation is new but very important for Tajikistan.

The main environmental cross-border issues which require cooperation are:

- Degradation of lands and pastures
- Severe salinization
- Decrease of forest areas
- Ablation of shores of cross-border rivers
- Natural disasters in cross-border areas
- Pollution of soils of minor rivers

In order to resolve these issues it was planned to:

- To develop joint environmental conservation projects on utilization of water resources;
- Preservation of biodiversity, prevention of ablation of river shores, degradation of lands, forests and glaciers, on desertification, natural disasters and many other types of issues;

- To consider the possibility and the mechanism for creation of cross-border SPNAs on the basis of already existing areas of reserved areas of Tajikistan "Tigrovaya Balka", "Dashtidjum", "Zorkul", etc.;
- To resolve cross-border issues through development of the strategy and action plan on continuation of cooperation;
- To organize field works and joint expeditions on the territory of both states;
- To develop action plans and programs in regards of the basin of Amydarya river.

In 2007 the capacity of cooperation between Afghanistan and Tajikistan was supported by Kyrgyzstan and Turkmenistan where there were also conducted inter-state workshops with partners from the entire region.

The main priorities of the agreements on the regional cooperation were sources of pollution of cross-border rivers and sites, loss of biodiversity, climate change and natural disasters (drought, desertification).

The National Center on Biodiversity and Biosafety in the frames of scientific cooperation between the Russian Federation has organized Tajik-Russian expedition to Central and Southern Tajikistan for joint assessment of the status of vegetative resources of Tajikistan's SPNAs. Number of activities were conducted: update of the botanical materials, development of geo-botanical descriptions of flora, assessment of the status of natural ecosystems, assessment of life forms of the main dominants of the vegetative cover under the current man-induced loads, visual appraisal of the productivity of resources, compilation of maps. All the results of the study were presented on the national scientific workshop in the Institute of Botanics of the ASRT. For continuation of joint works on research there was developed an agreement on scientific cooperation between the Russian Academy of Sciences (Siberian Department) and the Academy of Sciences of Tajikistan.

For Tajikistan the issue of sustainable and effective use of agricultural ecosystems is formed as a priority for providing support to GEF. In this regards, in 2008 there was conducted regional mission on assessment of the status of agricultural ecosystems with participation of international consultants and a national workshop with interested ministries, agencies and NGOs. According to the results of works there were identified the strategy and priorities on sustainable preservation of agricultural biodiversity in conditions of climate change.

Study tour of the World Bank consultants in the frames of assessment of adverse effects of Vaksh range of disposal of pests for located down the stream of Vaksh river ecosystems has served as a basis for creation of new cooperation and partnership with Persistent Organic Pollutant Conventions and the Rotterdam Convention. Research materials and priorities of the following cooperation are developed in the form of joint project initiatives for the upcoming period.

Cooperation in the Sphere of Education and Public Awareness

This area of activities is being actively implemented by national NGOs with particularly effective work in the frames of the Aarhus Convention. Initiatives on work with children were activated, "green patrol" initiative groups were formed, new textbook on additional extracurricular education on ecology was published which was transferred to the Ministry of Education and Science for use in educational process, summer ec-camps for children, youth eco-forums and contests for young journalists are conducted. However, insufficient media coverage os such initiatives and efficiency of such for public development reduces their capacity for reproduction of the best practices in other areas and remain limited to their projects.

Cooperation of NGOs' Initiatives

Previous cooperation of the NCBB with international NGOs formed a basis for development of new joint project. Together with WWF, Tajikistan has implemented the Project on Development of Sustainable Management Plan in the Lower Courses of Vakhsh River. National NGOs participate in the regional projects on development of management plans, Regional Action Plan on Environmental Conservation, and actively cooperate through partnership grant programs and carrying out activities on preservation of biodiversity on the level of communities. Such unofficial consortium of partners attracted significant amount of sources and implemented coordination of many works which became an input into preservation of biodiversity.

Many workshops and trainings were conducted for communities where the main attention was paid to consideration of issues of monitoring and expansion of the efficiency of environmental management, assessment of capacity, trends and threats to exosystems.

As a result of workshops new perspectives of cooperation were identified for future joint work with scientists and partners on both national and regional levels. Involved politicians became better aware of the main issues and challenges to preservation and sustainable use of biodiversity.

The most dramatic event was the national workshop on root causes of deforestation in Tajikistan which was conducted with financial and technical assistance of the Global Forest Coalition (GFC).

Comprehensive research of the three model areas were conducted in cooperation with CGF on assessment of the root causes of deforestation in Tajikistan. Materials of research were presented on the national workshop which was attended by scientists, politicians, wood-growers, communities, including women's organisations, media. For the first time in the past 20 years (as was noticed by the participants) it became possible to consider important, key causes of degradation of mountainous forest ecosystems and link them with the issues of socio-economic development of rural areas. Resolution of the workshop was distributed among all stakeholders for future activities because the basis for consequent inter-sectorial and inter-agency cooperation was formed. The program of top-priority works was developed for the perspective of reduction of the processes of degradation of forests in Tajikistan.

Cooperation with Local Administrations

Local governmental offices (khukumats and jamoats) play an important role in development and application of tools for planning of land use and zonation, territorial management, abidance of environmental norms and standards, and development of the infrastructure, in promotion of investments and conduction of awareness raising campaigns. All these promotes the development of local communities and also has a positive effect on biodiversity, water resources, climate change, protected areas, agriculture and forest areas, and also on public awareness and education.

Good practice of environmental management was developed in the frames of the finalized Project of the World Bank/GEF on "Preservation of Biodiversity in Dashtidjum Reserved Forest" which was implemented in Southern Tajikistan in Shurabad rayon (www.zakaznik.tj). Significant role in all the activities was based on cooperation with local administration and communities.

Just one effectively implemented project has not just created the basis for preservation of biodiversity and sustainable use of natural resources nearby SPNA, but has also ensured the inpit of Tajikistan into implementation of the CBD. Some finding on achieved results of the project and its input into implementation of the CBD are:

1. All the partners were provided with access to the global information with the aim of use of the global practice and knowledge, including on monitoring of biodiversity (CBD articles 12c, 16.4).
2. Indicators of the status of biodiversity were identified and the system on monitoring of biodiversity was developed. Particulalry important is access to new approaches and technologies, including those based on requirements/guidelines of the CBD, IUCN, WB, UNDP/GEF, UNEP, etc. This ensures more effective implementation by Tajikistan of the articles 16, 17 and 18 of the CBD.
3. Skills and knowledge on development of management plan for SPNAs were developed and applied in the frames of the Project (which ensures implementation of the articles 6 and 8f).
4. Experience on the issues of preservation of traditional knowledge was gained and is improving. In the frames of Small Grants Program special investments were allocated to support traditional forms of activities and use of nature, and capacity for production of goods and profit-generation was build among the local population (articles 8j and 10).
5. The current data base on biodiversity for monitoring and organization of management, scientific research, capacity assessment and build were developed (article 7d).
6. New programs, cartography practice, including GIS system, processing of space photo images were made.
7. On the basis of the previous unit territorial and functional zonation of the reserved forest was developed with consideration of the sited of spread of valuable biodiversity (article 12).
8. Indicators of the status of biodiversity were set up (on specific components and ecosystems); assessment of the factors effecting biodiversity in SPNAs was conducted (article 7).
9. Practice of harmonization of use of natural resources was gained and expanded through public initiatives (Small Grants Program on regeneration of forests in mountain ecosystems) on the basis of socio-economic situation and capacity of natural resources of Dashitdjum ecosystem in the poorest areas of Tajikistan (article 6).

Evaluation of Implementation of the Previous National Strategy and Action Plan of Preservation of Biodiversity

The Strategy contains 5 important structural targets: (1) improved preservation of SPNAs; (2) sustainable use of biodiversity of natural ecosystems and agricultural ecosystems; (3) rational use of biotechnology; (4) development and strengthening of political, institutional, legislative and human resources; and (5) equal distribution of profits from the use of biological resources. NGOs are involved in all the working processes of the NCBB.

Top priority areas of work of the NBSAP are:

- Improvement of the policy, legislation and institutional basis;
- Territorial planning and programs on preservation of biodiversity;
- Research of biodiversity and monitoring of the status of biodiversity;
- Education and training of the population;
- Strengthening of the mechanisms of financial support to enterprises working on preservation of biodiversity;
- Awareness, coordination and cooperation;
- Development of cooperation mechanism; and

- International cooperation.

Generally, we can highlight high efficiency of implementation of the majority of tasks and goals of the NBSAP which is linked to:

1. Deep rooted traditions in the sphere of environmental protection (for instance, long-standing history of SPNA system in Tajikistan);
2. High level of scientific support of the mesures on preservation of biodiversity, which involved instituties of the Academy of Sciences and sectorial institutes of agriculture, fishery and hunt industries;
3. Clearness in determination of thematic and geographical priorities of the National Strategy ("hot spots", priority regions);
4. Constant state support of the implementation of the National Strategy on behalf of the CEP which consists of preparation and support of inter-agency target programs on preservation of rare animal species, development of SPNA net, etc.;
5. Existence of solid institutional basis founded by GEF Projects on "Preservation of Biodiversity of Gissar Mountains", "Preservation of Biodiversity of Dashtidjum Reserved Forest" and other major GEF projects implemented in Tajikistan over the past 10 years; and
6. High activity of some international environmental organisations and funds (WWF, GEF, IUCN, etc.).

Amongst concrete positive results of the implementation of the National Strategy there could be highlighted:

- Increase of the area of SPNAs from 15% to 22% of the country's total area; creation of new SPNAs directly from the list of priority areas for establishment of SPNA defined in the National Strategy;
- National Park of the Republic of Tajikistan is included in the World Herritage List of UNESCO;
- Development and implementation of the projects on preservation of rare and endangered animal species, plants and regeneration of the population of some rare species particularly marked in the Strategy as top-priority – markhoor, snow leopard, Bukharian deer, Persian gazelle, pheasant, etc.
- Strengthening of capacity and development of management plans for SPNAs;
- Timely development and implementation of major international projects on preservation of biodiversity listed in the National Strategy as priority areas, such as preservation of genetic resources of agrobiodiveristy, regeneration of pastures ecosystems;
- Development of environment-oriented small business linked to sustainable use of biodiversity; this recommendation was listed in the National Strategy in the form of alternative economic development and integrated management of ecosystems;
- Establishment of the national centers on biodiverisyt and preservation of genetic resources;
- Adoption of the Law "On Pastures", "On Genetic Resources", "On Biological Economic Activities", etc.; and
- Signing of the Nagoya Protocol on Genetic Resources.

Challenges to Implementation of the NBSAP on Unreached Targets

It should be mentioned that in the frames of the current National Strategy on Preservation of Biodiversity the country has set for itself very ambitious goals which, at the moment, are not

fully implemented. Analysis of the NBSAP shows that 37% of the total planned activities are implemented.

From challenges to implementation of the goals set in the Strategy it is necessary to highlight:

1. Overall, the national legislation and the system of state control in the sphere of environmental conservation allow resolving the issues of preservation and sustainable use of biodiversity in accordance with the priorities set in the National Strategy. However, over the past ten years significant changes took places both in the country's economics and environmental control. In this regards for improved efficiency of preservation of biodiversity on the state level it is necessary to further improve the national legislation in the sphere of environmental conservation.
2. Legal framework significantly falls behind current needs in preservation and sustainable use of biodiversity in terms of regulation of conservation, control and use of fauna and habitats in accordance with delimitation of powers in this sphere between state regulatory bodies. Over the past 5 years many ministries and agencies have been restructurised and their sphere of activities have changed.
3. State record-keeping and forecasting of the status of fauna are conducted very limitedly (mainly in the frames of state record-keeping of hunting animals, determination of allowed catches, record-keeping of the number of animals in federal SPNAs). That is why data on the status of population of the major part of animal species, overall in the country and by the regions, including those listed in the Red Book of the Republic of Tajikistan, are out of the date and are not sufficient for forecasting and reasoning of the measures on preservation and regeneration.
4. Serious problem in political and socio-economic spheres are principal underestimation on behalf of governmental bodies, private sector and society of importance of wildlife for sustainavle development of the country and for enhancement of welfare of the population. In the system of state and public priorities the issues of biodiversity are in the end of the list. Biospheric functions of wildlife in economic life of the country are not fully considered.
5. One of the challenges to implementation of the goals and targets set in the National Strategy remains weakness of the state control in the sphere of protection and use of biological resources, lack of financing, increase of illegal use of such, poaching, volumes of which are equal to those of the legal industry.
6. In comparison to previous years, the level of participation of public environmental organisations in development of the state policy in the sphere of preservation of biodiversity and development of the public control for its implementation has significantly fallen down.

CHAPTER V. OUTCOMES OF IMPLEMENTATION OF TARGETS FOR 2020 IN REGARDS OF PRESERVATION AND SUSTAINABLE USE OF BIODIVERSITY ADOPTED IN AICHI, AND THE INPUT IN ACHIEVEMENT OF RESPECTIVE TARGETS OF MILLENIUM DEVELOPMENT GOALS FOR 2015

Measures on Observance of the UN Convention on Biological Diversity and on Achievement of the Relevant Targets of Millenium Development Goals for 2015

UN Convention on Biological Diversity (CBD) as an international agreement defines the general problem, sets up global targets and policy, degines general obligations, organizes technical and financial cooperation between the Parties to the Convention. However, the duty to achieve the goals set is mainly lays on the member-states, including on the Republic of Tajikistan as a on the party to the CBD.

Implementation of the CBD in Tajikistan is goin through a number of measures aimed at implementation of specific practical actions on *key duties of the CBD* which include:

- General measures on preservation and sustainable use of biodiversity;
- Identification, inventory and monitoring of the components of biodiversity;
- *In-situ* conservation of biodiversity (including management of the SPNA system);
- *Ex-situ* conservation of biodiversity;
- Sustainable use of the components of biodiversity and incentive measures;
- Research and personnel training;
- Public awareness raising and education;
- Access to genetic resources;
- Access to and transfer of technology;
- Exchange of information;
- Scientific cooperation;
- Application of biotechnology and distribution of profits; and
- Financial resources and mechanisms of financing.

One of the first steps of the member-states to the Convention, including Tajikistan, is an activity of the governments on establishment, development and attraction of the necessary structural capacity (institutional and personnel). For implementation of the obligations under CBD many state bodies, research institutions, public and non-governmental organisations are involved, which compose the main structural capacity for implementation of the CBD on the national level. Goals of the CBD are also reflected in other various sectors, programs, plans, state strategies. The main bodies of state management, to a certain extent, are considered in resolution of the issues of environmental conservation. These are Majlisi Oli (Parliament), the Government, the Committee on Environmental Conservation, the Academy of Sciences, the Ministry of Agriculture and Tajik Academy of Agricultural Sciences, SO on Hydrometeorology of CEP, the Ministry of Economics and Trade, the Ministry of Justice, RDC ICSD, REC CA and some other organisations.

The Government of the country provides legal regulation of relations betseen users of natural resources and protects biodiversity. It is the Government that implements direct control over the national resources and national economics through its competent authorities. Ensuring of such control shall constantly develop in terms of quality and efficiency.

In the frames of its obligations, Tajikistan, as a party to the CBD, shall establish, develop and attract necessary structural capacity (institutional and personnel). However, despite the efforts made in previous years, the capacity remains quite low, which is a challenge to more effective implementation of not only national programs and NBSAP, but the CBD, in general.

Particularly important for Tajikistan is establishment and effective integration of the national programs on training of personnel on the issues related to biodiversity, education and advanced training (Article 12 of the CBD). This initiative is supported by UNDP/GEF in the frames of development the initiatives on strengthening of capacity of the three conventions. Such approach will enable effective cooperation of the three Rio-Conventions and harmonization of the priorities of cooperation for improved efficiency. Inter-dependence of the Rio Conventions will ensure harmonization of the approach. Climate change effects biodiversity and desertification.

More intense and entailing serious consequences climate change can result in displacement of natural zones, in loss of plants and animals, in drought and loss of productivity and vegetation cover of semi-arid lands, in spatial variations of traditional forms of activities. It is these features that will be reflected in new national educational programs.

ANNEX 1

Information about the Republic of Tajikistan

Tajikistan is a state located in south-east of the Central Asia. Tajikisan has borders with Uzbekistan and Kyrgyzstan (on the west and north), with Afghanistan (on the south), with China (on the east). The total area of the country is 142.6 thousand sq. km.

As per the character of landscape Tajikistan is a typical mountainous country with absolute heights from 300 to 7495 meters. 93% of the country's territory is covered with mountains related to the highest mountainous systems of the Central Asia, i.e. Tien-Shan and Pamir. The main mass of the population and economic activites in Tajikistan are focused on the 7% of the country's territory, mainly, in valleys.

Population size is 8.0 million people. 26.4% reside in cities and 73.6% resude in rural areas. Average annual increase of the population equals to 2.5%.

Natural resources of Tajikistan are quite diverse. On the territory of Tajikistan there are many deposits of polychemic, rare and noble metals: zink, plumbum, molybdenum, wolframium, cuprum, gold, silver, stibium, mercury, fluor calcareous, stannum, uranium, bismuth, ferrum, mangan, sodium chloride, magnesium and other minerals which are important for export. Famous deposits of minerals in Tajikistan include gold fields of Pendjikent and Shugnan, silver minefield Bolshoy Kanimansur (Big Kanimansur), stibium minefields of Anzod, marble minefields in Vanj, Pendjikent, Darvoz, Shahristan, and others. There are deposits of coal, gas, oil, construction materials. Tajikistan is the leading country in the Central Asian region in regards to stocks of coal deposits. The total geologic resources amount to 4.0 billion ton. 80% of this coal is coky.

Tajikistan can be viewed as a specific model of the planet, since on its relavently small territory there can be seen almost all climatic zones with the range of temperatures from $+50^0$C to -60^0C. Country's climate is arid with no lack of warmth and significant fluctuations of its annual parameters. The absolute minimum of the atmospherical temperature of -63^0C was recorded in Eastern Pamir, and the absolute maximum of $+47^0$C was recorded in the south of the country. Average annual rainfalls are 760 mm. In high-mountainous deserts of the Eastern Pamir there is just 70-160 mm of rainfalls, and in the Central Tajikistan rainfalls can exceed 1800 mm per year.

In respect of stock of water resources Tajikistan is the leading country in the Central Asia. Mountainous and submontane areas of the country compose the main zone of formation of the basin stock of Aral Sea. More than 80% of Amudarya's river flow and 1% of Syrdarya's river flow are formed in Tajikistan. Overall, this composes 64 cubic km per year or 55.4% of the water resources of the Aral Sea. The total volume of the glaciers of the country compose more than 845 cubic km, ground waters compise 18.7 cubic km per year, and lake waters – 46.3 cubic km.

In Tajikistan, same as in the rest of the world, climate change can be clearly observed. Over the past 65 years in broad valleys the average annual atmospheric temperature increased by 0.7-1.2^0C, in mountainous and high-mountainous areas – by 0.1-0.7^0C, in cities – by 1.2-1.9^0C. As a consequence of climate change glaciers have also passed through transformation. According to some estimates, ove the past 50-60 years, glaciers have lost 20% of the volume and 30% of the surface.

Tajikistan has very insignificant stocks of oil and gas, and the deposits of coal are hard to reach for the purposes of commercial exploitation. However, Tajikistan has huge unexhaustible stocks of waterpower resources. By estimats of experts such stocks are equal to around 527 billion kW/hour per year. In the present time around 98% of the total energy is produced by hydro power plants. In 2012, production of energy was equal to 16.79 billion kW/h that is 3% of the existing capacity. This capacity three times exceeds the current energy needs of the entire

Central Asian region and under effective use could supply the region with cheap and environmentally safe electrical energy.

The Process of Preparation of the National Report

On the basis of the decree of the CEP RT the steering group under the NCBB was established for the purpose of preparation of the Fifth National Communication. The steering group ensured consistent implementation of all the activities and was coordinating the work of the national consultants on development of the necessary materials based on the format defined by the Secretary of the CBD (http://www.cbd.int/nr5/default.shtml).

National experts have conducted an analysis and assessment of the available data and have conducted additional research. The group of the national experts conducted consistent assessment of the reporting procedures in the frames of the CBD on the natonal level, including information on biodiversity and reports in other sectors of the economy. Together with these, positive, negative and synergetic effects of the impact of various types of economic activities on biodiversity were assessed. Particular attention was paid to the process of determination of the national goals and targes on biodiversity with attraction of scientists, experts in the spheres of finance and economu, environmental conservation, and individual experts. In the process of work regular consultations were conducted with stakeholders with subsequent compilation and synthesis of their materials for preparation of the Fifth National Communication.

The Committee on Environmental Conservation provided the supervision for implementation of the project and compliance with the budget, conducted monitoring of the results and enhanced the positive process of project completion. Upon completion of the planned activities national workshop was conducted with participation with all stakeholders where the Fifth National Communication on Biodiversity of the Republic of Tajikistan was discussed and approved.

Engaged Actors

For better coverage and promotion of effective implementation of the NBSAP and engagement of all the stakeholders, NCBB ensured liaison with the main organizational executors:

Governmental organisations, including:

- Governmental Environmental Commission
- The Committee on Environmental Conservation under the Government of the RT
- The Forestry Agency of the CEP RT
- The State Office of Hydrometeorology
- The State Office of SPNAs
- The Ministry of Agriculture
- State Committee on Land Tenure Relations and Cartography
- The Ministry of Finances
- The Ministry of Economics and Trade
- The Ministry of Health
- Local administrations, including:
- Oblasts, rayons
- Community leaders
- Institutions, including*:*
- The Academy of Sciences, sectoral research institutes
- Higher educations institutions

- Tajik Academy of Agricultural Sciences
- Media, including:
  - Nation-wide and local newspapers
  - National and local television
  - National and local radio
  - National and international environmental initiatives, including:
  - Action program on improvement of the environmental and socio-economic status in the basin of Aral Sea
  - Projects on agriculture
  - The Project on Preparation of the National Biosafety Framework
  - NGOs working in the sphere of:
  - Environmental conservation
  - Development of rural areas
  - Education
  - Alternative sources of energy
  - International sector

Used Materials Taken as a Basis

In the process of preparation of the Fifth National Report the team used reporting materials of the Academy of Sciences of RT, reviews of the status of environment prepared by the CEP, statistical data of the State Committee on Statistics, annual reports and newsletters on biodiversity of the higher education institutions, reports of the Research and Technology Patent Center, statistical data by rayons and oblasts for 2010-2012, reports of individual experts and materials of field trips to oblasts and rayons of the Republic.

The list of the ministries and organisations whose materials were used during the preparation of the Fifth National Report:

- The Committee on Environmental Preservation under the Government of RT (www.hifzitabiat.tj)
- The Ministry of Melioration and Water Resources (www.mwr.tj)
- The Ministry of Agriculture (www.moa.tj)
- The Committee of Statistics of RT (www.stat.tj)
- The Agency on Forestry and Hunt of the CEP RT
- State Office of Special Protected Natural Areas of the CEP RT
- State Committee on Land Tenure Relations and Cartography (www.komzem.tj)
- Research and Technology Patent Center of the Ministry of Economics and Trade of RT
- Scientific organisations
- The Institute of Botanics, Physiology and Genetics of Plants of the Academy of Sciences of RT
- The Institute of Zoology and Parasitology of the Academy of Sciences of RT
- The Institute of Biology of GBAO
- Khudjand Institute of Natural Sciences

- Tajik Academy of Agricultural Sciences (www.ziroatkor.tj)
- International organisations, environmental NGOs
- UN Development Program in Tajikistan (www.undp.tj)
- Russian Representative Office of the World Wildlife Fund (www.wwf.ru)
- Biosafety Clearing House mechanism of the Government of Tajikistan and the UN Convention of Biological Diversity (www.bch.biodiv.tj)
- Web-site of the National Center on Biodiversity and Biosafety of the Republic of Tajikistan (www.biodiv.tj)

ANNEX 2. TABLES

Table 1.1. Countrywide Dynamics of Changes of Pastures and Haylands for 2010-2013

Name	Units	Total in the Country			
		2010	2011	2012	2013
Pastures	ha	3846564	3852564	3849242	3849242
Including irrigated	ha	3600	3661	3874	3874
Including seasonal					
- Winter	ha	707399	708496	707885	706,9
-Summer	ha	2124280	2127574	2125739	288,3
- Spring-autumn	ha	626989	627961	627419	683,4
- Haylands	ha	21300	20831	20858	200000

Source: *Statistical Summary "Regions of Tajikistan", 2012*

Table 1.2. The Main Activities on Preservation and Regeneration of Forests' Biodiversity and Indicators for the Period of 2010-2012

#	Name	Units	2013	2014	2015	Dynamics for the past year, percents, "+" – more, "-" – less
1	*The total area of the state forest fund*	*ha*	1668	1668	1776	**+6,5**
2	*Organization and regeneration of forests*	*ha*	1196	1996	2803	**+40,4**
3	*Tending of forests*	*thousand ha*	9,0	10,1	13,1	**+29,7**
4	*Ensuring the growth of plant trees*	*%*	61	64	68,7	**+7,3**
5	*Combating forest pests*	*ha*	8000	9009	9171	**+1,8**
6	*Land preparation*	*ha*	1955.6	1996	2803,9	**+40,4**
7	*Collection of seeds and plant trees*	*tonn*	22.4	23,2	24	**+0,8**
8	*Cultivation of plant trees in forest nurseries*	*thousand pieces*	3590,0	3600,0	3670,0	**+10,1**
9	*Plant trees ready for cultivation and sale*	*thousand pieces*	1870,0	1938,0	2074,0	**+7,0**
10	***Cultivation of medicinal and food plants (total, ha)***	***ha***	**900**	**935**	**951**	**+5,6**
	Including:					
	- Fetid gum	***ha***	**850**	**875**	**875**	**+1,6**
	- Rheum	***ha***	**25**	**30**	**41**	**+6,4**
	- Anzur onion	***ha***	**25**	**30**	**35**	**+40**

Source: *The Committee on Environmental Conservation under the Government of the Republic of Tajikistan*

Table 1.3. Monitoring of Conducted Biotechnical Activities for the Period of 2010-2012

#	Name	Units	Period of 2010-2012			
			2012	2011	2010	"+" and "-" in %
	Preparation of forage for over-wintering of wild animals and birds (total)	tonn	213,3	157,0	106,0	+201,2
	Including:					
	- Hay, stover, clover, etc.	tonn	154,5	120,8	77,9	+98,3
	- Grain and others	tonn	48,7	24,2	20,1	+40
	- Mineral forage	tonn	10,1	12,0	8	+25

Source: *The Committee on Environmental Conservation under the Government of the Republic of Tajikistan*

Table 1.4. Increase of the Productivity of Forests Over the Period of 2011-2012

#	Name	Units	Period of Activity (2011-2012)			
			2012	2011	In comparison to 2011 "+", "-"	"+" and "-" in %
1	Income generated by forests	thousand TJS	3098,0	2927,0	+171,0	+5,8
2	Sales of forest products	thousand TJS	4320,0	4161,0	+159,0	+3,8
3	Procurement of timber	cubic meter	9070	9016	+54	+0,6
4	Collection of fruits of wild-growing plants	tonn	140	124	+16	+12,9
5	Collection of medicinal plants	tonn	19	17,6	+1,4	+11,8
6	Brier	tonn	31	25	+6	+24
7	Dried fruits	tonn	148	131	+17	+13
8	Pistachio	tonn	55,6	0,0	+55,6	+100
9	Nuts	tonn	72,6	53	+19,6	+37
10	Bitter almond	tonn	14	11,1	+5,9	+27,3
11	Grain products	tonn	621,2	262	+359,2	+137
12	Collection of fodder cultivars	tonn	3999	2009	+1990	+99,1
13	Potato	tonn	197,4	109,8	+87,6	+80,7
14	Production of honey	tonn	12,3	5	+7,3	+146

Source: *The Committee on Environmental Conservation under the Government of the Republic of Tajikistan*

Table 1.5. Countrywide Dynamics of Productivity of Agricultural Crops in 2012

#	Name	Units	Countywise	In Khatlon oblast	In Sogd oblast	RRS	GBAO
1.	Grain cultivars	centner/ha (c/ha)	23,6	27,6	18,7	20,7	27,4
2.	Cotton	(c/ha)	20,6	21,5	18,7	21,9	20,3
3.	Potato	(c/ha)	228,3	230	247,3	206,7	229,2
4.	Vegetables	(c/ha)	216,5	222,7	222,3	201,1	219,9
5.	Gourds	(c/ha)	205,9	240	142,7	83,1	357,8

6.	Fruits	(c/ha)	49,6	57,7	47,8	40,4	52,5
7.	Vinelands	(c/ha)	49,6	57,7	47,8	40,4	52,5

Source: *Statistical Summary "Regions of Tajikistan", 2012*

Table 1.6. Countrywide Dynamics of the Area of Plurannual Trees for the Period of 2010-2012

Name	Units	Countrywise			Difference in 2010-12 (-;+)
		2010	2011	2012	
The total area of plurannual trees *including:*	**ha**	**120662**	**126417**	**132531**	**11869**
- Gardens	ha	84258	88322	92594	8336
- Vinelands	ha	27317	28635	30019	2702
- Mulberries	ha	6205	6205	6205	0
- Citrus cultures	ha	2366	2366	2366	0
- Mixed trees	ha	516	889	1347	831

Source: *The Committee on Environmental Conservation under the Government of the Republic of Tajikistan*

Table 1.7. Usage Quoata for Usage of Flota and Fauna

#	Name	2010	2011	2012
1	Bear	16	0	**16**
2	Lebetina viper	0	0	**100**
3	Cobra	0	0	**100**
4	Marco Polo	0	80 heads	**80 heads**
5	Ferid gum	200 tonn	220 tonn	**140 tonn**
6	**Liquorice**	**3000 tonn**	**3500 tonn**	**5000 tonn**

Source: *SO SPNA of the Committee on Environmental Conservation under the Government of the Republic of Tajikistan*

Table 1.8. Plurannual Trees 1000 and more Years of Age (Natural Floral Sites) in 2012

#	Name of Trees	Amount of Samples
1	Plane tree *(Platanus orientalis)*	**42**
2	White mulberry *(Morus alba)*	**23**
3	Birch (Betula tianshanica)	**13**
4	Walnut (Juglans regia)	**15**
5	Poplar (Populus alba)	**9**
6	William's osier (*Salix Vilgelmii*)	**4**
7	Pistachio (*Pistacia vera*)	**4**
11	Ash (*Fraxinus potomophilla*)	**3**
13	Zeravshanian juniper (*Juniperus seravcshanica*)	**3**
14	Hawthorn (*Crataegus pontica*)	**3**
15	**Cercis (*Cercis*)**	**2**

Source: *The Committee on Environmental Conservation under the Government of the Republic of Tajikistan*

Table 1.9. ACTION PLAN ON PRESERVATION OF BIODIVERSITY OF GRAZINGS

#	Activities	Period of Implementation	Funding Source	In Charge of Implementation
1	2	3	4	5
A. IMPROVEMENT OF THE POLICY, LEGAL FRAMEWORK AND INSTITUTIONAL BASIS				
1.	Improvement of the policy on preservation of biodiversity for the purpose of achievement of sustainable use of biological resources.	2011-2014	State budget (SB), MF	Parliament, Government, MA, CEP, State Committee on Land Tenure
2.	Development of the strategy on environmental assessment defining sustainable preservation and use of biodiversity.	2011-2015	SB, MF	CEP, AS, TAAS
3.	Assessment of the status of the national legal framework on implementation of the activities and improvement of the system of pastures' stability and development of proposals on update of such.	2011-2012	SB	Government, MA, MJ
4.	Organization of the profiled institutional unit in the executive agency on improvement of the Strategy on Development of Pastural Farming.	2011-2015	SB	Government, MF, MA
5.	Strengthening of the capacity of science and research institutions, conduction of monitoring and management on biodiversity of pastures.	2011-2019	SB, EF, MF	AS, CEP, MF, MA
6.	Research and evaluation of the impact of climate change on biodiversity of pastures.	2011-2019	SB, EF, MF	CEP, MA, AS, NGO
7.	Scientific rationale and development of the programs on rehabilitation of mountainous evosystems.	2011-2015	SB, EF, MF	CEP, AS, MA, NGO
8.	Development of the data base of valuable fodder plant communities.	2011-2016	SB	CEP, AS, HEI, NGO, TAAS
9.	Development of the basis of the e-system of biological monitoring of pasture ecosystems.	2012-2018	SB, MF	CEP, NCBB, AS, NGO, TAAS
10.	Mapping the most valuable fodder plant communities.	2011-2019	SB, EF	NCBB MA, AS, NGO, CEP
11.	Creation of the master model on preservation and sustainable use of biodiversity of pastures in project areas (Central Tajikistan).	2011 -2018	MF, EF	CEP, MA, NCBB
12.	Rehabilitaiton of forest shelter belts on the area of 1200 ha of the project area.	2011-2019	SB	SO FM
13.	Rehabilitation of pasturage biodiversity on recurrently degraded plots of the project area.	2011-2019	SB, local funds (LF)	MA, FM, TAAS
14.	Improvement of the system of personnel training in the sphere of forestry management.	2011-2015	SB	CEP, MA, FM
15.	Economic evaluation of biological resources of pastures used in the national economy.	2011-2019	SB, EF	MET, AS, TAAS, MA
16.	Improvement of the mechanisms of economic incentives for the activities aimed at preservation of biodiversity of	2011-2019	SB, EF, LF	MET, MF, AS, MA, CEP

	pastures.			
17.	Development of integrated data base on the system of management of grazing biodiversity.	2011-2016	GF	MA
18.	Development and approval of the norms on use of pastures of high-mountainous ecosystems (regulation of grazing, collection of medicinal and food plants).	2011-2015	SB, LF	MA, CEP, SPC, TAAS
19.	Development and introduction of the programs on regeneration of the productivity of degraded pastures and haylands.	2012-2015	SB, LF	MA, CEP, AS, SPC, TAAS
20.	Development of the programs on regeneration of barley communities in winter grazing lands.	2011-2015	SB, LF	MA, AS, NGO, TAAS
21.	Regeneration of the composition and structure of fauna for the purpose of preservation of fodder base on drift-way pastures.	2011-2019	SB, LF	AS, TAAS, SPC
	B. RESEARCH AND MONITORING			
1.	Conduction of inventory of pastures.	2011-2016	SB	Parliament, AS, SPC
2.	Development of recommendations on accelerated regeneration of the structure and functions of disturbed plant communities on the project area.	2004-2005	SB	AS, MA, TAAS
3.	Improvement of the system of inter-relations (management) between land users, increase of their sense of responsibility for preservation of valuable plant communities of pastures.	2011-2019	SB, EF	AS, MA, SPC, NGO
4.	Development and approval of the regulatory acts on use of mountain-steppe pastures.	2012-2016	SB, LF	MA, CEP, TAAS, AS
5.	Regulation of use of pastures in places of growth of valuable steppe communities.	2012-2015	SB	Parliament, AS, MA, TAAS
6.	Improvement of the methods of pasturage management in habitats of the species listed in the Red Book.	2012-2015	SB, MF	AS, MA, CEP, TAAS
7.	Development and introduction into practice of modern technologies pasturage management.	2012-permanently	SB	SPC, MA, MA, TAAS, farmers' enterprises
8.	Establishment of special regime of economic activities in the zone of distribution of parvifoliate and broad-leaed forests.	2012-2016	SB, EF	Government, CEP, MA
10.	Improvement of the legal and regulatory acts limiting grazing and cutting of fresh pistachio plantings.	2013-2016	SB	Government, CEP
11.	Expansion of the functions of state instituions responsible for protection of forests.	2013	SB	Government, CEP
12.	To register pistachio open woods in favor of citizens and work collectives on a long-term basis.	2004-permanently	SB	Government, CEP, MA
13.	Control of vegetative cover of the main grass communities of tall grasses of semisavannas.	2014-permanently	SB, LF	CEP, MA, SPC, TAAS

14.	Establishment of the bank of seed materials of wild-growing flora species for improvement of pastures.	2013-permanently	SB, LF	MA, AS, MA, SCP, TAAS
15.	Expropriation of the territory for regeneration of haloxylon deserts and *salsola*, prostrate summer cypress and other types of bushes suited for animal breeding.	2013-periodically	SB	SPC, MA, CEP, Local Khukumats (local administrations)
16.	Preparation of seed fund and implementation of biotechnical activities on establishment of artificial grazing communities.	2004-permanently	SB	MA, SPC, Local Khukumats
17.	Inventory of sand-desert grazing communities.	2013-2017	SB, LF	SPC, MA, AS, TAAS
18.	Organization of monitoring on master plots in the main pasturage areas.	2004-permanently	SB	TAAS, AS, Local Khukumats
19.	Development of the e-database on rare and endangered plant species growing in grazing project areas.	2014	SB	AS, CEP, MA, TAAS

Table 1.10. Monitoring of Carrying of Ecological Advocacy and Awareness for the Period of 2011-2013

#	Name	2011	2012	2013
1	Broadcast and presentations on television	1065	1907	1728
2	Broadcast and presentations on radio	832	1251	1305
3	Publications in newspapers and journals	764	1105	1054
4	Workshops	238	243	378
5	Meetings and discussions	3898	7779	8578
6	Publication of monthly newspaper "Navruzgoh" by the CEP	11 publications	9	8
7	Journal "Environmental Conservation" by the CEP (organized in the second half of 2011)	2	2	2
8	Republican competitions	3	3	2
9	Publication of materials in the Internet, on the web-site of the CEP (organizaed in the second half of 2011)	120	235	227
10	Inquiries to the CEP for access to environmental data	57	79	98

Source: *The Committee on Environmental Conservation under the Government of the Republic of Tajikistan*

Table 1.11. Information about Environmental Centers of the Republic of Tajikistan for 2013

#	Name	Location and Reporting Relationship
1	Center on Environmental Information	Dushanbe; reporting to the CEP
2	Aarhus Environmental Information Center	Dushanbe; reporting to the CEP
3	Environmental Information Center	Vahdat rayon, RRS; reporting to SO SPNA and to reserved area "Romit"
4	Environmental Information Center and Museum	Jilikul rayon, Khatlon oblast; reporting to SO SPNA and to reserved area "Tigrovaya Balka"
5	Environmental Center of the Historical and Natural Park "Shirkent"	Tursunzade rayon, RRS; reporting to SO SPNA and to historical and natural part "Shirkent"
6	Environmental Center	Khudjand city, Sogd oblast; reporting to the local Department of CEP

7	Center of Environmental Information	Kulyab city, Khatlon oblast; reporting to Kulyab Inspection of the Environmental Conservation
8	Environmental Information Center	Tursunzade rayon, RRS; reporting to the local Department of CEP
9	Aarhus Environmental Information Center	Kurgan-Tube, Khatlon oblast
10	Aarhus Environmental Information Center	Khorog, GBAO

Source: *The Committee on Environmental Conservation under the Government of the Republic of Tajikistan*

Table 1.12. Violations in the Sphere of Plant Life over the Period of 2010-2012

#	Name of the Region	Number of Violations			Sum of Recovery for Violations (Thousand TJS)		
		2010	**2011**	**2012**	**2010**	**2011**	**2012**
1	**Total in the Republic**	**739**	**2483**	**3005**	**403,2**	**506,2**	**628,2**
	Including in the project regions	75	96	121	18,2	28,5	**36,8**
2	Ayni	9	11	13	4,6	7,3	**9,2**
3	Pendjikent	6	7	9	3,4	6,9	**7,1**
4	Tajikabad	6	9	10	0,9	1,9	**1,1**
5	Nurabad	4	9	16	1,7	2,4	**4,4**
6	Baldjuvan	8	11	17	1,7	2,2	**3,7**
7	Shurabad	17	19	22	2,1	2,5	**3,8**
8	Khovaling	17	19	21	2,7	3,2	**4,4**
9	**Muminobod**	**8**	**11**	**13**	**1,1**	**2,1**	**3,1**

Source: *The Committee on Environmental Conservation under the Government of the Republic of Tajikistan*

Table 1.13. Violations in the sphere of Wildlife for the period of 2010-2012

#	Name of the Region	Number of Violations			Sum of Recovery for Violations (Thousand TJS)		
		2010	**2011**	**2012**	**2010**	**2011**	**2012**
1	**Total in the Republic**	**92**	**103**	**131**	**5,3**	**13,8**	**16,8**
	Including in the project regions	38	48	58	2,3	2,9	**2,1**
2	Ayni	6	9	11	1,0	1,0	**0,3**
3	Pendjikent	5	7	9	0,1	0,1	**0,2**
4	Tajikabad	0,0	0,0	1	0,0	0,1	**0,2**
5	Nurabad	0,0	0,0	0,0	0,0	0,0	**0,0**
6	Baldjuvan	7	5	5	0,2	0,1	**0,1**
7	Shurabad	7	9	11	0,4	0,6	**0,4**
8	Khovaling	8	13	13	0,3	0,6	**0,6**
9	**Muminobod**	**5**	**5**	**8**	**0,3**	**0,4**	**0,3**

Source: *The Committee on Environmental Conservation under the Government of the Republic of Tajikistan*

Table 1.14.Violations in the Sphere of Protection of Fish Resources for the Period of 2010-2012

#	Name of the Region	Number of Violations			Sum of Recovery for Violations (Thousand TJS)		
		2010	2011	2012	2010	2011	2012
1	**Total in the Republic**	211	267	291	22,3	35,9	**36,9**
	Including in the project regions	34	29	32	0,8	1,0	**2,0**
2	Ayni	7	9	12	0,2	0,3	**0,8**
3	Pendjikent	6	7	8	0,1	0,2	**0,6**
4	Tajikabad	1	1	1	0,0	0,0	**0,1**
5	Nurabad	0,0	0,0	0,0	0,0	0,0	**0,0**
6	Baldjuvan	5	4	5	0,1	0,0	**0,1**
7	Shurabad	5	4	5	0,1	0,2	**0,1**
8	Khovaling	6	3	6	0,2	0,1	**0,2**
9	**Muminobod**	**4**	**4**	**4**	**0,1**	**0,2**	**0,1**

Source: *The Committee on Environmental Conservation under the Government of the Republic of Tajikistan*

Table 1.15. Violations in the Sphere of Biodiversity for the Period of 2010-2012 (Thousand TJS)

#	Years	2010		2011		2012		Dynamics in 2010-2012	
	Sector	**Number of Violations**	**Recovery Sum (Thousand TJS)**	**Number of Violations**	**Recovery Sum (Thousand TJS)**	**Number of Violations**	**Recovery Sum (Thousand TJS)**	**Number of Violations**	**Recovery Sum (Thousand TJS)**
1	Land and mineral resources	5321	108,6	6826	185,8	7411	202,4	+2090	**+93,8**
2	Wastes	3221	210,3	3522	231,4	3612	375,8	+391	**+165,5**
3	Tail waters	1823	168,1	2009	182,7	2799	200,7	+976	**+32,6**
4	Emissions	1230	61,0	1372	80,0	1596	106,6	+366	**+305**
	Total:	**11595**	**548,0**	**13729**	**679,9**	**15418**	**885,5**	**+3823**	**+337,5**

Source: *The Committee on Environmental Conservation under the Government of the Republic of Tajikistan*

Table 1.16. ADMINISTRATIVE VIOLATIONS IN THE SPHERE OF USE OF FOREST RESOURCES

(Index for calculations - 40 TJS)
(*0,0 – is not considered)

Article	Offences	Penalty Rate for Natural Persons	For Public Servants	For Legal Entities
180	Unauthorized violation of the duties on use of forest resources, and settlement of transactions violating State's property rights on forests.	5-10	20-40	**100-200**
181	Illegal use of land resources of the state forest	5-10	20-30	**100-200**

	fund.			
182	*1 Violation the authorized procedures on use of the forest fund, preparation and removal of timber; *2 Violation the authorized procedures on collection of barrios of trees, shrubs and plants;+ *3 Illegal collection of barrios of ferule for the purposes of processing, production of medical products, transportation or transfer into property of another person, under absence of elements of crime.	3-5 2-5 10-30	10-20 5-10 50-100	**50-100** **20-30** **300-500**
183	1. Illegal cutting and damage of trees and shrubs, destruction or damage of forest cultures, seedlings or tree plants in forest nurseries and on plantations, and also of young stock of natural growth and natural seedings on the areas allocated for forest regeneration works, under absence of elements of crime. 2. Similar activities covered by Part 1 of this article, conducted repeatedly over the period of one year after imposition of an administrative penalty.	5-10 5-10	20-40 50-60	**100-200** **250-300**
184	Implementation of forest use in contradiction with aims and requirements covered in the license (order) for cutting or use of forest.	10-20	30-40	**100-200**
185	Violations of the rules and norms on regeneration and improvement of the status and species composition of forests, improvement of their productivity, and also use of resources of mature wood.	0,0	30-40	**200-300**
186	Damage of haylands and pasture lands on the territory of the state forest resources.	3-7	10-20	**70-100**
187	Unauthorized farming, haying, grazing, collection of wild-growing fruits, nuts, mushrooms and berries in the forest and on the lands free of forest of the state forest resources.	3-5	10-20	**70-100**
188	Collection of wild-growing fruits, nuts, berries and others with violation of the prescribed periods of collection.	1-3	5-10	**70-100**
189	Illegal collection (without special authorization by the competent bodies), destruction or cutting of roots, collection of flowers and fruits of the plants listed in the Red Book, under absence of the elements of crime.	5-10	15-20	**100-200**
190	Putting into operation of the enterprises, workshops. aggregates, transport routes, production facilities which are not equipped with mechanisms preventing harmful effects on the status and regeneration of forest.	0,0	5-10	**100-200**
191	Damage or pollution of lands of the state forest resources with waste waters, chemical substances, productional, industrial and communal and household wastes resulting in drying out or deseases of forests, under absence of the elements of crime.	5-8	10-20	**100-200**
192	Destruction or damage of forest drying ditches, drenage systems or roads on the territory of the state forest resources.	2-5	10-15	**100-200**
193	Destruction or damage of boundary marks in the forests, or other marks related to such.	2-5	10-15	**0,0**

194	Extinction of fauna beneficial for forests on the lands of the state forest resources.	2-5	10-15	**0,0**
195	1.Violation of the fire safety rules in forests; 2. Destruction or damange of forests in the result of arson or negligent handling of fire, and also violations of fire safety rules in forests, development of fire in forests or expansion of fire on significant area, under absence of the elements of crime.	2-5 15-20	10-15 40-50	**100-200** **200-300**
196	Damage, destruction or unauthorized cutting of forest plantings alongside roads and railways, canals, water reservoirs, ditches, borders of crop rotation fields.	20-30	20-30	**100-200**
197	Contamination of forests with radioactive substances, bacterial, parasitic and quarantine pests resulting in drying out or contamination of forests.	10-20	30-40	**200-300**
198	1.Violation of hunting regulations on the lands of state forest resources and attached hunting areas, illegal hunting (hunting cards, passes, etc.), and also hunting during forbidden periods of hunt or with forbidden means and methods of hunting, or hunting on unauthorized species of wild anumals on the lands of state forest resources and allocated hunting areas; 2. Similar actions prescrived in the first part of this article repeatedly conducted over the period of one year after application of measures of administrative penalty.	10-20 30-40	0,0 0,0	**00** **0,0**
199	Violation of rules of conservation of habitats and conditions of propagation of wild animals and birds (nests) on the territory of lands of the state forest resources and allocated hunting areas.	10-20	20-30	**0,0**
200	Disobidience to legal requirement of the representatives of forest conservation and hunting control bodies, and, equally, impeding to timely, full and objective clarification of facts of the matter, to ensuring of performance of issued decree.	3-7	10-20	**0,0**
201	Unauthorized removal of the upper fertile soil layer, sod, and, equally, desctruction of plant stand on the lands of the state forest fund.	10-20	30-40	**0,0**
201	**Misrepresentation of the facts of registration and evaluation of the forest fund.**	**0,0**	**5-10**	**0,0**

Source: *The Committee on Environmental Conservation under the Government of the Republic of Tajikistan*

Table 1.17. ADMINISTRATIVE VIOLATIONS OF THE REGIME OF CONSERVATION OF FLORA AND FAUNA

(Index for calculations - 40 TJS)
(*0,0 – is not considered)

Article	Offences	Penalty Rate for Natural Persons	For Public Servants	For Legal Entities
203	Unauthorized transfer of a right to use objects of flora and fauna, and settlement of any other types of transactions which violate the right	5-10	10-20	**0,0**

	of the state ownership on flora and fauna.			
204	Violation of the rules of protection of habitats and migration paths of animals, rules of creation, refill, keeping, use and registration of zoological collections, and also the rules of transfer and export of the objects of wildlife and zoological collections, unauthorized relocation, acclimatization and cross-breeding of animals.	10-20	30-40	**0,0**
205	1.Import or export of the objects of flora or fauna or its products without authorization, if such authorization procedure is prescribed by the regulations and laws of RT. 2. Similar activities as described in the part 1 of this article, conducted in relation to rare or endangered species of plants or animals which are listed in the Red Book or in specific lists of international conventions, and, equally, egg-laying area, seeds, fruits or other parts.	10-20 20-30	30-40 40-50	**0,0** **0,0**
206	Violation of the regulations of use of fauna in reserved or specially protected ares, and illegal import of animals and plants which have harmful effect on preservation of plant and animal species listed in the Red Book.	5-10	20-30	**0,0**
207	Extinction of rare or endangered species of plants or animals, listed in the Red Book, or destruction of their eff-laying areas, nests, other sites, or any other actions which potentially can result in death, reduction of population or disturbance of habitats of plants or animals, or procurement of such animals or plants with violation of the conditionsnof hunt and use.	10-20	30-40	**0,0**
208	1.Violation of reules of hunting, fishing and preservation of fish resources, and other rules of use of fauna; 2. Flagrant violation of hunting rules (hunting without relevant license, or in forbidden places, or during forbidden periods, or using forbidden means or methods) or systematic violation of other hunting rules, and repetitive violation of similar activities over the period of one year since application of administrative penalty; 3. Similar actions as considered in the part 2 of this article conducted by civil servants and natural persons with use of vehicles for the purpose of unauthorized hunt, fishing, fowling or catching of animals.	2-5 10-15 30-40	10-20 30-40 50-60	**0,0** **0,0** **0,0**
209	1.Destruction or damage of wild-growing plants, and damage of plant cover or plough lands as a result of pollution by waste waters, chemical and radioactive substances, oil products, industrial and other wastes; 2. Damage of plant cover or plough land by means of vehicles on the areas not considered for their passage or parking.	5-10 10-15	20-30 10-15	**0,0** **10-15**

210	Violation of the established regime of procurement, buying-up or sale of the objects of flora and fauna, theoir products, fruits, parts and their products, storage and utilization of crop protection agents, growth stimulators, mineral fertilizersa and other subtances which have harmful effect on flora and fauna.	5-10	20-30	**0,0**
211	Sale, buying-up and processing of processed and raw pelts of wild fur animals which are the subject of hunting and which do not have specific earmarks, and products from such animal furs.	10-20	30-40	**0,0**
212	Violation of the regime of the order of processing, buying-up, procurement, exchange, processing, storage, commercialization, import and export of valuable pelts of fur animals, or tailoring or sale of products made from such pelts.	10-20	40-50	**0,0**
213	Illegal use of the objects of fauna and unauthorized procument and collection of the parts and products of wild animals.	10-20	30-40	**0,0**
214	**Violation of the established order of breeding, commercialization, keeping of animals, use and return to nature of specific species of fauna.**	**5-10**	**20-30**	**0,0**

Source: *The Committee on Environmental Conservation under the Government of the Republic of Tajikistan*

Table 1.18. ADMINISTRATIVE VIOLATIONS IN THE SPHERE OF ENVIRONMENTAL CONSERVATION AND USE OF NATURAL RESOURCES

(Index for calculations - 40 TJS)
(*0,0 – is not considered)

Article	Offences	Penalty Rate for Natural Persons	For Public Servants	For Legal Entities
215	Violation of the rules of maintenance of cadastres of natural resources (land, water, forest, minerals, fauna, reserved areas).	0,0	3-7	**0,0**
216	Impeding to implementation of state control of environment and use of natural resources.	5-10	20-30	**0,0**
217	Violation of the rules of protection of rare and remarkable objects of live and inorganic nature (secular trees, boulders, etc.) which are valuable in terms of science, history, culture and awareness, and recreation, and violation of protection regime of state reserved areas, reserved forests and national natural parks, zones of sanitary protection zones, resorts and water protection zones.	3-5	10-20	**0,0**
218	Failure to submit, non-disclosure or misrepresentation of information about the status of environment and use of natural resources, and about the sources and volumes of pollution, non-disclosure of the facts of waste disposals, excessive wastes	10-15	30-50	**100-200**

	and disposals of pollutants into the atmosphere or misrepresentation of the information about accidents with harmful consequences for environment and on the level of environmental pollution.			
219	Avoidance of passing through state environmental expertise, violation or failure to comply with requirements of the conclusion of the state environmental expertise.	5-10	20-30	**100-200**
220	Failure to comply with directives and decrees of the bodies maintaining control over environmental preservation and use of natural resources.	5-10	20-30	**100-200**
221	Failure to take measures on rehabilitation of the environment, reproduction of natural resources and relief of the consequences of harmful effects on the environment.	5-10	20-30	**100-200**
222	Delay in construction of the sites and objects intended for environmental protection purposes for the period of 6 months and more.	0,0	30-40	**200-300**
223	Violation of the standards, rules, norms, instructions and other environmental requirements on environmental preservation and rational use of natural resources.	2-5	10-20	**0,0**
224	Excess of the norms of maximum allowed pollutant wastes or temporarily agreed pollutant wastes into environment, excess of the norms of maximum allowed harmful physical effect on the environment, discharge of pollutants into environment without authorization of the competent state bodies, waste disposal, causing physical and any other harmful effects on the environment without authorization of competent state bodies, and failure to implement to the full extent of measures on protection of the environment and activities on reduction of wastes triggering increased level of pollution of the environment in the period of unfavourable meteorological conditions.	3-7	10-15	**100-200**
225	Putting into operation of new and reconstructed facilities, buildings and other objects which do not comply with specific requirements on protection of the atmosphere.	0,0	10-15	**100-200**
226	Failure of the capitain or any other members of a vessel's crew to comply with legally prescribed duties on registration in vessel's documents of the operations with substances which are harmful for human health and for living resources, water objects, or with subtances containing excessive ratio of such substabces, registration of fake data about or illegal failure to present such documents to the	0,0	30-40	**0,0**

	competent authorities.			
227	Violation of the regulations on transportation, storage and use of flora and fauna, unauthorized destruction of crop-protection agents, stimulators of growth, mineral fertilizers and other substances which can result in pollution of the environment (surface and ground waters, atmosphere) or extinction of any particular plant or animal specie, other aquatic organisms, or those which damaged flora or fauna.	3-5	10-15	**100-200**
228	Violation of operation regulations, and failure to use of sites, devices or other objects intended for environmental protection purposes, installed for clearance and management of wastes which resulted in damage of such objects, improper functioning or other harmful consequences.	0,0	30-40	**100-200**
229	Placing into operation of transport and other vehicles disposals of which contain excessive norms of pollutants, and also if the level of noise produced by such vehicles under operation exceeds enforceable standards.	-	10-15	**100-200**
230	Operation by natural persons of transport or other vehicles disposals of which contain excessive norms of pollutants.	Warning or 1 index	Warning or 1 index	**Warning or 1 index**
231	Violation of the rules of storage of industrial and household wastes, non-compliance with the requirements on environmental preservation in regards of storage and buring of industrial and household wastes, and also incineration in a free flame of fuel and construction materials under construction or any other works.	1-3	30-40	**100-200**
232	Violation of the requirements on environmental protection during transportation, allocation, use, disposal (dumping) of industrial, household and other wastes.	1-3	10-15	**100-200**
233	Implementation and application of fuel which does not correspond to standard requirements and technical conditions which result in excessive disposal of emmissions.	5-10	20-30	**100-200**
234	Violation of environmental requirements during planning, designing, confirmation, allocation, construction, reconstruction, placing into operation, operation or liquidation of facilities, construction sites, vehicles and other objects which have direct or indirect impact on the status of environment, and, equally, during export and import of environmentally sensitive products.	10-20	30-40	**100-200**
235	Production of construction, hydro-	10-20	40-50	**200-300**

	technical, demolition and drilling works, development of quarries and conduction of any other forms of economic activities which has harmful effect on the environment and natural resources without authorization, if obtaining of such authorization is prescribed by the law of RT.			
236	Liquidation of environmental construction on operating technological equipment and objects without authorization of state environmental conservation bodies.	0,0	40-50	**200-300**
237	Destruction and damage of special protected objects and areas of natural complexes of state reserved areas, national natural parks, health, recreation and sanatorium resorts, typical or rare landscapes, natural landmarks which are under protection of the state, in the absence of the elements of crime.	10-20	30-40	**0,0**
238	Use of natural resources without special authorization, if acquisition of such is necessary in accordance with the law of RT, and, equally, disposal of wastes.	5-10	20-30	**100-200**
239	Violation of environmental requirements in regards of storage (allocation), transportation, use, decontamination and dumping of toxic industrial and household wastes.	5-10	30-40	**200-300**
240	Violation of environmental requirements in regards of storage (allocation), transportation, use in the national economy, decontamination and dumping of radioactive materials, toxic chemical substances.	5-10	30-40	**200-300**
241	Pollution of the environment and, as a consequence of such, incliction of harm to human health, and also to flora and fauna, national economy.	15-20	40-50	**200-300**
242	Unauthorized cutting or damage of trees and shrubs in parks, reserved areas, green zones of cities and other residential centers, field-protective aforestation, aforestation strips along roads and railways, protective forest strips along rivers and canals, around lakes and other reservoirs, in the absence of the elements of crime.	5-10	20-30	**0,0**
243	Violation of the established regime of use of lands for the purpose of environmental protection, reserved, recreational, historical and cultural purposes, other lands with special conditions of use, and lands which have been exposed to radioactive, chemical, bacteriological pollution.	3-7	10-20	**0,0**
244	**Damage of agricultural lands and other lands, or destruction of the fertile soil layer with chemical and radioactive substances, bacterial-pests or quarantine animal and plant organisms, industrial**	**3-7**	**10-15**	**0,0**

	and other wastes, waste waters.			

Source: *The Committee on Environmental Conservation under the Government of the Republic of Tajikistan*

Table 1.19: Cost Estimation of the Natural Capital of Timber Forest Products (Traditional Activity)

#	Types of Products	Volume of Production	Price (TJS)	Amount (Million TJS)
1	Cradle (thousand)	180,0	300	**54,0**
2	Wooden plates (thousand)	400,0	450	**18,0**
3	Wooden paddles (thousand)	496,0	35	**8,7**
4	Fence	38,4 thousand families x 20 meter	10	**7,7**
5	Fuel resources (firewoods)	495,7 thousand families x 4 cubic meter	76	**150,7**
6	Instrument for deflation of oil	40% of familes = 198.3 thousan families	200	**0,4**
7	Constructions of barns	40% of families = 198.3 thousand families	1 cubic meter x 76	**15,1**
8	Construction of houses, shelters (private and communal)	400 pcs	250	**1,0**
9	Construction and repairmen of sites for over-wintering of cattle	246 jamoats x 5 barns x 4 cubic meter	76	**0,4**
10	Traditional ploughs	246 jamoats x 4 pcs	650	**0,6**
11	Musical instruments	40% of families = 198.3 thousand families	60	**11.9**
12	Other forms of housegold items, toys, rake-combs, etc.	40% of families = 198.3 thousand families	8	**1,6**
	Total:			**270,1**

Source: *The Committee on Environmental Conservation under the Government of the Republic of Tajikistan*

Table 1.20. Cost Estimation of the Natural Capital of Wild Animals and Birds (according to the Materials of SO SPNA for 2012)

#	Wild Animal Species	Number of Animals (Heads)	Price per Unit (TJS)	Amount (Thousand TJS)
1	Bukharian deer	140	15161,8	**2122,7**
2	Urial	253	1819.4	**460,3**
3	Markhoor	239	197861.7	**47288,9**
4	Argali	1955	60647.3	**118565,5**
5	Persian gazelle	60	7580.9	**454,9**
6	Siberian capricorn	5041	485.2	**2445,9**
7	Boar	1528	75.8	**115,8**
8	Snow leopard	47	90970.9	**4275,6**
9	Bobcat	43	7580.9	**326,0**
10	Jungle cat	60	1516.2	**90,9**
11	Hyena	18	7580.9	**136,5**
12	Bear	93	7580.9	**705,0**
13	Wolf	243	80	**19,4**
14	Jackal	242	10,6	**1,6**

15	Fox	891	10,6	**9,5**
16	Otter	103	7580,9	**780,8**
17	Stone marten	144	10,6	**1,6**
18	Badger	160	10,6	**1,7**
19	Porcupine	365	1516	**553,3**
20	Red marmot	9921	10,6	**105,2**
21	Hare	5790	6,1	**35,3**
22	Nutria	20	10	**0,3**
23	Snow cock	2383	60	**143,0**
24	Tibetan snow cock	160	60,7	**9,7**
25	Pheasant	1285	151,6	**194,8**
26	Pigeons	1752	2,3	**4,1**
27	Chukar	5647	6,1	**34,5**
28	Bar-headed goose	691	75,8	**52,4**
29	Ducks	51140	2,3	**117,6**
30	Birds of prey	230	227,4	**52,3**
	Итого			**179.105,1**

Source: *The Committee on Environmental Conservation under the Government of the Republic of Tajikistan*

Table 1.21. Cost Estimation of the Natural Capital of Wild Animals on the Territory of SO of Fofrest Resources and Hunt for 2012

#	Wild Animal Species	Number of Animals (Heads)	Price per 1 Head (TJS)	Amount (Thousand TJS)
1	Bukharian deer	44	15161,8	**667,1**
2	Urial	641	1819.4	**1.166,2**
3	Markhoor	198	197861.7	**39176,6**
4	Argali	2980	60647.3	**180.729,0**
5	Persian gazelle	60	7580.9	**454,9**
6	Siberian capricorn	5041	485.2	**2.445,9**
7	Boar	9367	75.8	**710,0**
8	Snow leopard	148	90970.9	**13.463,7**
9	Bobcat	51	7580.9	**386,6**
10	Jungle cat	131	1516.2	**198,6**
11	Hyena	21	7580.9	**159,2**
12	Bear	1075	7580.9	**8.149,5**
13	Wolf	2875	80	**230,0**
14	Jackal	5230	10,6	**55,4**
15	Fox	6589	10,6	**69,8**
16	Otter	333	7580,9	**2.524,4**
17	Stone marten	254	10,6	**2,7**
18	Badger	180	10,6	**1,9**
19	Porcupine	1879	1516	**2.848,6**
20	Red marmot	7988	10,6	**84,7**
21	Hare	16995	6,1	**103,7**
22	Nutria	16	10	**0,2**
23	Snow cock	2628	60	**157,7**
24	Tibetan snow cock	130	60,7	**7,9**
25	Pheasant	1401	151,6	**212,4**
26	Pigeons	1758	2,3	**4,0**
27	Chukar	41798	6,1	**255,0**

28	Bar-headed goose	3695	75,8	**280,1**
29	Ducks	11578	2,3	**26,6**
30	Birds of prey	230	227,4	**52,3**
31	Axis deer	168	1100	**184,8**
	Total:			**254.808,9**

Source: *The Committee on Environmental Conservation under the Government of the Republic of Tajikistan*

Table 1.22. Estimation of the Natural Capital of Flora for 2012

#	Type of Forest	Area (Thousand ha)	Reserve (Thousand cubic meters)	Market Price per Unit (TJS)	Amount (Thousand TJS)
1	Pistachio	79,0	330,0	350	**115,5**
2	Asiatic poplar	24,0	710,0	384	**272,6**
3	Poplar	7,0	95,0	672	**63,8**
4	Saxaul	8,0	40,0	400	**16,0**
5	Shrubby	73,0	100,0	250	**250,0**
6	Walnut	8,0	324,0	120	**38,9**
7	Sea-buckthorn	2,0	90,0	150	**13,5**
8	Almond	12,0	105,0	250	**26,3**
9	Maple	44,0	430,0	768	**330,2**
10	Willow tree	11,0	80,0	486	**38,9**
11	Birch	3,0	84,0	486	**40,8**
12	Pine tree	150,0	3600,0	1440	**5.184,0**
13	Alycha	2,6	0,02	250	**5,0**
14	Othre hardy-shrub species	29,4	0,2	150	**30,0**
15	Total stock of timber	421,1	6000,0	110	**660000,0**
16	Pastures	3849,2	4619,1 т.	550	**2540,5**
17	Haylands	20,9	31,4 т.	600	**18840,0**
17	Gardens	65,4	196,2 т.	7	**62,7**
18	Vinelands	22,9	68,7 т.	8	**549,6**
	Total:				**688.418,3**

Source: *The Committee on Environmental Conservation under the Government of the Republic of Tajikistan*

Table 1.23. Cost Estimation of the Natural Capital of Forest Products for 2012

#	Type of Products	Reserve (tonn)	Market Price per 1kg (TJS)	Amount (thousand TJS)
1	Pistachio	7900	60	**474000,0**
2	Food plants	933,3	2	**1866,6**
3	Dried fruits	888	8	**7104,0**
4	Medicinal plants	67	80	**5360,0**
5	Bitter almond	85	100	**8500,0**
6	Sweet almond	37,8	65	**2457,0**
7	Walnut	500	15	**7500,0**
8	Brier	108,5	55	**5967,5**
9	Anzur onion	133	25	**3325,0**
10	Cumin	9,6	300	**2880**
11	Barberries	55,5	65	**3607,5**
12	Sea-buckthorn	60	110	**6600,0**
13	Mushrooms	5	40	**200,0**

14	Hawthorn	55	7	**385,0**
	Total:	**10837,7**		**529.752,6**

Source: *The Committee on Environmental Conservation under the Government of the Republic of Tajikistan*

Table 1.24. Cost Estimation of the Natural Capital of Reserved Area "Tigrovaya Balka" (of Wild Animals for 2012)

#	Wild Animal Species	Number of Animals (Heads)	Price per 1 Head (TJS)	Amount (Thousand TJS)
1	Bukharian deer	140	15161,8	**2.122,7**
2	Urial	30	1819.4	**54,6**
3	Persian gazelle	60	7580.9	**454,8**
4	Boar	120	75.8	**9,1**
5	Jundgle cat	60	1516.2	**91,0**
6	Hyena	18	7580.9	**136,5**
7	Wolf	20	80	**1,6**
8	Jackal	130	10,6	**1,4**
9	Fox	230	10,6	**2,4**
10	Otter	16	7580,9	**121,3**
11	Badger	15	10,6	**0,2**
12	Porcupine	30	1516	**15,5**
13	Hare	140	6,1	**0,9**
14	Nutria	20	10	**0,2**
15	Pheasant	1200	151,6	**181,9**
16	Ducks	46 000	2,3	**105,6**
	Total:			**3.299,7**

Source: *The Committee on Environmental Conservation under the Government of the Republic of Tajikistan*

Table 1.25. Cost Estimation of the Natural Capital of Reserved Area "Ramit" (of Wild Animals for 2012)

#	Wild Animal Species	Number of Animals (Heads)	Price per 1 Head (TJS)	Amount (Thousand TJS)
1	Siberian capricorn	75	485.2	**36,4**
2	Boar	227	75.8	**17,2**
3	Snow leopard	5	90970.9	**454,9**
4	Bobcat	8	7580.9	**87,6**
5	Bear	49	7580.9	**371,5**
6	Wolf	45	80	**3,6**
7	Fox	43	10,6	**0,5**
8	Оттек	12	7580,9	**91,0**
9	Stone marten	35	10,6	**0,4**
10	Badger	28	10,6	**0,3**
11	Porcupine	63	1516	**95,5**
12	Red marmot	93	10,6	**1,0**
13	Hare	24	6,1	**0,2**
14	Snow cock	193	60	**11,6**
15	Pigeons	159	2,3	**0,4**
16	Chukar	1032	6,1	**6,3**
17	Ducks	91	2,3	**0,3**
18	Birds of prey	85	227,4	**23,6**
	Total:			**1.202,3**

Source: *The Committee on Environmental Conservation under the Government of the Republic of Tajikistan*

Table 1.26. Cost Estimation of the Natural Capital of Reserved Area "Dashtidjum" (of Wild Animals for 2012)

#	Wild Animal Species	Number of Animals (Heads)	Price per 1 Head (TJS)	Amount (Thousand TJS)
1	Urial	223	1819.4	**405,7**
2	Markhoor	239	197861.7	**47.289,0**
3	Boar	571	75.8	**43,3**
4	Snow leopard	8	90970.9	**727,8**
5	Bobcat	3	7580.9	**22,7**
6	Bear	9	7580.9	**68,2**
7	Wolf	37	80	**3,0**
8	Jackal	152	10,6	**1,6**
9	Fox	262	10,6	**2,8**
10	Otter	12	7580,9	**90,9**
11	Badger	8	10,6	**0,1**
12	Porcupine	262	1516	**397,2**
13	Hare	125	6,1	**0,8**
14	Pheasant	85	151,6	**8,8**
15	Pigeons	300	2,3	**0,7**
16	Chukar	3500	6,1	**21,4**
	Total:			**48.784,0**

Source: *The Committee on Environmental Conservation under the Government of the Republic of Tajikistan*

Table 1.27. Cost Estimation of the Natural Resources of Reserved Area "Zorkul" (of Wild Animals for 2012)

#	Wild Animal Species	Number of Animals (Heads)	Price per 1 Head (TJS)	Amount (Thousand TJS)
1	Argali	830	60647.3	**50.337,3**
2	Siberian capricorn	715	485.2	**347,0**
3	Snow leopard	3	90970.9	**273,0**
4	Bobcat	3	7580.9	**22,7**
5	Bear	2	7580.9	**15,2**
6	Wolf	38	80	**3,0**
7	Fox	49	10,6	**0,5**
8	Otter	32	7580,9	**242,6**
9	Stone marten	30	10,6	**0,3**
10	Red marmot	1 800	10,6	**19,1**
11	Hare	960	6,1	**5,9**
12	Snow cock	300 пар	60	**36,0**
13	Bar-headed goose	218 пар	75,8	**33,1**
14	Ducks	2000	2,3	**4,6**
	Total:			**51.340,5**

Source: *The Committee on Environmental Conservation under the Government of the Republic of Tajikistan*

Table 1.28. Cost Estimation of the Natural Resources of Reserved Area "Sarikhosor" (of Wild Animals for 2012)

#	Wild Animal Species	Number of Animals (Heads)	Price per 1 Head (TJS)	Amount (Thousand TJS)
1	Siberian cupricorn	30	485.2	**14,6**
2	Boar	200	75.8	**15,2**
3	Snow leopard	2	90970.9	**181,9**
4	Bear	3	7580.9	**22,7**
5	Jackal	5	10,6	**0,1**
6	Fox	40	10,6	**0,5**
7	Badger	20	10,6	**0,2**
8	Porcupine	20	1516	**30,3**
9	Red marmot	20	10,6	**0,2**
10	Hare	30	6,1	**0,2**
11	Pigeons	50	2,3	**0,1**
12	Chukar	80	6,1	**0,5**
	Total:			**266,5**

Source: *The Committee on Environmental Conservation under the Government of the Republic of Tajikistan*

Table 1.29. Cost Estimation of the Natural Resources of Natural and Historical Park "Shirkent" (of Wild Animals, for 2012)

#	Wild Animal Species	Number of Animals (Heads)	Price per 1 Head (TJS)	Amount (Thousand TJS)
1	Siberian cupricorn	30	485.2	**14,6**
2	Boar	120	75.8	**9,9**
3	Snow leopard	1	90970.9	**90,9**
4	Bear	6	7580.9	**45,5**
5	Wolf	12	80	**1,0**
6	Jackal	5	10,6	**0,1**
7	Fox	40	10,6	**0,5**
8	Otter	8	7580,9	**60,6**
9	Stone marten	23	10,6	**0,3**
10	Badger	10	10,6	**0,1**
11	Porcupine	22	1516	**33,4**
12	Snow cock	15	60	**1,0**
13	Pigeons	40	2,3	**0,1**
14	Chukar	400	6,1	**2,4**
	Total:			**260,4**

Source: *The Committee on Environmental Conservation under the Government of the Republic of Tajikistan*

Table 1.30. Cost Estimation of the Natural Capital of the Natural Park "The National Park" (of Wild Animals, for 2012)

#	Animal Species	GBAO	Djirgital	Tavildara	Number of Animals (Heads)	Price per 1 Head (TJS)	Amount (Thousand TJS)
1	Argali	1125			1125	60647.3	**68.228,2**
2	Persian gazelle	3700	400	90	4190	7580.9	**31.764,0**
3	Siberian cupricorn	3700	400	90	4190	485.2	**2.033,0**
4	Boar		10	344	354	75.8	**26,8**
5	Snow leopard	8	6	14	28	90970.9	**2.547,2**
6	Bobcat	8	12	3	23	7580.9	**174,,4**
7	Hyena	9	15		24	7580.9	**181,9**
8	Bear	9	15		24	7580.9	**181,9**
9	Wold	71	15	18	104	50	**5,2**
10	Jackal	20	15	15	50	245	**12,3**
11	Fox	120	65	60	245	38	**9,3**
12	Otter	22	4	12	38	7580,9	**288,1**
13	Stone marten	22		36	58	10,6	**0,6**
14	Badger	20	18	40	78	10,6	**0,9**
15	Red marmot	6500	850	1500	8850	10,6	**93,8**
16	Hare	1321	515	200	4515	6,1	**27,5**
17	Snow cock	190	96	150	1536	60	**92,2**
18	Tibetan snow cock				160	60	**9,6**
19	Pigeons	300	250	600	1150	2,3	**2,6**
20	Chukar	200	280	450	1580	6,1	**9,6**
21	Bar-headed goose	275			275	75,8	**20,8**
22	Ducks	3000	140		3140	2,3	**7,2**
23	Birds of prey	85	20	40	145	227,4	**33,0**
	Total:						**105.750,1**

Source: *The Committee on Environmental Conservation under the Government of the Republic of Tajikistan*

Table 1.31: Production of Agricultural Products for 2013

#	Types of Products	Unit	Total	Agricultural Enterprises	Farms of the Population	Dekhkan Households	Market Price per Unit (pcs, ton, heads/ TJS)	Total Cost (Thousand TJS)
1.	Grain cultures	tonn	1098182	109196	459878	529108	2200	2.416.000,4
2.	Cotton (total)	tonn	416490	94102	0	322388	6000	1.449.364,0
3.	Potato	tonn	863069	61165	528377	273527	2000	1.726.138,0
4.	Vegetables	tonn	1242026	79285	772869	389872	3000	3.726.078,0
5.	Gourds	tonn	423323	32115	143394	247914	2000	846.646,0

6.	Fruits	tonn	263060	19312	181414	62334	8000	2.144.480,0
7.	Grapes	tonn	154726	8939	96747	49040	12000	1.856.712,0
8.	Cattle stock	heads	2015353	35122	1859295	120936	2742,7	5.527.530,0
	Including cows	heads	1037058	10430	994904	31724	2000	2.074.116,0
	Bulls	heads	978295	24692	864391	89212	2500	2.445.337,5
9.	Small cattle	heads	4618595	287226	3845831	485538	850	3.925.805,8
10.	Pigs	heads	694	0	694	0	700	485,8
11.	Horses	heads	76523	6312	55494	14717	5000	382.615,0
12.	Chicken	heads	4654827	1539199	2883001	232627	18	83.787,0
13.	Meat	tonn	150764	4758	140450	5556	27000	4.070.628,0
14.	Milk	tonn	695892	14410	653885	27597	3500	2.435.622,0
15.	Eggs	Thousand pcs	254694	151424	96966	6304	650	165.551,1
16.	Wool	tonn	6027	438	4955	634	4000	24.108,0
17.	Honey	tonn	3510,7	0	0	0	40000	100.428,0
18.	Cocoon	tonn	1110	0	0	0	10000	11.100,0
19.	Fodder cultures	tonn	86042	20013	12696	53333	2500	2.151.05
	TOTAL:						**27244269,78 TJS** **5.4 billion USD**	

Source: *Statistical Summary "Regions of Tajikistan", 2013*

Table 1.32: Unrecorded Products of Biodiversity

#	Nam of the Product	Unit	Quantity	Price TJS	Thousand TJS
1	Pistachio	tonn	7900	40000	316.000,0
2	Almond	tonn	500	3500	1.750,0
3	Walnut	tonn	5000	8000	40.000,0
4	Pomegranate	tonn	40000	1100	44.000,0
5	Rhubarb	tonn	1200	3000	3.600,0
6	Barberries	tonn	555	35000	19.425,0
7	Brier	tonn	1085	25000	27.125,0
8	Cumin	tonn	76,8	30000	2.304,0
9	Hawthorn	tonn	440	4000	1.760,0
10	Mushrooms	tonn	60	10000	600,0
11	Anzur onion	tonn	865	15000	12.975,0
12	Lemon	tonn	7390	10000	73.900,0
13	Mulberry	tonn	30000	4000	120.000,0
14	Food plants	tonn	1866,6	2000	3.733,2
15	Medicinal plants	tonn	201	8000	1.608,0
16	Sea buckthorn	tonn	200	110000	22.000,0
17	Timber and construction materials	m^3	240000	90	21. 600,0
	TOTAL AMOUNT:				**712.380,2**

Source: *Calculated on the basis of experts' estimations*

**Unrecorded products of biodiversity are not considered in the official statistics. Data is assessed and listed in the table on the basis of experts' estimates. The table includes products of gardening, honey, milk, vegetables and gourds, hay, chaff and others which are produced by households for personal consumption.*

From this amount, natural capital equals to more than 14.1% and unrecorded products of biodiversity account for more than 8.2%.

$$PC = \sum (X \times Y)K$$

Whereas:
NC – natural capital,
X – quantity,
У – price per unit,
К – indexation rate (0.7% set by the Decree of the Government of the Republic of Tajikistan #546 by November 2nd, 2007).
Calculation of the rate of GDP by sectors of the conomics looks as following:

$$BD = \sum (NC + ABD + UNS)$$

Whereas BD – biodiversity,
NC – natural capital,
ABD – agrobiodiveristy,
UNS – unrecorded natural services.
Biodiversity is counted as follows:
= 28.959.715,88 thousand TJS or around 5.815.204 thousand USD or more than 5,8 billion USD, which equals to 68% of the country's GDP. From this amount, ABD products account for 63.5%.

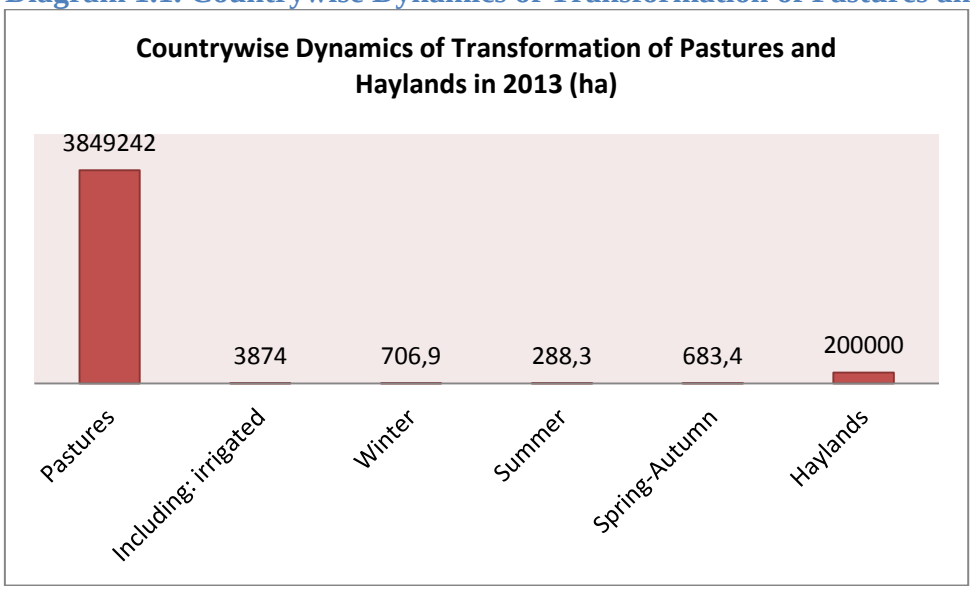
Table 1.33. Forecast of the Country's GDP by Sectors until 2020

#	Name	Years										
		2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
1	Dynamics of GDP in RT, percents	6,5	7,4	7,6	7,8	8,0	8,2	8,4	8,6	8,8	9,0	10
2	GDP of RT, billion USD	6,7	7,3	7,9	8,5	9,1	9,7	10,3	10,9	11,5	12,1	12,7
3	GDP generated by BD, percents, К=0,6	67,1	67,7	68,3	68,9	69,5	70,1	70,7	71,3	71,9	72,5	73,1
4	Dynamics of GDP in RT per capite, USD	745	846,3	850,7	952	1053,3	1154,6	1255,9	1357,2	1458,5	1559,5	1661,1
5	Dynamics of growth of the population, thousand people, К=2,2	7784,0	7952,0	8120,0	8288,0	8456,0	8624,0	8792,0	8960,0	9128,0	9296,0	9462,0

Source: *Calculated on the basis of experts' estimations*

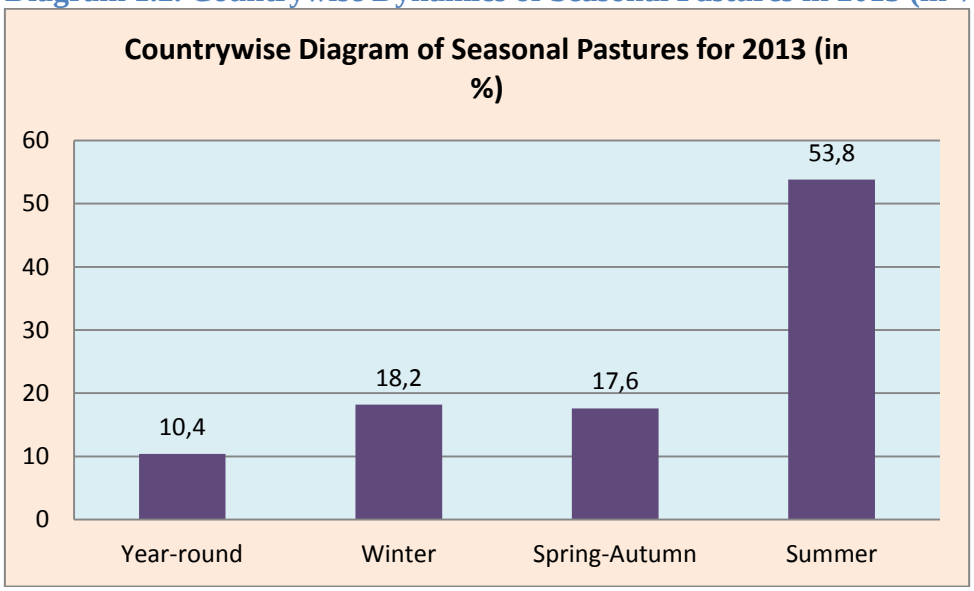
ANNEX 3. DIAGRAMS

Diagram 1.1. Countrywise Dynamics of Transformation of Pastures and Haylands in 2013



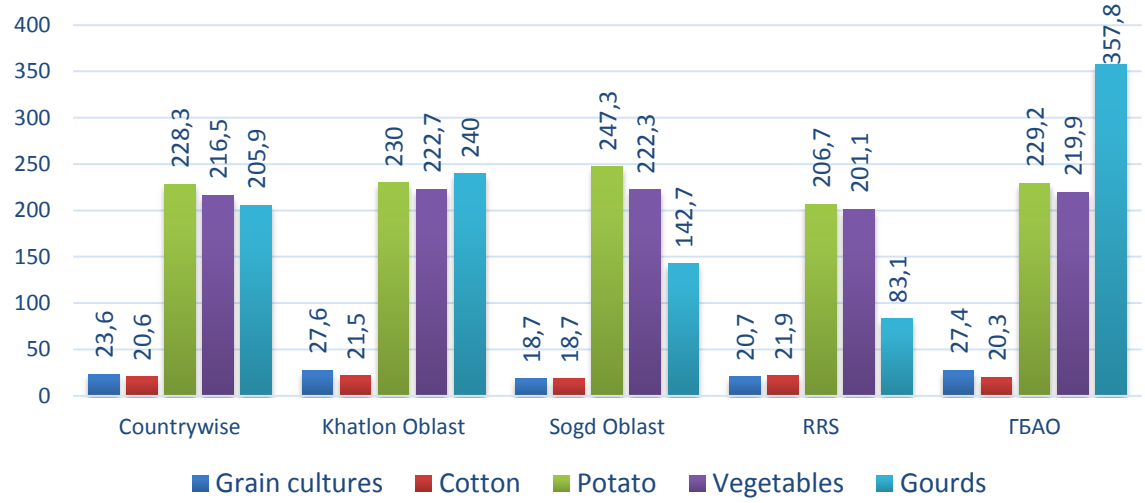
Source: *Statistical Summary "Regions of Tajikistan", 2013*

Diagram 1.2. Countrywise Dynamics of Seasonal Pastures in 2013 (in %)



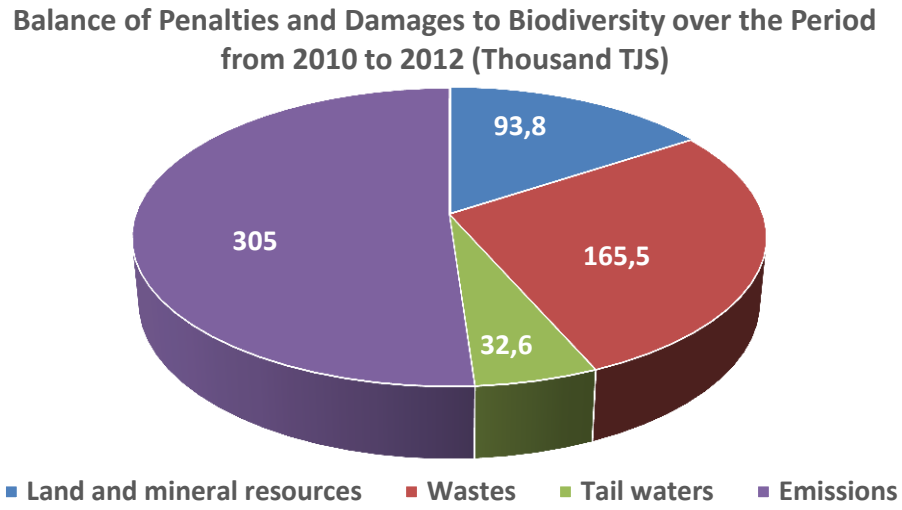
Source: *Statistical Summary "Regions of Tajikistan", 2013*

Diagram 1.3. Countrywise and Project Regions Dynamics of Agricultural Crops Productivity in 2012



Source: *Statistical Summary "Regions of Tajikistan", 2013*

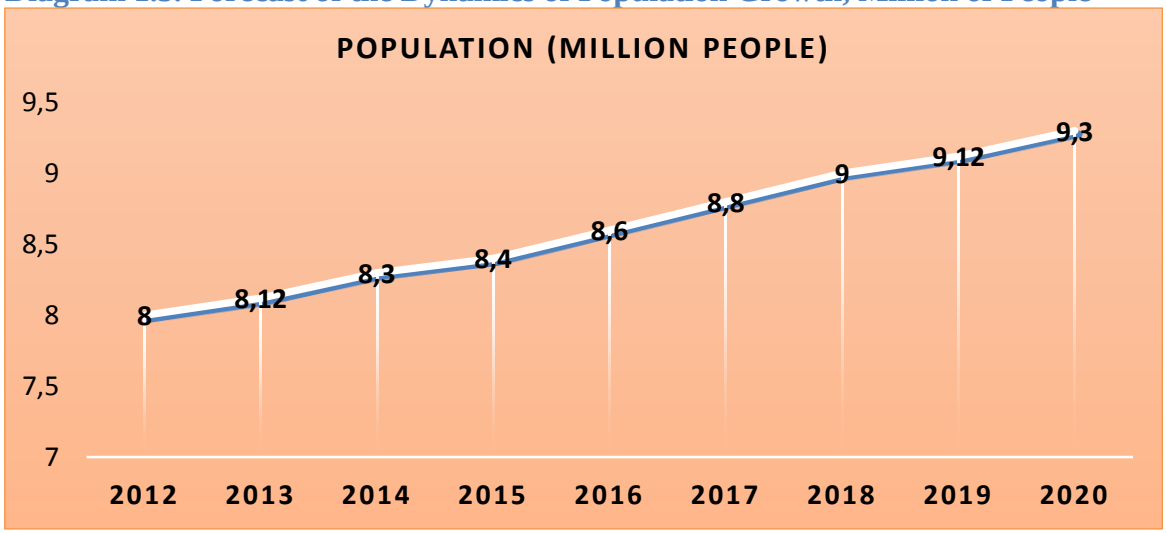
Diagram 1.4. Balance of Penalty Fines and Damage to Biodiversity over the Period from 2010 to 2012 (Thousand TJS)



Source: *The Committee on Environmental Conservation under the Government of the Republic of Tajikistan*

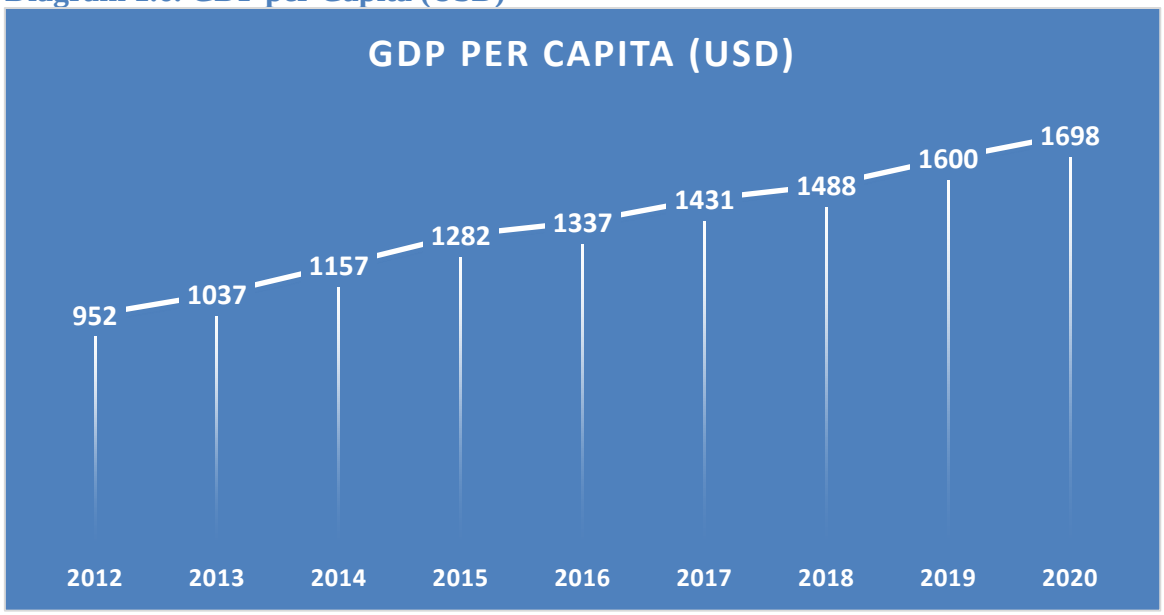
**In 2012 the inflation rate was equal to 10.2% which is 0.4% higher (9.8%0 comparint to the rate in 2010, and in 2011 the rate was equal to 9.3%.*

Diagram 1.5. Forecast of the Dynamics of Population Growth, Million of People



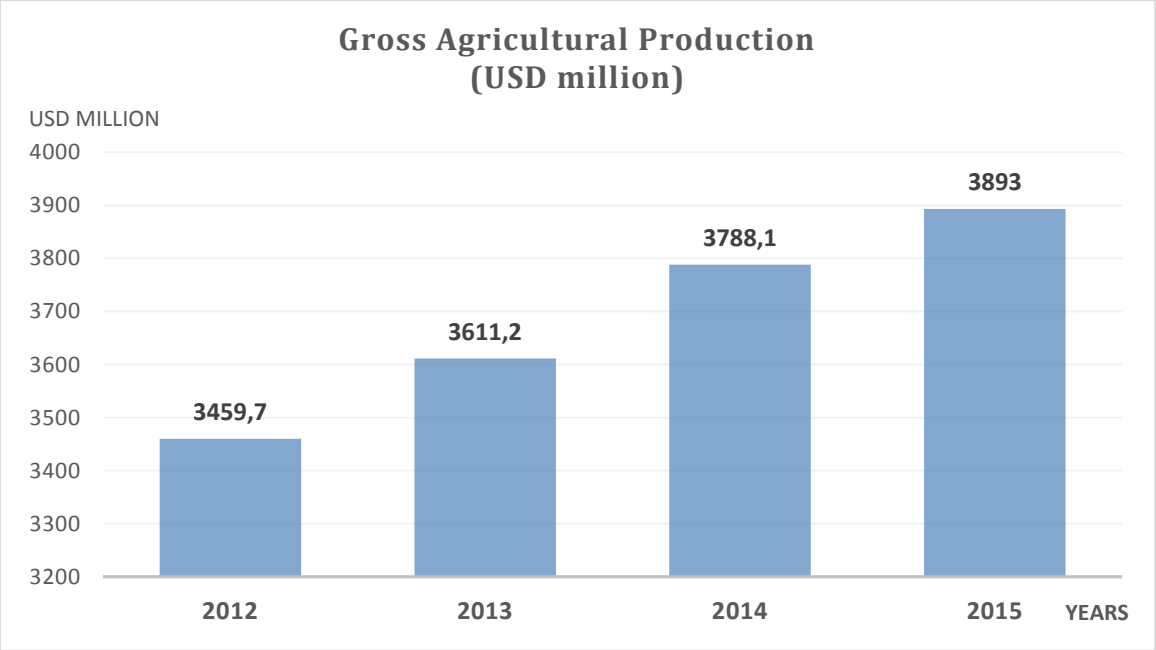
Source: *Calculated on the basis of experts' estimations*

Diagram 1.6. GDP per Capita (USD)



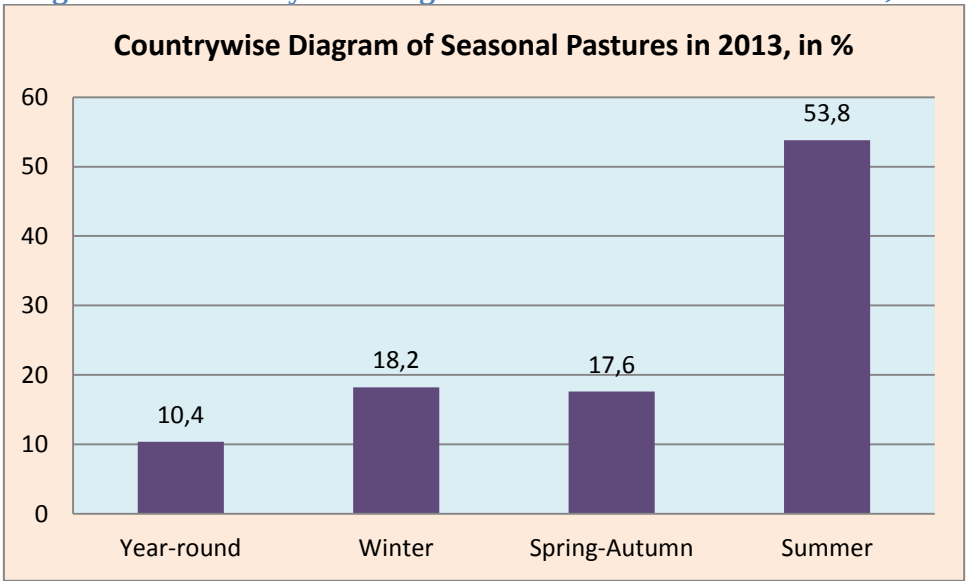
Source: *Calculated on the basis of experts' estimations*

Diagram 1.7. Gross Agricultural Production (USD million)



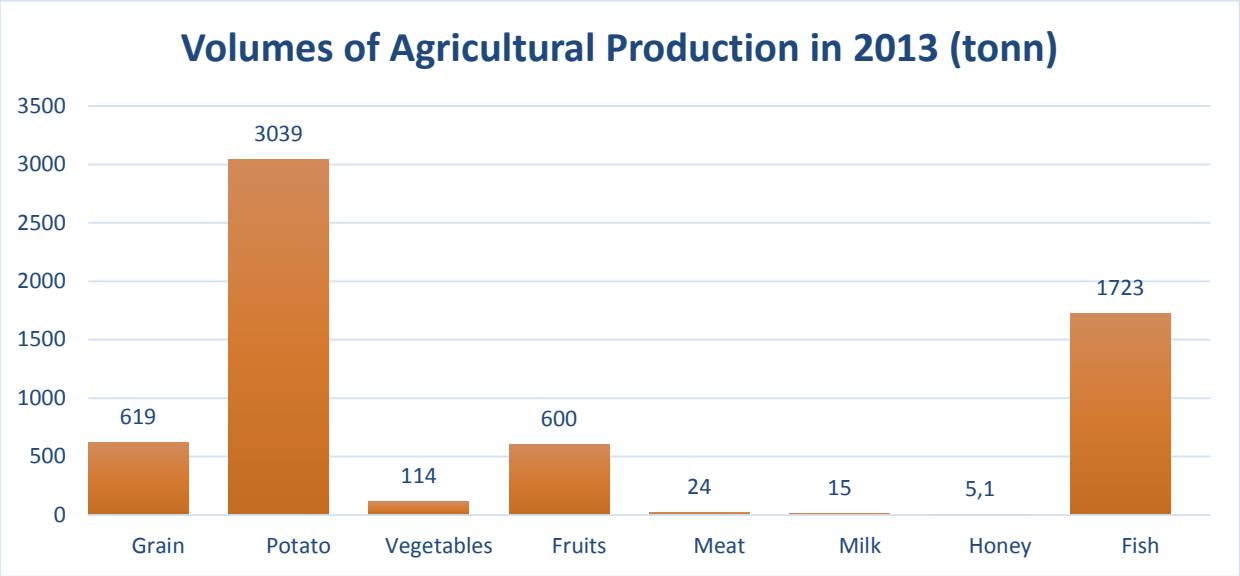
Source: *Calculated on the basis of experts' estimations*

Diagram 1.8. Countrywise Diagram of Seasonal Pastures in 2013, in Percents



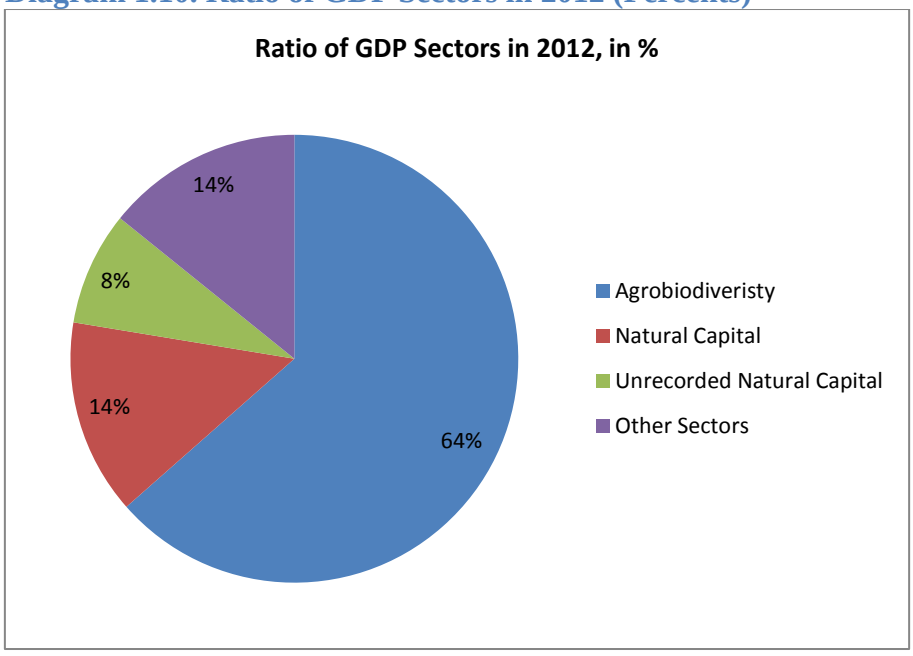
Source: *Statistical Summary "Regions of Tajikistan", 2013*

Diagram 1.9. Agricultural Production Rate in 2013 (Tonn)



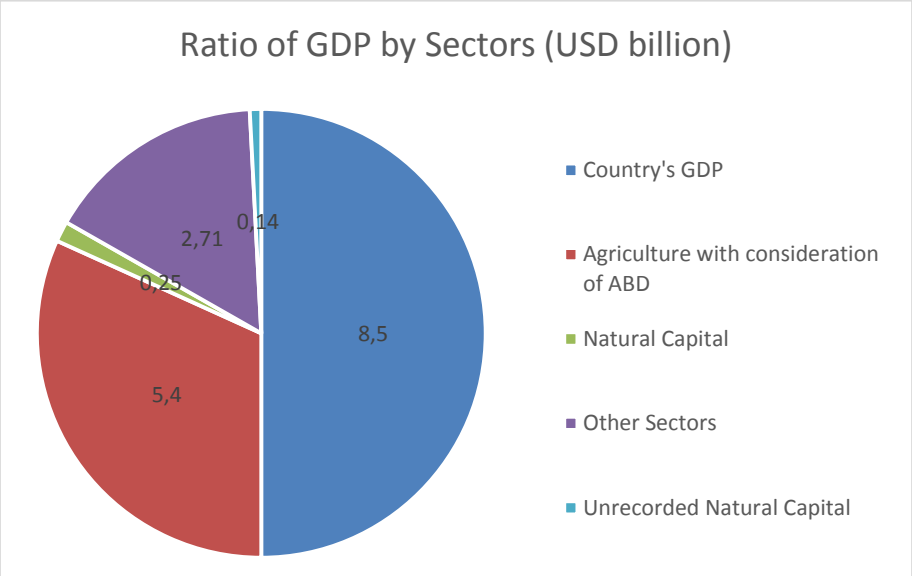
Source: *Statistical Summary "Regions of Tajikistan", 2013*

Diagram 1.10. Ratio of GDP Sectors in 2012 (Percents)



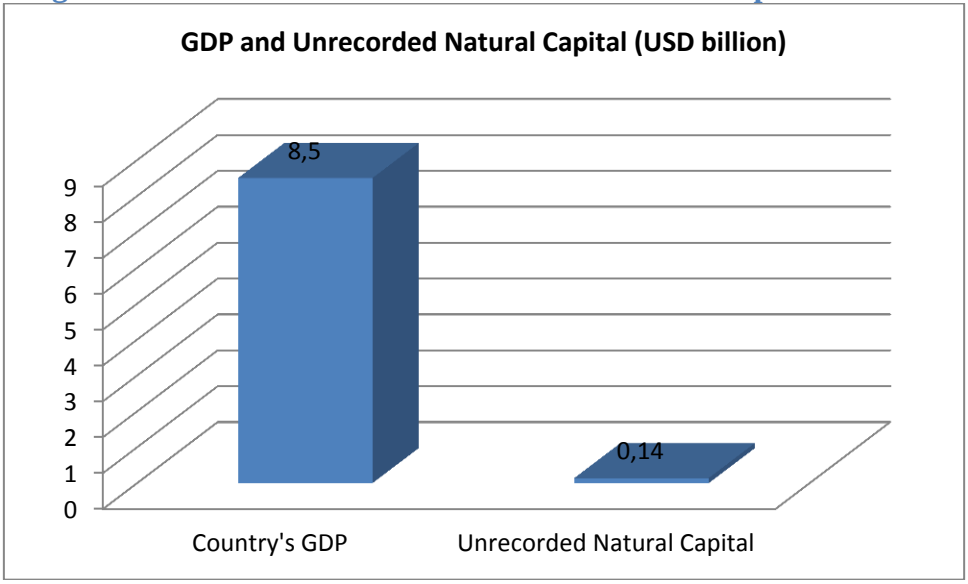
Source: *Calculated on the basis of experts' estimations*

Diagram 1.11. Ratio of GDP Sectors (USD Billion)



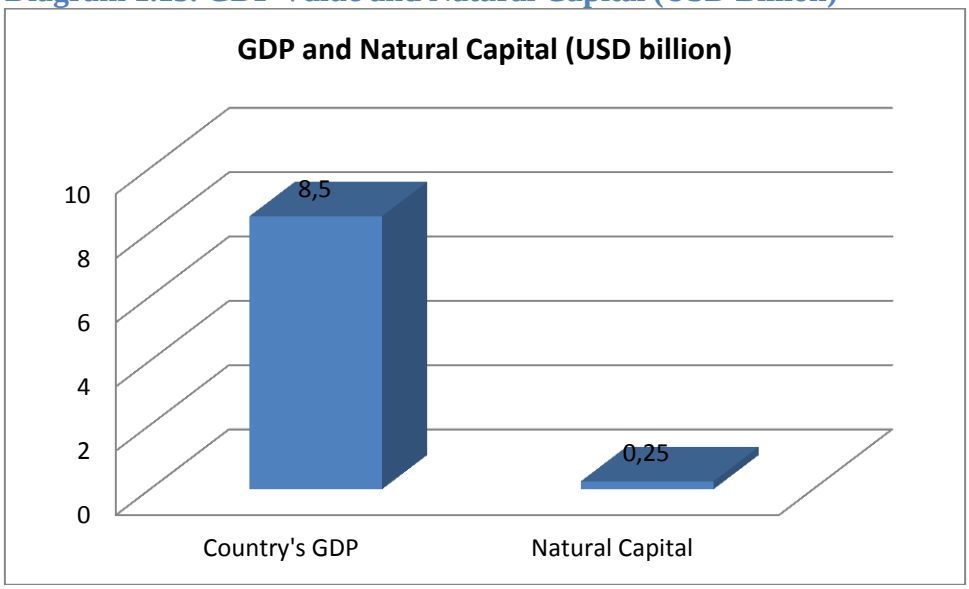
Source: *Calculated on the basis of experts' estimations*

Diagram 1.12. GDP Value and Unrecorded Natural Capital



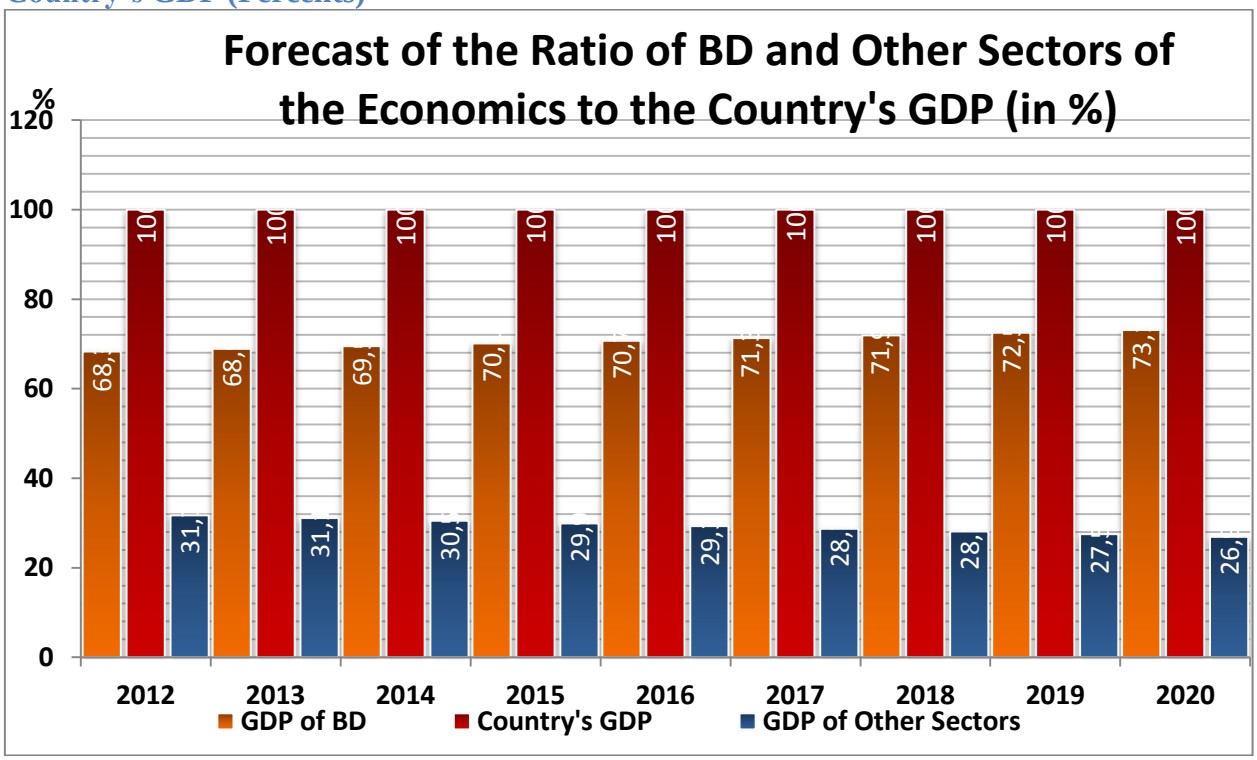
Source: *Calculated on the basis of experts' estimations*

Diagram 1.13. GDP Value and Natural Capital (USD Billion)



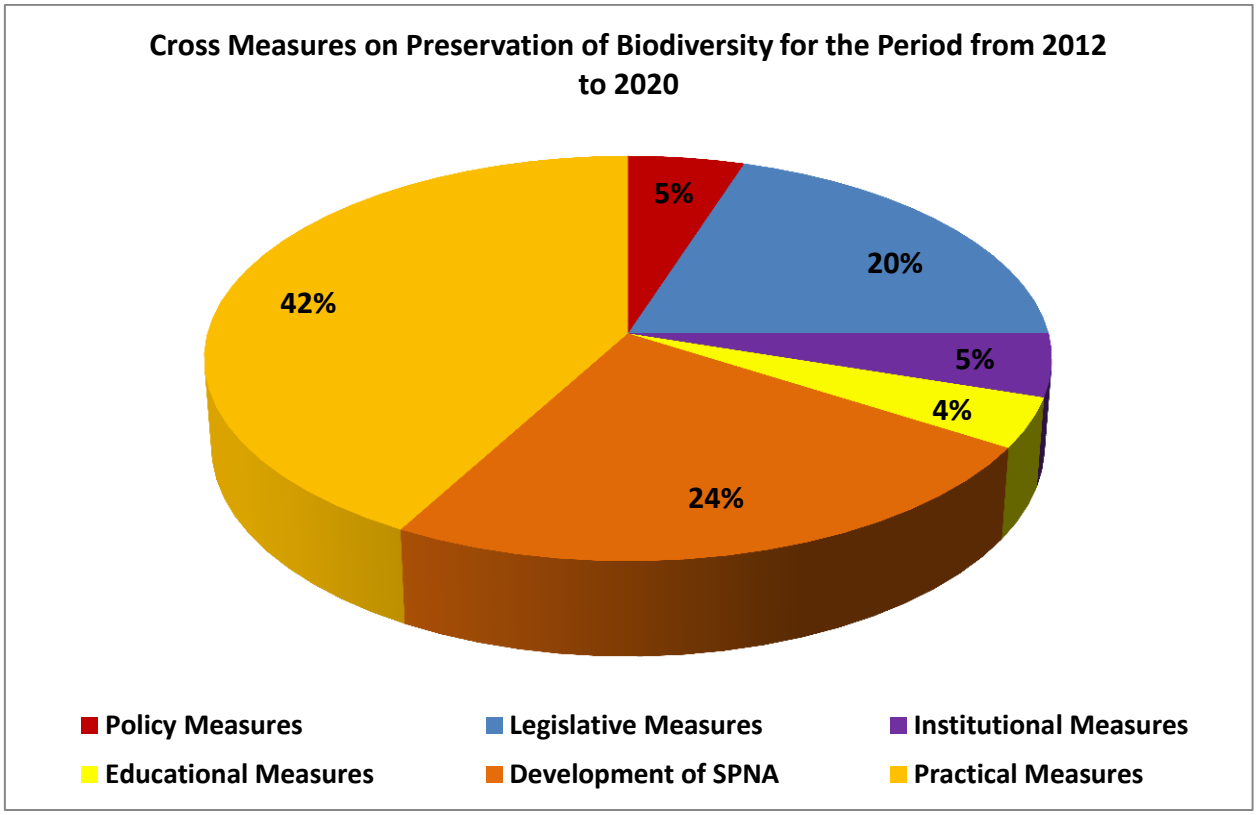
Source: *Calculated on the basis of experts' estimations*

Diagram 1.14. Forecast of the Ratio of Biodiversity and Other Sectors of Economy to the Country's GDP (Percents)



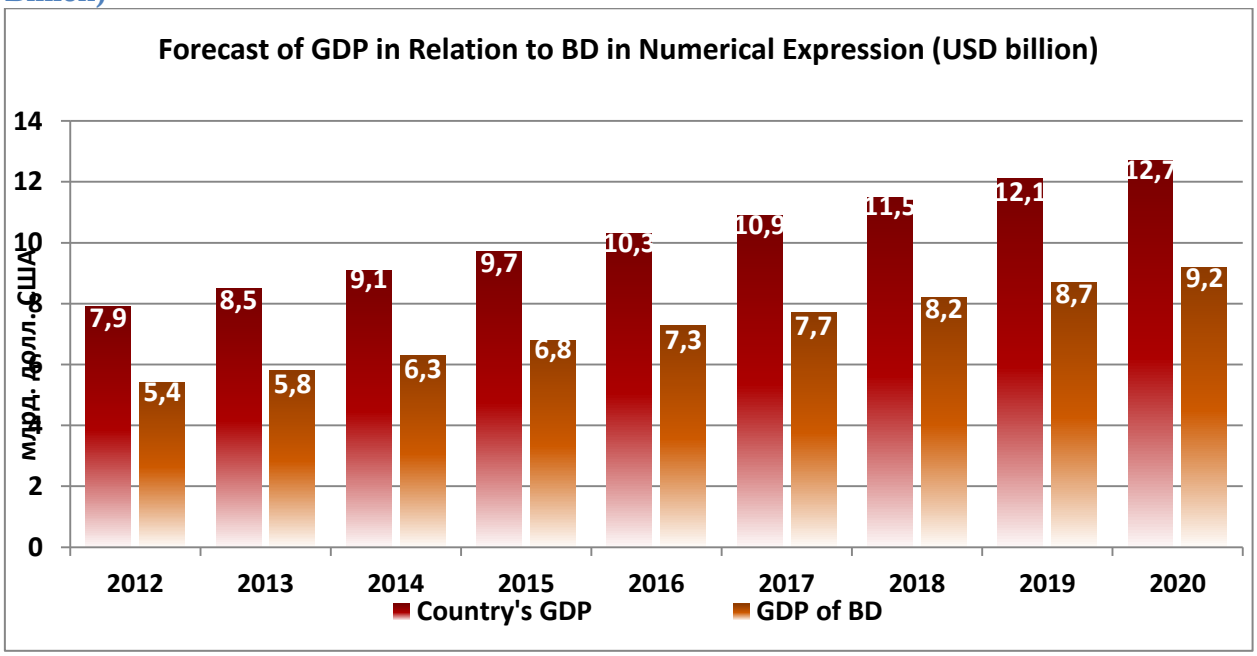
Source: *Calculated on the basis of experts' estimations*

Diagram 1.15. Cross Measures on Preservation of Biodiversity for the period from 2012 to 2020



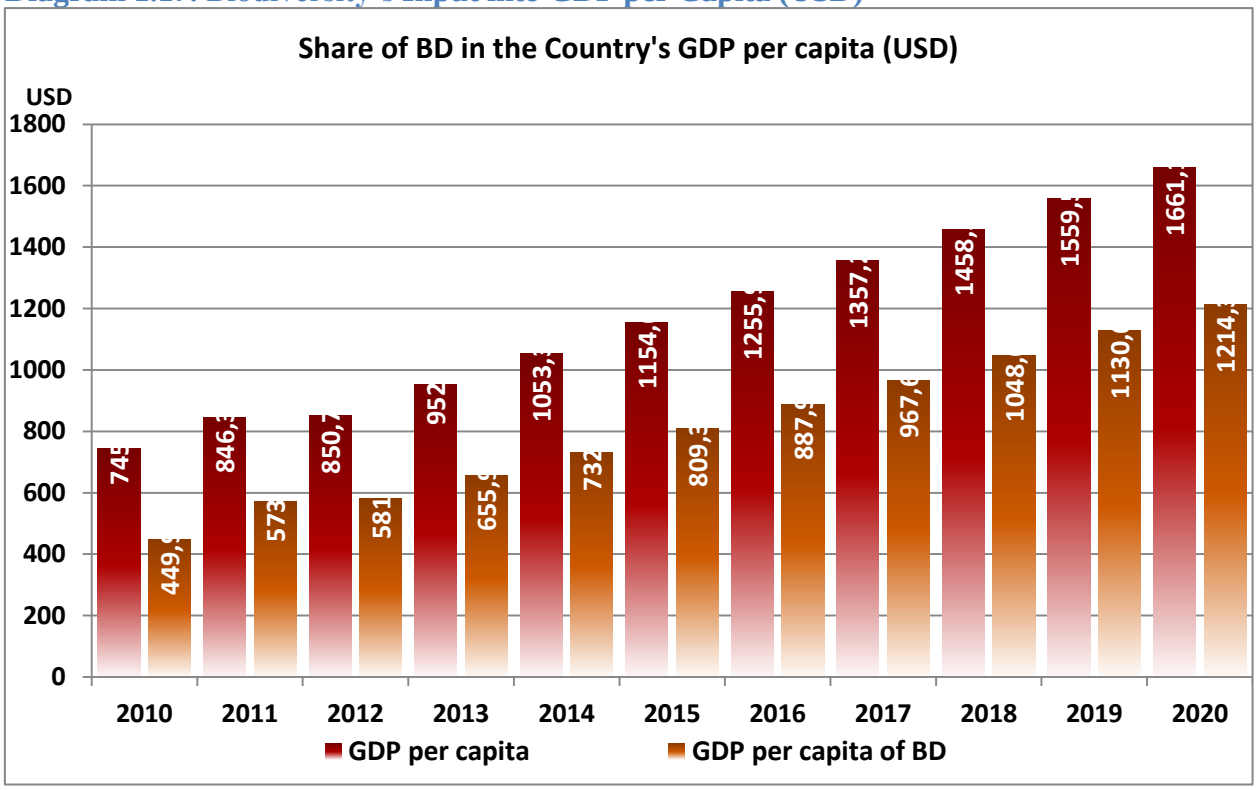
Source: *Calculated on the basis of experts' estimations*

Diagram 1.16. Forecast of GDP in Relation to Biodiversity in Numerical Expression (USD Billion)



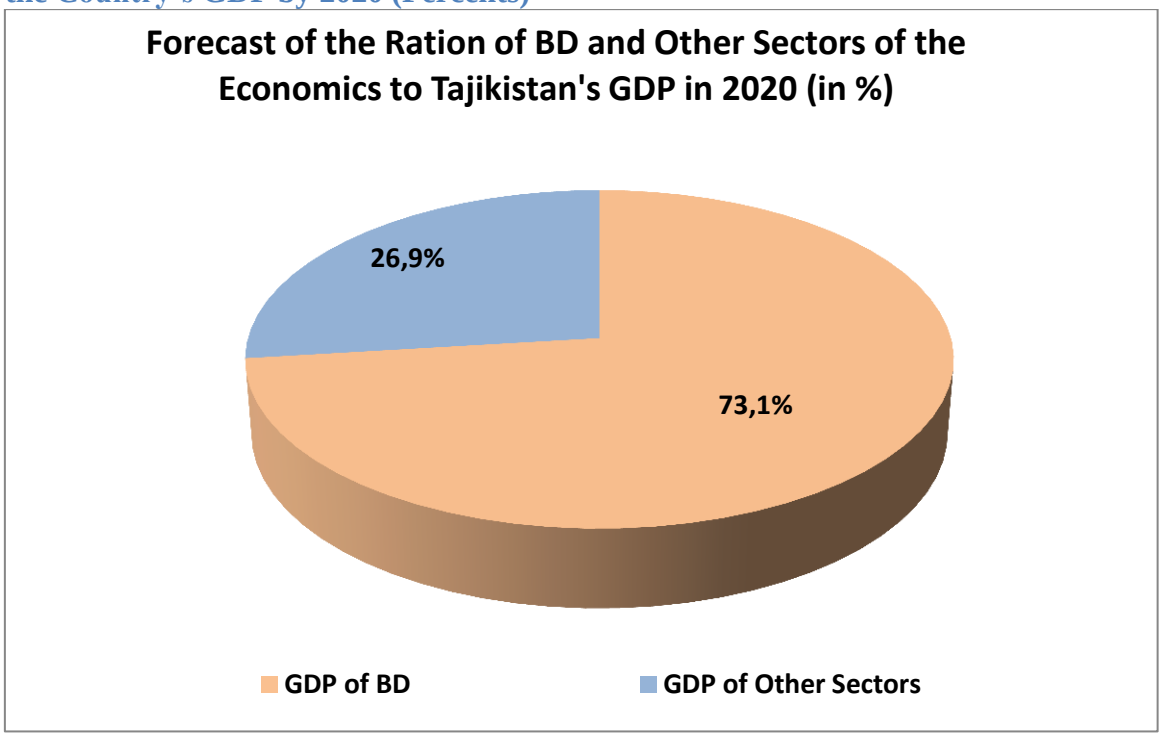
Source: *Calculated on the basis of experts' estimations*

Diagram 1.17. Biodiversity's Input into GDP per Capita (USD)



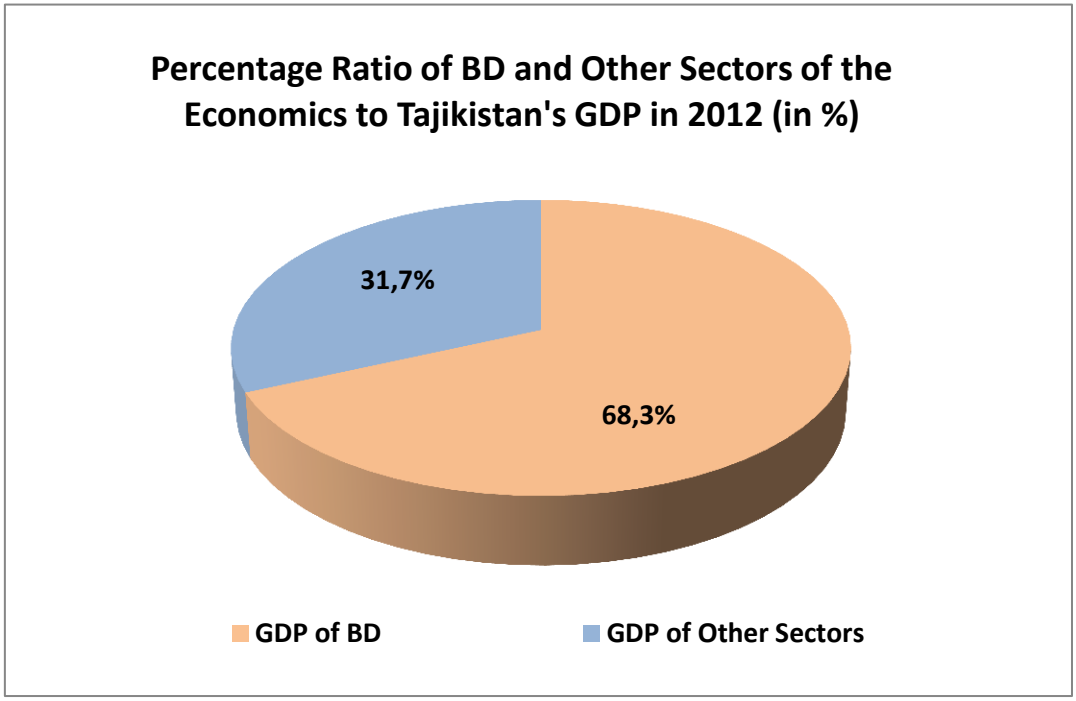
Source: *Calculated on the basis of experts' estimations*

Diagram 1.18. Forecast of the Ratio of Biodiversity and Other Sectors of the Economy to the Country's GDP by 2020 (Percents)



Source: *Calculated on the basis of experts' estimations*

Diagram 1.19. Percentage Ratio of Biodiversity and Other Sectors of the Economy to the Country's GDP as of 2012 (Percents)



Source: *Calculated on the basis of experts' estimations*

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LIST OF ACRONYMS

ABD	**Agrobiodiversity**
AP	Action Plan
AS	The Academy of Sciences of the Republic of Tajikistan
BD	Biodiveristy
CA	Central Asia
CBD	UN Convention on Biological Diversity
CBS	Candidate of Biological Sciences (PhD)
CEP	The Committee on Environmental Preservation under the Government of the Republic of Tajikistan
CIS	Commonwealth of Independent States
DBS	Doctor of Biological Sciences (Post-Doctorate)
ECONET	Central Asian Ecological Net
ENVSEC	Environment and Security
Ex situ	Outside of natural habitats
FAO	UN Food and Agricultural Organization
FCCC	UN Framework Convention on Climate Change
GBAO	Gorno-Badakhshan Autonomous Oblast
GDP	Gross Domestic Product
GEF	Global Ecological Fund
GFC	Global Forest Coalition
HNP	Historical and Natural Park
ICSD	Interstate Commission on Sustainable Development
In situ	Inside of natural habitats
IRA	Islamic Republic of Afghanistan
IUCN	International Union for Conservation of Nature
JSC	Jamoat Support Center
LMO	Living Modified Organisms
MLF	Micro Loans Fund
NAPEC	National Action Plan on Environmental Conservation
NCBB	National Center on Biodiversity and Biosafety
NP	Natural Park
NBSAP	National Strategy and Action Plan on Preservation of Biodiversity
POP	Persistent Organic Pollutants
RDC	Research and Development Center
REC	Regional Ecological Center
RRS	Regions of Republican Subordination
RT	The Republic of Tajikistan
SGP	Small Grants Program
SNRA	State Natural Reserved Area
SPNA	Special Protected Natural Areas

TAAS	Tajik Academy of Agricultural Sciences
TNP	Tajik National Park
UN	United Nations
UNDP	United Nations Development Program
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational Scientific and Cultural Organisation
WB	World Bank
WMO	World Meteorologic Organisation
WTO	World Trade Organisation
WWF	World Wildlife Fund

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