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National Circumstances of the Republic of Tajikistan

2.1. Geographic position

Tajikistan is situated in the south of the Commonwealth of Independent States, within Central Asia, in the center of Eurasia, between the latitudes 36°40'N- 41°05'N and latitudes 67°31'E - 75°14'E.

The area of Tajikistan is 143.1 thousand sq.km, stretching 700 km from west to the east and 350 km from north to the south. In the north and west, Tajikistan borders on Uzbekistan and Kyrgyzstan, in the south on Afghanistan and in the east on China. The country's perimeter borders total 3,000 km. The territory of the country is divided into 4 administrative regions: Sogd Region, Khatlon Region, Mountain-Badakhshan Autonomous Region and Regions under Republican Administration.

Tajikistan is a mountainous country. Mountains occupy about 93% of the terrain while about half of the territory is situated at an altitude above 3,000 masl. The absolute heights vary from 300 to 7,495 masl. Western deserts and semi-deserts of Turan lowland gradually translate to the foothills. To the east, are the huge mountain ranges of the Tibetan plateau and Tian Shan. Such geographical positioning results in great diversity of natural conditions and environments.

The form of the landscape is not uniform. In the north lie the Ferghana valley and the Kuramin range. The central region of the republic is occupied by the Kuhiston mountain ranges, while on the east there are Pamirs - the most severe and mountainous region of Tajikistan (the highest peak being Ismoil Somoni at 7,495 masl).

Western Pamir includes high mountain ranges separated by deep river valleys. The valleys are located at elevations of 1,700-2,500 masl, while the mountain range heights exceed 6,000 masl. Thus, the terrain of Western Pamir is mostly rugged. Smooth relief characterizes Eastern Pamir, despite its high elevation above sea level, where wide valleys at elevations of 3,500-4,000 masl prevail. The absolute elevations of Eastern Pamir are high, but local mountains rise only 1,000 to 1,500 m above the valley's floor.

Low mountain ranges and wide valleys occupy the southwest part of Tajikistan. The plains of Tajikistan lie at various heights above sea level - from 300 to 1,000 m. The largest plains are Western Ferghana, Penjikent, Kulyab, Gissar, Vakhsh and lowland Kafirnigan.

2.2. Climatic conditions

Aridity, abundance of heat, and significant variability of almost all climatic elements are characteristics for Tajikistan's climate.

Local climate covers a wide range of temperatures, humidity conditions, precipitation and intensity of solar irradiation. The annual mean temperatures vary from +17°C in the south to -6°C in the Pamirs. Maximum temperatures are observed in July and minimum in January. East Pamir is distinguished with its extreme severe climate, where minimum reaches -63°C. In the south maximum surface air temperature can exceed +47°C.

The annual precipitation in lowland hot deserts of Northern Tajikistan and cold mountain deserts of East Pamir averages from 70 to 160 mm, while in Central Tajikistan precipitation can exceed 1,800 mm a year.

Annual average sunshine is about 2,100-3,170 hours. The least duration of sunshine is observed in mountainous areas, which are characterized by cloudiness. The most duration of sunshine is observed in the lowlands of northern Tajikistan, Gissar and Zeravshan valleys, southwest Tajikistan and in the Pamirs.

Cloud cover reduces solar irradiation and radiation balance. During the year clouds reduce direct solar radiation by 32-35% in lowlands and by 50% in the mountains. Total solar radiation reaches its maximum during May-July. The intensity of the total radiation changes in the foothill areas from 280 to 925 MJ/sq.m. In mountain areas it fluctuates from 360 to 1,120 MJ/sq.m throughout the year.

2.3. Glaciers and water resources

Due to specific climate conditions and landscape, Tajikistan is considered the main glacial centre of Central Asia. Glaciers retain huge amounts of water, and regulate river flow and climate. Glaciers and snowfields are the main source of water replenishing the Aral Sea. Glaciers occupy more than 8.0 ± 0.4 thousand sq.km, which is about 6% of the total country area. The most ice cover is observed in the western part of Pamir Mountains.

The largest glacier of Tajikistan is the Fedchenko Glacier. Its length exceeds 70 km, width - 2 km, and maximum thickness - 1 km. The volume of glacier itself with tributaries is 144 cub.km. Upper elevations of the glacier reach 6,200 masl, and the glacier tongue is located at 2,909 masl. The total number of glaciers is about 8 thousand and 7 of the glaciers have a length of more than 20 km.

Tajikistan's rivers are the basic source of fresh water for the Aral Sea. These rivers bring life to the neighbouring areas down stream; they are important for irrigation, power generation, water supply, etc.



1. Upper reaches of the Vakhsh River
Photo by A. Yablokov

Major watersheds of Tajikistan are Syrdarya (North Tajikistan), Zeravshan (Central Tajikistan), Pyanj (Southwest Tajikistan and Pamirs) and blind drainage area of East Pamir. The largest rivers are Pyanj, Vakhsh (photo 1), Syrdarya, Zeravshan, Kafirnigan, Bartang, etc. Most of the rivers in Tajikistan are mountainous; some of them originate at an altitude of more than 3,000 m.

There are 947 rivers in Tajikistan with a length of more than 10 km. Total river length is 28,500 km. The annual surface runoff reaches 30-45 l/sec/sq.km in the highlands. The annual river flow is about 53 cub.km. Most of the water resources are formed in the

basins of Pyanj and Vakhsh rivers. During flood season, when snow melts intensively and heavy rainfall occurs (April-August), the rivers carry much suspended solids, which can exceed 5,000 g/cub.m (Kysylsu).

Amplitude of water fluctuation during the year in most of the rivers is not very high and varies between 0.6-2.0 m. The level of water can significantly rise during floods in the Vakhsh, Pyanj and Obihingou rivers. Water level in flood season on the rivers Vakhsh, Pyanj and Obihingou can raise in one day by 4-5 m that lead to the destruction of road facilities, flooding of agricultural fields and the overflowing of dams and canals.

Hot and cold mineral waters are widely spread over the territory of Tajikistan. The best-known mineral water sources are Garm-Chashma (Hot spring), Liyangan, Anzob, Khodja-Obigarm, Sangkhok, Yavroz, Shambari, and Tashbulak. Many mineral water sources are used for drinking, medicinal and other purposes.

Tajikistan is rich in lakes. There are more than 1,300 lakes, 80% of which are located at an altitude of around 3,000 m with an area of less 1 sq.km. The total area of large lakes exceeds 680 sq.km. According to their origin, lakes are divided into tectonic, erosive and glacial.

The largest salt-water lake in Tajikistan is Karakul (this lake was formed at the site of an asteroid impact), which is located in East Pamir (3,914 masl), total area 380 sq.km. The deepest freshwater lake in Tajikistan is Sarez (3,239 masl); its depth exceeds 490 m, total area 86.5 sq.km. Sarez Lake is located on the West Pamir within the Bartang River canyon. The lake was formed as the result of a powerful earthquake and rockslide in February 1911. The volume of water in Sarez Lake exceeds 17 cub.km.

Other big lakes are Iskanderkul, Zorkul, Yashilkul. Sometimes temporary lakes occur as a result of glacier movement or rockslides. In addition to natural lakes there are reservoirs Kairakkum, Nurek, Farkhad and others.

2.4. Forests

Forests in Tajikistan are State property referred to as “first group forests”, which means that all forestry activities are aimed at expansion and improvement.

The role of forests in Tajikistan is essential. Forests are needed, in the first instance, as accumulators of moisture for soil protection, regulators of climate, and sources of food, botanical and medical goods.

At present, the total area of the state forest reserves is 1.8 million hectares; some 23% of them are under tree plantations. Forests in Tajikistan occupy an area of 410 thousand hectares. Juniper forests occupy an essential part of national forests, which are located at different altitudes between 1,500 and 3,200 masl on the slopes of Gissar, Zeravshan and Turkestan ranges. Juniper forests are good regulators of surface runoff preventing soils from erosion in mountains and valleys, as well as CO₂ sinks. Junipers can be as old as five centuries.

Pistachio forests are well adapted to the arid hot climate and occupy 78 thousand hectares. Pistachios dominate the landscape in the south of Tajikistan at altitudes from 600 to 1,400 masl.

Walnut forests occupy a territory of 8 thousand hectares and differ by very demand in terms of soil and climatic conditions. Walnut forests grow in Central Tajikistan at an altitude from 1,000 to 2,000 masl.

Maple forests occupy a significant part of national forests - 44 thousand hectares. Poplars, willows, birches, sea-buckthorns and other types of groves are spread fragmentarily.

2.5. Flora and fauna

Flora of Tajikistan is rich and diverse and includes more than 5,000 species of higher plants, over 3,000 species of lower plants including endemic and rare species.

Tajikistan as a typical mountain country is unique with its high-altitude flora distribution and its geographic isolation. Some plant communities typical for Tajikistan are: broad-leaf forests (*Acer turkestanicum*, *Juglans regia*), tugai flood plain forests (*Populus pruinosa*, *Elaeagnus angustifolia*, *Tamarix laxa*, *Phragmites communes*), small-leaf forests (*Salix turanica*, *Hippophae rhamnoides*, *Populus tadshicistanica*, *Betula tadshicistanica*), juniper forests (*Juniperus turkestanica*, *J. seravschanica*, *J. semiglobosa*), light forests (*Pistacia vera*, *Cercis griffithii*, *Amygdalus bucharica*), saxaul deserts, shrub deserts, steppes, meadows, pulvinates and thorn dwarf shrubs (photo 2).



2. Middle mountain zone

Photo by I. Abdusalyamov

The fauna of Tajikistan is very diverse. There are 84 species and subspecies of mammal, 385 species of bird, 46 species of reptile, 52 species of fish, 2 species of amphibian, more than 10,000 species of invertebrate. Such diversity takes place due to the specific geographical location of Tajikistan inside the Eurasian continent with its diverse habitats, ranging from the hot lowland deserts of Southern Tajikistan to the high mountains of Western and Eastern Pamir.

A few rare and endangered species of animals can also be listed, such as screw-horned goat, argali, urial, Bukhara red deer, snow leopard, Central Asian cobra, desert monitor, peregrine, snow-cock, and others.

2.6. Population

According to the census conducted in 2000, the population of the republic is 6.1275 million people. Over the last 70 years, the population has increased by 6 times. In comparison with other CIS and CEE countries, the population's growth in Tajikistan is faster. Average annual increase is 1.5-3.5%.

The rural population of Tajikistan exceeds 70% of the country's total population; 49.5% male, 50.5% female with over 30% of the population children under the age of ten.

Natural and historical conditions have led to an irregularity in populating Tajikistan's territory. The valleys and mountain canyons are major places of human

habitation. Here, the density of population exceeds 200 people per 1 sq.km (Gissar, Vakhsh valleys and northern regions of the country). In mountain regions, the density of population is as low as 4-10 people per 1 sq.km. Eastern Pamir is considered a less populated area of Tajikistan. The density of population here is less than 1 person per 1 sq.km. The population density averages at about 42 people per 1 sq.km.

Most of the population in Tajikistan are involved in agriculture (65%). The rest of the population are occupied in industry, services, education, public health and other sectors.

More than 100 nationalities reside in Tajikistan. Native inhabitants of Tajikistan are Tajiks. According to the census conducted in 2000, they comprise 80% of the country's total population. Tajik, Russian, Uzbek and other languages are used for communication. The state language of Tajikistan is Tajik. Russian is the preferred language of international communication.

2.7. Social economic development

Independence of Tajikistan was declared on September 9, 1991. In 1992, Tajikistan was inducted into the United Nations. 170 countries acknowledged Tajikistan's sovereignty. Many countries have their diplomatic missions in Tajikistan.

The supreme public official in the country and the head of the state is the President. By free vote and on an alternative basis, Emomali Rakhmonov was elected as the President of the Republic of Tajikistan.

The national unit of currency is the SOMONI, which was introduced as of November 1, 2000. The annual GDP in 1998 was US\$ 217.8 per capita.

Out of 80 sectors of Tajikistan's business, the prevailing industry is non-ferrous metallurgy, which amounted to a 50% share in the total industrial output for 1999. The enterprises of this branch produce aluminum, gold, silver, lead, zinc, molybdenum, tungsten, and mercury.

Recently, more than 400 mineral deposits have been explored and 200 of them are currently being exploited. Some 45 types of metal ores, fossil fuels, and minerals are being mined.

Energy industry is another important branch of the country's economy. Electricity production in the country in 1998, in comparison with that in 1940 has increased 233 times. During the years of independence, the average production of electricity has been more than 15 billion kilowatt-hours annually.

Light and food processing industries, especially cotton, canning and meat production are being developed on an agriculture basis. Few agricultural crops such as rice, grain, tobacco, corn, potato, vegetables, gardens and vineyards are cultivated. Animal husbandry is very popular in mountain regions.

Transport is an integral part of the economy in Tajikistan. In view of the complicated mountainous pattern of the country, transport plays a most significant role. In a brief period, Tajikistan turned from a land of few roads into a country of modern transport. It has transformed its traditions of caravan tracts to highways and air routes.

Some 533 km of railroads, 13.6 thousand km of asphalt-coated roads run through the country's territory. The total length of national air routes exceeds 53.2 thousand km.

At present, there are 3,357 schools with a total number of 1.5 million pupils. Some 100 thousand students attend 30 universities and 72 colleges. More than 5 thousand scientists work in the Academy of Sciences and scientific-research institutes, and about two thousand of them have academic degrees.

The number of doctors in the country has reached 13 thousand. For every 10 thousand residents there are 21.2 physicians and 52.8 medical nurses. More than 1 thousand health institutions including 433 hospitals provide their services to the population. Many famous health resorts such as Khoja Obigarm, Shohambary, Zumrat, Havotague, Ura-Tube, Garm Chashma offer their services to those who need rehabilitation.

During these years of independence, the country has put into operation the Pamir hydropower station, small hydropower stations in Badakhshan region, gold and silver branches of the "Vostokredmet" enterprise, mineral water plant "Obi Zulol", Tajik-British joint venture "Zeravshan", a segment of the railroad between Kurgan-Tube and Kulyab, motorway "Murgab-Kulma pass" with the outlet at the Chinese border. The Anzob tunnel, which will enable year round transportation between the northern and southern parts of the country, is under construction. Besides, a number of light and food processing enterprises have been established. Some houses and public buildings, schools and hospitals have been constructed.

At present, the Republic of Tajikistan has trade partners in 71 countries of the world. Foreign trade turnover in 1998 amounted in almost US\$ 1.4 billion. Some 64% of this amount is related to CIS partnership. The share of export is 45.6% of foreign trade turnover.

Exports mainly concentrate on raw materials, including aluminum, raw cotton, electricity, precious metals and jewelry stones, fresh vegetables and fruits, canned vegetables, raw leather, silk fabrics, carpets, handicraft products, etc.

Imports mainly consist of raw materials for the aluminum industry, natural gas, liquid fossil fuels, vehicles, and machinery.

2.8. Energy production and use

Tajikistan is relatively poor in deposits of fossil fuels. In total, 18 deposits of oil and gas (Kanibadam, Airtan, Niyazbek, Kichikbel and others) and over 40 deposits of coal (Nazaraylok, Shurab, Fan-Yagnob and others) are explored and registered in Tajikistan. Proven reserves of oil and gas obviously do not pose significant industrial importance. Coal is available in large quantities in Tajikistan but its deposits according to estimates are not efficient for industrial and energy-related use in current conditions. About 15-20 thousand tonnes of coal are being mined in Tajikistan annually.

Development of nuclear power in the country is problematic because of high seismic risk and other circumstances. Wind energy potential is not sufficiently researched and would require significant investment for equipment and maintenance.

Hydropower resources are abundant and evenly located over the territory of Tajikistan. In terms of hydropower potential, Tajikistan is one of the world leaders. For the time being, only 5% of this potential is being exploited. Hydropower engineering is the base for the electric energy sector of the country. The total capacity of operating power plants comprises 4,412.7 Megawatts, 93% of which is being produced by hydropower plants. Tajikistan's peak energy production was recorded in the early 1990s, when it reached 17-18 billion kilowatt-hours a year (fig. 2.1). At present, this has diminished and on average is 15 billion kilowatt-hours.

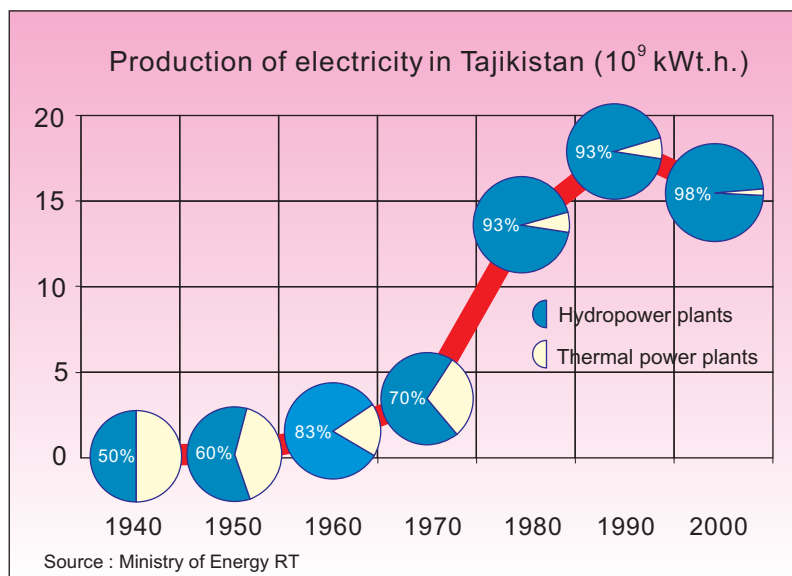


Fig. 2.1.

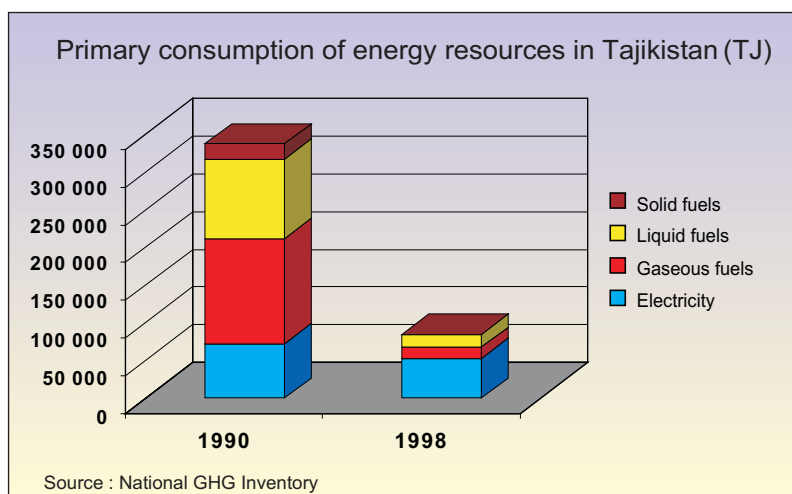


Fig. 2.2.

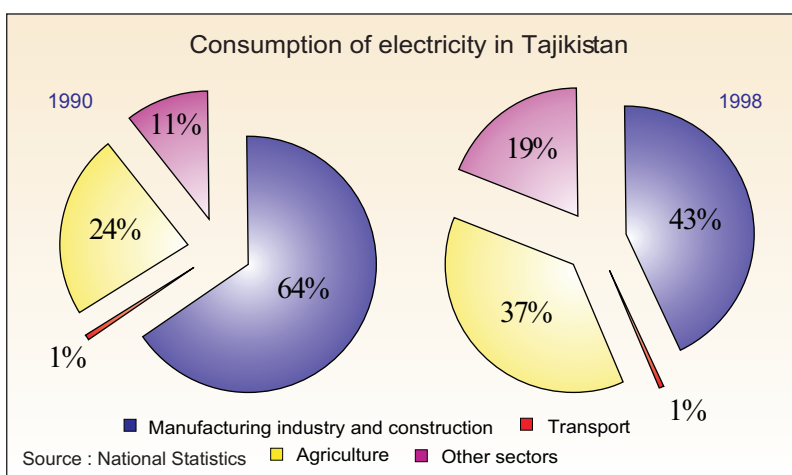


Fig. 2.3.

The biggest hydropower plants in Tajikistan are: Nurek hydropower plant (height of dam is 300 m) with production capacity of 3,000 MW, Baipaza hydropower plant - 600 MW, Golovnaya HPP - 240 MW, Kayrakkum HPP - 126 Megawatts. Small hydropower plants have big prospects. At present, their total capacity is about 30 MW.

Several new big hydropower plants are under planning and construction: Rogun hydropower plant with production capacity at 3,600 (3,000) Megawatts, Sangtuda 1 HPP - 670 Megawatts, Sangtuda 2 HPP - 220 Megawatts and Niznekafarniganskaya - 100 HPP. Once fully operational these hydropower plants will be responsible for doubling the current level of electricity generation.

Dushanbe thermal power plant (capacity 198 Megawatts) and Yavan thermal power plant (capacity 120 Megawatts) are using natural gas and oil as the basic fuels, which are environmentally safer than thermal stations on solid fuels.

The structure of primary energy consumption in Tajikistan has significantly changed. During the period between 1990-1998, the consumption of natural gas decreased somewhere between 10 and 15 times, consumption of liquid fuels decreased by 8 times, and the consumption of coal decreased by 400 times (fig. 2.2). The major consumers of energy resources are: the manufacturing industry, construction, motor vehicles and the residential sector.

Less significant changes have taken place in electricity consumption. In 1990, all sectors of the national economy consumed 19,388 million kilowatt-hours of electric energy, and 14,667 million kilowatt-hours in 1998.

At the same time, there have been substantial changes in the structure of electricity consumption. In 1990, electricity consumption by the manufacturing industry and construction amounted to 11,578 million kilowatt-hours of electric energy, while by 1998 it had decreased to 5,154 million kilowatt-hours. Electricity consumption within the transport sector in the period between 1990-1998 decreased from 158 million kilowatt-hours to 67 million kilowatt-hours. The lack of fossil fuels has been responsible for electricity consumption in residential and agricultural sectors increasing by somewhere between 1.2 and 1.5 times (fig. 2.3).

2.9. Industry

There are 80 main branches of industry within Tajikistan comprising of 1,300 different enterprises.

The share of industry in GDP in 1990 made up 22.9% and by the year 1998 it had decreased to 20.1%. Between 1992 and 1998, there was a clear indication of production decline in the manufacturing industry. However recently, there has been a tendency for some growth.

The major enterprises of metallurgy are; Isfara hydro metallurgic plant, Anzob ore-dressing plant, Adrasman lead-zinc plant, industrial venture Vostokredmet, joint venture "Zeravshan", joint venture "Darvaz" and the industry giant - Tajik Aluminum Plant. The aluminum industry is the main cause for industrial exports and national income. More than 460 thousand tonnes of aluminum was produced in 1989.

The chemical industry has 9 different enterprises, the biggest of them being the joint stock company "Azot" producing ammonia and the joint stock company "Tajikhimprom" producing chlorine-containing products, caustic sodium, lime and sodium chloride.

The construction industry includes the Dushanbe cement plant and other plants producing reinforced concrete, lime products, alabaster, and construction designs. These enterprises are located in all areas of the country. Cement production has decreased from 1.067 million tonnes in 1990 to 17.7 thousand tonnes in 1998 (fig. 3).

Mechanical engineering produces a variety of goods ranging from spare parts for agricultural machines and vehicles to electric transformers, refrigerators, industrial equipment, etc.

Despite the fact that industrial production has been severely reduced, many enterprises are trying to use foreign investments and undertake reforming projects to solve their problems during the conditions of transitional period.

2.10. Agriculture

The share of GDP in agriculture is about 25%. Light and food processing industries, especially cotton, canning and meat production are being developed.

Most agricultural ventures are either privatized or incorporated into collective farms. At present, some 283 collective farms, 260 soviet farms, 47 state and local farms, 230 farming associations and 12.3 thousand private and family farms produce agricultural products.

Cereals, cotton, potatoes, vegetables, melons, fruit and grapes are cultivated in the country. Before the 1990's, production of raw cotton ranged from 800 thousand to 1 million tonnes. In recent years, the country has been producing up to 400 thousand tonnes of raw cotton. Annual productivity of cotton varies from year to year in different regions and averages 1,400-2,700 kg per hectare. The volume of cereal production in the year 1998 in comparison with 1990 has increased by 1.6 times and amounted to 499.6 thousand tonnes of cereals. In 1998, the country produced: 174.5 thousand tonnes of potatoes, 40.3 thousand tonnes of rice, 35.5 thousand tonnes of corn, 97.3 thousand tonnes of fruit and 46.3 thousand tonnes of grapes.

As well as the cultivation of fruit and vegetables, due to the great assortment and diversity of pastures, animal husbandry is also well developed in Tajikistan. During the last 8 years, the structure of animal husbandry has significantly changed due to the reorganization of the economy and the realization of land reform. The volume of production in the cattle-breeding sector has significantly decreased and makes only 40-50% of that of the 1990's. The volume of meat production during 1990-1998 has decreased from 107.5 thousand tonnes to 30 thousand tonnes. The total number of cattle stock, pigs and birds has significantly decreased in comparison with the 1990's.

2.11. Land use

The total land area of Tajikistan is 14.2545 million hectares. The area of agricultural lands in 1998 in Tajikistan was 4.5461 million hectares.

More than half of the country's area is unsuitable for agriculture: watercourses, glaciers, rocks, mountain slopes, riverbeds, low productive pastures, etc.

The total area of arable land was 734.2 thousand hectares in 1998, which is 70 thousand hectares less than in previous years. Rather large agricultural fields in the south of the country have not been in use over the last few years because of salinization and swamping. This has been the result of economic instability and the lack of technical resources, fuels, seeds, etc.

The total area of irrigated land is 600.2 thousand hectares; the total area of pastures - 3.6595 million hectares; perennial plantations - 102.7 thousand hectares; fallow lands - 26.1 thousand hectares; hayfields - 23.6 thousand hectares. During the 1950-1990s, the area of irrigated land has increased by 320 thousand hectares.

2.12. Nature protection

The problem of climate change and atmospheric air protection has been declared in the national legislation and other state provisions of the Republic of Tajikistan. This problem is indicated in the relevant articles of the Law on nature protection, the State ecological program, the State program on public awareness and environmental education, and other documents.

At present, the country has developed a series of strategies and action plans on such environmental problems as desertification, biological diversity, climate change, ozone layer depletion, water management and flood prevention. All these documents consider the aspects of climate change problem.

For the conservation of biodiversity and protection of endangered species, there have been established 4 strict nature reserves, 14 species management areas, and 2 national parks. One of the oldest natural reserves in Tajikistan - "Tigrovaya balka" has recently celebrated its 60-th anniversary.