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POLITICAL AND SOCIOLOGICAL AFFAIRS

(FOUO 2/82)

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REGIONAL

TAJIKS EVALUATE NATURAL RESOURCES CONSERVATION

Dushanbe IZVESTIYA AKADEMII NAUK TADZHIKSKOY SSR: OTDELENIYE OBSHCHESTVENNYKH NAUK in Russian No 2, Mar-Apr 81 (manuscript received Apr 81) pp 34-49

[Article by K. Sh. Dzhurayev, Dushanbe State Pedagogical Institute imeni T. G. Shevchenko]

[Text] The "Report of the CPSU Central Committee to the 26th Congress of the Communist Party of the Soviet Union and Upcoming Tasks of the Party in the Fields of Domestic and Foreign Policy"--the address delivered by Comrade L. I. Brezhnev, general secretary of the CPSU Central Committee--and "Basic Directions for the Economic and Social Development of the USSR Over the Period of 1981-1985 and up to the Year 1990" represent a new historic stage of communist construction in our country.

The CPSU teaches and requires that all issues concerning communist construction be resolved on a strictly scientific basis both in the country as a whole and also in each union republic. "The Party of Communists takes for granted that construction of the new society is simply unthinkable without science," L. I. Brezhnev pointed out.[1]

The practical and theoretical questions concerning harmonious interrelationship of science and nature--the optimum geographic location and development of the productive forces, economic and administrative regionalization, the shaping of sectoral and general geoeconomic complexes and so on--have been and are a driving force behind birth and development in the geographic sciences as in other sciences.

"One of humanity's most ancient sciences--geography, is helping to speed up scientific-technical progress in many branches of knowledge and production. Geographers of various countries are conducting extensive research on our planet's nature, economics and population and are thereby making an appreciable contribution to the cause of peaceful cooperation among states. The Soviet Union is interested in expanding and strengthening international scientific relations among geographers of all countries aimed first of all at optimum utilization of natural resources, economic development, and protection and improvement of the human environment,"[2] stated the greetings of the Soviet Government to participants in the 23d International Geographic Congress in Moscow.

In the Soviet Union, on the basis of subject matter methodology and scientific research methods, Decree No 231 of the State Committee of the USSR Council of Ministers for Science and Technology, dated 25 May 1977, includes the following in the system of geographic sciences:

11.00.01	Physical Geography, Geophysics and Topographic Geochemistry;
11.00.02	Economic and Social Geography;
11.00.04	Geomorphology and Paleogeography;
11.00.05	Biogeography and Soil Geography;
11.00.07	Hydrology of Land, of Water Resources;
11.00.08	Oceanography;
11.00.09	Meteorology, Climatology and the Physics of the Atmosphere;
11.00.10	Hydrochemistry;
11.00.11	Optimum Utilization of Natural Resources and Environmental Protection.

Other fields of geographic science which are developing successfully include the following: population geography, glaciology, medical geography, recreation geography, political geography, historical geography, space geography and so on.

I

Comprehensive development of the productive forces and economics are the basis for the gradual movement of Soviet society toward communism. V. I. Lenin said: "We value communism only when it has an economic basis."[3] The CPSU is guided by V. I. Lenin's instruction to the effect that scientifically sound economic construction of our multinational state is the party's main policy.

The supreme goal in the CPSU's economic strategy has been, is now and will be to raise the people's material and cultural standard of living. In his address to the 26th CPSU Congress L. I. Brezhnev noted: "Specific concern about a particular person, his needs and requirements, is the beginning and the end of the party's economic policy."

The geographic sciences, especially the economic and social geography of advanced socialism in the USSR, occupy the place they deserve in the scientifically sound conduct of the CPSU's economic policy. Under the conditions of advanced socialism economic and social geography, along with the other social sciences, political economy first of all, serves as the methodological foundation of economic planning, management and development, furnishes the scientific substantiation of policy in the field of economic assessment of natural conditions, natural resources and labor resources, environmental protection, optimum geographic location of the productive forces, economic regionalization, the shaping of regional-industrial and agroindustrial complexes, of the combined economic and social development of the country, of the regions and union republics, of intraregional and interregional economic relations and so on.[4]

The history of society is above all the history of the interaction among man, nature, the geographic environment, the development and location of the productive forces, and economic relations. It is well known that the mode of production of material goods, the sum total of economic relations, is the decisive

factor in historic development. Society and economic relations develop on an economic-geographic foundation.

K. Marx specifically pointed out: "The local life of Spain, the independence of its provinces and communes, the lack of uniformity in the development of society, which originally resulted from the country's geographic configuration, but which thereafter developed historically because the different provinces had freed themselves of more domination independently, in so doing forming small independent states...."[5]

Production in the broad economic-geographic sense is the process of man's life and economic activity in a particular geosystem, bound together by particular production relations and creating material goods in the form of means of production and consumer goods necessary to the existence of human society.

K. Marx writes: "In order to produce men enter into certain connections and relations, and only within the framework of those social connections and relations do relations exist toward nature and does production take place."[6]

The questions of the division of labor, the location and development of the productive forces, the growth of cities and rural areas and the prosperity of the people are closely bound up with the size and diversity of the economic-geographic foundation. "The level of development of a nation's productive forces is detected most vividly of all from the degree to which division of labor has developed in it,"[7] K. Marx wrote.

Nature, the economic-geographic base, is not only the prime source of human life, but also the field of its conscious activity. That is why these words have a particular relevance today: "Labor is the father of wealth, but land is its mother."

V. I. Lenin pointed out that achieving higher productivity of labor is the foremost and most important thing for the victory of the new social order.[8] Raising the productivity of labor urgently requires a comprehensive scientific-technical and economic-geographic approach. The division of labor, economic-geographic regionalization, the knowledge of natural and economic conditions and peculiarities of localities, and the planning and management of the harmonious interrelationships of society with nature are an indispensable factor for a full-fledged general rise of labor productivity. As K. Marx wrote, the productivity of energies and labor is determined by diverse circumstances and "natural conditions."[9] For example, while capital investments, the amount of labor, technology, chemicalization and so on have increased, the gross harvest of grain crops in our country has varied from year to year (Table 1).[10]

The influence of a favorable or unfavorable geographic year, of natural conditions on the productivity of labor, can also be illustrated by other sectors of the country's economy and by economic regions and republics. There is a particular need, then, not only to study natural conditions and resources, but also to take into account the peculiarities of geosystems, to make economic assessments of them and to make geographic forecasts of favorable and unfavorable years of regions and zones. This approach would be beneficial to the dynamic and

proportional development of the productive forces and to a growth of the national income and resources of the country and of the union republics.

Table 1

Favorable Geographic Years	Gross Harvest, millions of tons	Unfavorable Geographic Years	Gross Harvest, millions of tons
1973	222.5	1971	181.2
1974	195.7	1972	168.2
1976	223.4	1975	140.1
1977	195.7	1979	179.2
1978	237.4		
1980	220.0		

"Geography--the oldest science, which studies the world and the various countries--is at the present time performing an important social function in serving in every way humanity's optimum utilization of diverse natural resources, regional economic development and the location of the productive forces and settlements.

"Social changes in the world and the present-day scientific-technical revolution have confronted geography with crucial new problems. Important among them is the problem of the protection and purposive transformation of the environment, which constitutes an organic part of a still broader problem--the interrelationships between nature and society,"[11] A. P. Aleksandrov, president and member of the academy, has written on behalf of the USSR Academy of Sciences.

II

On the basis of the theoretical and practical requirements of communist construction, policy-making documents of the CPSU Central Committee and Soviet Government, and the USSR Constitution, the plans for environmental protection and optimum utilization of natural resources have in our country become an integral part of annual and multiannual plans of economic and social development. In the age of scientific-technical progress the socioeconomic importance of environmental protection and of judicious utilization and reproduction of natural resources, will increase steadily.

The 26th CPSU Congress pointed out the need "to improve the effectiveness of measures in the field of natural conservation, optimum utilization of the resources of the biosphere ...". The documents of the party forum pointed out: "Improve natural conservation, step up the effort to preserve farmland, combat erosion of farmland, increase the pace of efforts to bring land back under cultivation, provide protection of such land from torrents, landslides, cave-ins, and the processes leading to salinization, bogginess, submergence and aridity.

"More comprehensive development of mineral deposits, preventing at the same time losses in mining and processing.

"Intensified protection of sources of water to prevent depletion.

"Continuation of the effort toward protection and optimum utilization of unique natural complexes....

"Develop efforts to create and improve a system of survey registers of natural resources and to improve state management of exploitation of natural resources and environmental protection. Broader involvement of the public in natural conservation."[12]

Diverse micro- and macro-economic and geographic conditions and peculiarities of localities, geosystems and the population have created and are creating a multitude of different types of production and economic and cultural relations. Since in spite of the geographic and historical similarity "between individual countries, regions and even localities, there will always be a certain inequality in the conditions of life, which can be reduced to a minimum, but will always be beyond complete elimination. The inhabitants of the Alps will always have different living conditions than those who live in the plains," as F. Engels noted.[13]

Everything depends on the conditions, the place and the time. L. I. Brezhnev noted: "Tajikistan ... is a mountain republic. The highest peaks in the country stand beneath the Tajik sky. And judging by the proportion of undertakings and the plans for the future, the republic is on a level with its high mountains."[14]

"Even though I have seen a great many places, starting from Sicily to the Arctic Circle and from Transbaykal to the Pyrenees, here in Tajikistan I have seen much that is new to me ..." (D. N. Pryanishnikov, member of the academy). "As an object of study Tajikistan is an interesting country in itself" (S. F. Ol'denburg, member of the academy).[15]

"Discovery of the original cultivated flora in Tajikistan, unknown to science up until that time, has served as a point of departure for all future geographic explorations ..." (N. I. Vavilov, member of the academy).[16]

L. I. Brezhnev posed the task of a comprehensive approach to drafting a program for development of the productive forces of regions in which economic, sociopolitical, geographic and many other factors would be linked together.[17]

The CPSU and Soviet Government, taking into account the unique historical-economic-and-geographic conditions and peculiarities of this mountainous region, sent to Tajikistan an interdisciplinary scientific expedition for comprehensive study of the productive forces after the republic was formed. Participants in the expedition included the following outstanding scientists: A. Ye. Fersman D. V. Nalivkin, D. I. Shcherbakov, N. I. Vavilov, D. N. Pryanishnikov, V. L. Komarov, S. F. Ol'denburg, N. P. Gorbunov, I. P. Gerasimov, members of the academy, and others.

On the basis of the expedition's results in April 1933 the USSR Academy of Sciences, jointly with the Council of People's Commissars of Tajikistan, held a scientific conference in Leningrad on the problems of studying the productive forces of TaSSR. The country's most important scientists, headed by A. P. Karpinskiy, member and president of the USSR Academy of Sciences, took part in the

proceedings of the conference. The conference summed up the results of scientific research which has been done in Tajikistan by scientific expeditions and offered recommendations to the republic's government concerning the compilation of plans for the development of the economy and science. The conference's message to Tajikistan's scientists specifically remarked that "the new method (that is, the method of interdisciplinary work) of a broad geographic coverage must be carried over to the entire effort of studying the whole country of the Soviets, its productive forces and their utilization."[18]

The conference stated the problem in the economic study of Tajikistan as well. The resolution pointed out: "Economics research can be divided into two groups of projects: regional economics and topical economics. In Tajikistan the two lines of research should develop simultaneously and uniformly.

"In the first case it is indispensable to set up the economic-geographic study and description of Tajikistan's principal regions. This work should be done according to a definite plan, and the first thing needed is to provide a description of the most important economic (khozyaystvenno-ekonomicheskiye) regions."[19]

Unfortunately, after the Tajik-Pamir Expedition there were no further major comprehensive general-geographic and especially economic-geographic studies of the natural conditions and natural resources, the population, labor resources, cities and rural areas, nor the economic and social problems of development of the republic and the economic regions.

Studies devoted to the economic problems of the development of the sectors of the economy of Tajikistan and the South Tajik TPK [Regional Industrial Complex] are now under way in the Economics Institute, the Council for the Study of the Productive Forces of the TaSSR Academy of Sciences, Gosplan and other scientific and project planning organizations of the republic. Among the projects along this line of research we should mention "Configuration of the Development and Location of the Productive Forces of TaSSR Over the Period 1971-1980," "Shaping the South Tajik TPK," and others, as well as the projects of I. K. Narzikulov, R. K. Rakhimov, Kh. M. Saidmuradov, I. M. Kleandrov, Ya. T. Bronshteyn, A. G. Khadzhibayev and others.

These studies will be of great help in solving the numerous scientific problems of economic geography related to optimum organization of the development of TaSSR's productive forces.

Even the participants in the Tajik-Pamir Expedition noted that the problems of the geography and geology of Tajikistan-Pamir were boundlessly broad and fascinating "As the nexus of Central Asian problems and of Asian problems in general."[20]

Tajikistan's historical, economic and geographic position, its conditions and its peculiarities, the building of the country's major fuel and energy base here, the republic's present condition and prospects for location and development of its productive forces necessitate further comprehensive study of the general geographic problems and especially of the problems of economic geography:

1. Economic-geographic problems of the history of the Tajik people and of the location and development of TaSSR's productive forces.

2. Optimum utilization and reproduction of natural resources and natural conservation. Identification and economic assessment of natural geographic complexes (geosystems).

3. The economic-geographic aspects of population: interrelationships between man and nature, the size of the republic's population and its dynamics in general: by oblasts, by rayons, by vertical zones, and by cities and settlements. Density, dispersion and regionalization with respect to dispersion criteria, labor resources by calculation and by count, diversity in the supply of labor resources to economic entities and the labor force participation rate, migration, the city, rural dispersion, the size of cities, rayons, kolkhozes and sovkhozes as a function of the economic-geographic context, urbanization, population mapping and so on.

4. Multipurpose industrial regionalization of Tajikistan. Comprehensive description of the systems of existing industrial centers, industrial parks, industrial districts and their peculiarities: structure, production relations, ascertainment of the economic-geographic reserves and prospects for their overall development.

5. Comprehensive agricultural regionalization of the republic and of economic regions, subregions and vertical zones. Study of the pattern of differences in the specialization of agriculture and establishment of the optimum relationships among the different branches of agriculture in particular geosystems.

6. Comprehensive agroindustrial regionalization of the republic and of economic regions. Identification of regions, subregions and zones where industry and agriculture approximate that level of development of the productive forces where their synthesis becomes possible.

7. Development of comprehensive recreation surveys of the republic and economic regions. Descriptions of rayons and zones aimed at development of health resorts, medical geography, medical-geographic forecasts and so on. The impact of the economic-geographic context on the shaping of health and the development of diseases, human adaptation to various geographic conditions. The geographic recreation resources of rayons and zones, the medical-biological-geographic nature of the therapeutic effect of geosystems on the organism and so on.

8. Study of the problems of the social geography of Tajikistan and of the economic regions--differences between city and country, determination of optimum systems for location of the institutions of public education, science, culture, health care, trade and the food service industry, consumer services and municipal services and utilities; study of the influence of the economic-geographic context on the productivity of labor and so on. Compilation of a scheme for the comprehensive social development of the republic, the oblasts, the rayons and so on.

9. Historical-geographic studies of the political-administrative division of the republic and the oblasts. Administrative division should in time conform to the economic-geographic regionalization.

10. Economic-geographic regionalization as the basis for optimum location and development of the productive forces, for specialization and concentration of production, and for economic planning and management. The building of economic-geographic models of each rayon and microrayon, and models of interrayon relations. Use of economic-geographic models for optimum mutual location and combination of the productive forces of the republic, of the economic regions and so on.

III

The problem of optimum utilization and reproduction of natural resources and natural conservation is becoming an especially acute one from the standpoint of Tajikistan's overall economic and social development.

The scale of the planning, development and location of the productive forces and the rise in the people's material and cultural standard of living depend on the size of the geographic foundation--on the diversity and effective utilization of the natural and economic conditions and the natural and labor resources. It is for that reason that V. I. Lenin regarded the task of optimum utilization of natural resources as an economic problem.

Tajikistan's geographic foundation (143,100 square kilometers) has a distinctive shape and a complicated border configuration, reflecting the historical-economic-geographic peculiarities of the Tajik people's dispersion in Central Asia.

The typical features which define the peculiarities of the natural-geographic context of its regions, its geosystems and its zones are conditioned by the fact that Tajikistan is typically an area of high mountains. With respect to hypsometric position and the pattern of relief it is divided into several levels: eminences up to 700-800 meters, foothills up to 2,000-2,100 meters, the middle mountain level up to 3,100-3,200 meters and the high mountain level up to 4,400-4,500 meters. Mountain districts higher than 600-700 meters comprise more than 93 percent of the republic's total area.

Tajikistan's mountainous relief has a strong impact on the economic-geographic organization of the productive forces and in some places creates formidable obstacles to cultivation of the land and industrial and road construction. They set conditions on location of the branches of agriculture, they restrict the possibilities for the use of machines, for irrigation of the land, for increasing the yield and so on. For example, on the raised (elevated) portions of fields cotton plantings suffer from drought, while in the low places and small hollows they suffer from too much water. In both cases the crop is of low quality, and the cotton yield is in places 5-6 quintals per hectare less than on uniformly even plots.

It is especially necessary to study and understand the relief when hydroelectric power stations, roads, bridges and canals are being built, when irrigation and

reclamation projects are being carried out, when sites are being chosen for construction of industrial enterprises, when cities and settlements are being laid out and so on.

Earthquakes, avalanches of snow, slides, torrents, severe soil erosion and other effects are related to Tajikistan's mountains. On the one hand the mountainous nature of this region accounts for the presence of a great number of glaciers, rivers and large reserves of hydroelectric power resources. They indeed create a large potential for development of health resorts, tourism, mountain climbing and for making these activities a sizable source of income. Scientific organization of the geographic foundation and determination of the most purposive use of each type of relief are now taking on great practical importance for the development and location of the republic's productive forces, since they have a direct influence on the cost of erecting any project. This can be illustrated by construction of the Nurekskaya and Rogunskaya GES's as well as by other construction.

The mountainous character of the relief and the altitude of the natural districts and geosystems give rise to climatic differences and division into vertical zones. Climatic differences have an essential impact on the regional organization of production. For example, in the northern part of Tajikistan the annual rainfall is 150-550 mm. Most of the districts there accumulate less than 5,000° of temperatures above zero during the year. As one goes into the mountains, this total drops to 2,000°. Accordingly, cotton, orchards and vineyards are being located in the valleys, and grain crops, potatoes and so on in the mountain districts. In the southwest portion of the republic (Vakhsh, Kabadian) the annual rainfall is 150-350 mm and 5,000-6,000° of above-zero temperatures are accumulated. In this region the mean temperature is high enough for fine-fiber varieties of cotton and subtropical crops to mature. In the Gissar geosystem the annual rainfall is 600-700 mm, and total above-zero temperatures 5,000-5,500°. It is there that cottongrowing, fruitgrowing and grapegrowing are mainly developing. Scientists long ago predicted certain cyclical changes in the climatic conditions of the country and regions. Where this is not taken into account a large economic loss is suffered.

The study and assessment of sunlight, heat, moisture, wind force and so on have great economic importance. For example, west winds, which bring rain, often with severe hail, mainly predominate in the cotton-raising districts of the republic. Almost every year hail inflicts sizable economic losses on agriculture, especially the cotton-growing districts of the republic.

The time has come to compile climatic descriptions and the agroclimatic conditions of each economic region of Tajikistan. And methods of influencing climatic conditions need to be developed for districts with adverse physical-geographic conditions (Eastern Pamirs, etc.). For example, bringing water to the plateau geosystems of the Eastern Pamirs could transform this district into an important basis for livestock raising, especially sheep raising and so on.

Tajikistan's flora and fauna are highly diverse. According to the data of botanists and zoologists, there are more than 500 plant species and 10,500 animal species here. The higher spermatophytes (4,500 species) predominate among the

plants. Among the animals there are 86 mammal species, more than 365 species of birds, 49 reptile species, 40 species of fish and more than 10,000 insect species.

"The wild flora of Tajikistan is extremely abundant in species, and in spite of the comparatively restricted area, represents one of the most interesting areas within the Soviet Union, an area equaled only by certain districts of the Transcaucasus"; and "the abundance of the cultivated and wild flora is a distinguishing characteristic of Tajikistan,"[21] N. I. Vavilov, member of the academy, remarked.

Five principal plant zones are distinguished in the republic: the desert and transition to the steppe, the steppe and the transition to the forest, the forest, the subalpine and the alpine.

Forests have great economic importance. In 1932 they occupied 1.17 million hectares, or more than 8 percent of Tajikistan's entire area. The area of forests has decreased in recent years; they have been destroyed for fuel and building materials, and they now occupy an area of only about 250,000 hectares. These include the following: 115,000 hectares are juniper, 42,000 hectares of broadleaf forest, 32,000 hectares of sparse xerophilous forest, 16,000 hectares of tuga, 3,000 hectares of birch and poplar and 42,800 hectares of other species.[22]

As for destruction of Tajikistan's forests, we should recall F. Engels' statement: "The people who uprooted the forests in Mesopotamia, Greece, Asia Minor and other places to obtain plowland did not even dream that in so doing they had initiated the process of the present desertification of those regions, since the forests they took away were their centers for collection and storage of moisture."[23]

Taking into account the sizable economic importance of forests in the republic's economy, V. L. Komarov, member of the academy, wrote: "... the problem of afforestation is one of the most important problems for Tajikistan, one which must be resolved at the earliest date."[24] Conservation of nature and development of the productive forces require that the republic undertake broader efforts at artificial raising of juniper forest, commence regulated grazing of livestock, cultivate more valuable plantings of juniper, walnut and pistachio in parks and forest preserves, improve the quality of cuttings done to combat pests and diseases and the clearing of forests, and begin to wage an intensified effort against pests and diseases of forest plantings in the light of the conditions and peculiarities of each of Tajikistan's geosystems. "It can be said without any exaggeration that the state of fruitgrowing in Tajikistan is closely bound up with preserving the zone of juniper forest,"[25] V. L. Komarov, member of the academy, noted.

The expanses of the republic's pastureland and meadowland have great economic importance, especially to livestock raising. Pastures are divided into autumn-winter-spring pastures and summer pastures. The expanses of autumn-winter-spring pastures are concentrated mainly in the low-mountain areas of southwest, west and northern Tajikistan. The summer pastures are located mainly in the high mountain zones with subalpine and alpine meadows.

At the present time the relative share of natural animal feeds in the republic's animal feed base is very high. The adequacy of winter and summer pastures for livestock varies from one natural-agricultural district to another. The prospects for development of livestock raising in the republic are closely bound up with solving the problem of winter feed. The problems of winter pastures can be solved to some extent by intensifying the management of pastures for the raising of livestock on outlying pastures on the basis of a study of the natural and economic conditions of each district.

The diverse conditions of Tajikistan's geosystems make it possible to use pastures one after another as they become ready in the course of the year. But both winter and summer pasturage is used unsystematically. As a consequence the pastures are highly exhausted, and this reduces the amount of animal feed they produce from year to year.

Taking into account the important role of forests and pastures in water conservation and protection and their climatic role, it is indispensable that a detailed natural regionalization of the republic be conducted for these purposes. Optimum standards of forest cover and natural sources of animal feed accordingly need to be ascertained for all geosystems.

The republic's mountainous relief makes its soil cover highly variegated and puts a limit on the amount of farmland available. The share of farmland is 4,330,500 hectares, or about 30 percent of the area. But the area suitable for irrigation (including steep slopes) comprises about 1 million hectares, once irrigated land has been deducted.

At the present time the present vertical soil zones are identified in Tajikistan: Sierozem (from 300 to 1,000 meters), the zone of brown soils (from 1,000 to 2,800 meters), mountain-meadow and mountain-steppe zones (from 2,500 to 3,600 meters), the mountain-desert--steppe zone (from 3,000 to 4,500 meters), the high-mountain--desert and desert-steppe zone of the Eastern Pamirs (from 3,500 to 4,800 meters) above sea level). The high-mountain zone of eternal snows and glaciers, rocks and talus occupies a sizable area of the republic above 3,800 meters (western and central portions) and 4,700-4,800 meters (Pamirs).

Various types of Sierozem soils, which occupy almost one-fourth of the republic's area and are the principal zone for location of cottongrowing, fruitgrowing and grapegrowing, are of the highest economic value to the development, location and specialization of agriculture. The brown soils are used for grain, legume, oilseed and other crops. Mountain-meadow, mountain-steppe and mountain-desert soils and rocky expanses occupy more than 60 percent of the republic's area. The shrinking of the timbered mountain geosystems and the unsystematic use of pastures, summer pastures especially, are the principal cause of intensified soil erosion. According to incomplete data, land subject to soil erosion comprises more than 70 percent of the area of the republic. Approximately 50 million tons of soil of varying geochemical composition is annually carried away from plowland alone. "That is why the issue must be raised sharply of a campaign to consolidate the woody vegetation and preserve the mountain soils,"[26] V. L. Komarov, member of the academy, remarked.

The limited amount of land and intensification of agriculture urgently require not only a soil survey of all farms, but also creation of a land register for each of the republic's economic regions. It would be an objective basis for raising the scientific level of geographic organization of agriculture both of the entire republic and also of each kolkhoz and sovkhoz.

Tajikistan, thanks to its geological and geographic conditions, abounds in minerals used as raw material. Regional surveys have now identified more than 5,000 deposits and occurrences of minerals. Of the 50 types of minerals which have been found at approximately 350 deposits, the following have been studied and turned over for industrial exploitation: coal, petroleum, gas, polymetallic ores, lead, zinc, tungsten, bismuth, antimony, tin, fluorspar, ozokerite, optical fluorite, common salt, various building materials and others. The republic occupies one of the leading places in the country with respect to reserves of antimony, strontium and common salt, and in Central Asia with respect to reserves of lead, zinc, bismuth and fluorspar. More than 70 deposits are being worked in the republic, and more than 25 types of minerals are being mined.

The present practice of extracting from ores only the principal components and dumping other valuable metals in piles of tailings is exhausting natural resources and inflicting a huge loss on the economy and on the republic's geographic environment. D. I. Shcherbakov, member of the academy, has written: "The rapidly developing mining industry of Central Asia is raising a number of new issues concerning the fullest use of the raw mineral mined. It is not just a question of extracting all the components of the ore, but also of a combined production operation in which use of the particular components of the ore opens up the opportunity to build on the site new industrial enterprises to take up the ores of other deposits or their individual components."[27]

The problems of optimum location of the productive forces and the further industrialization of the republic as a whole are also closely bound up with comprehensive study and utilization of its mineral resources in a regional context. At the present stage of economic and social development, taking into account the economic-geographic conditions, we can designate the following mineral regions in the republic: Leninabad, Zeravshan, Gissar, Yavan, Vakhsh, Kulyab, Surkhobskiy, Darvaza, Western Pamir, Eastern Pamir and Northern Pamir.

Thanks to the physical-geographic conditions and peculiarities, hydropower resources take the leading place among natural resources. The largest glaciers, mountain lakes and rivers in Central Asia (the Amu Darya, Pyandzh, Vakhsh, Zeravshan, Kafirnigan, Kzyl-Su and others) are formed in the republic's mountains (Table 2).[28]

Table 2

River length, km	More than 500	401-500	301-400	201-300	101-200	51-100	26-50	10-25	Total
Number of rivers	4	--	1	3	13	28	124	774	947

A study of the potential energy of watercourses and the possible differentiation by sections of the large rivers has shown that the potential of the republic's

rivers is 32.6 million kw. The basin of the Vakhsh River accounts for almost 50 percent of the hydropower potential, the basin of the Pyandzh River about 25 percent, and all the other rivers account for the remaining 25 percent.[29] There are a large number of lakes in the republic which could in time become natural reservoirs for seasonal regulation of the flow of many mountain rivers which have a high fluctuation in their discharge.

In almost every geosystem of Tajikistan there are more than 70 mineral springs of exceeding value in their therapeutic powers: Khodzha-Obi-Garm, Obi-Garm, Shaambary, Garm-Chashma and others.

Under these natural conditions the rivers and lakes constitute a large productive force mainly as sources for irrigation, a source of hydroelectric power and the basis for sanatoriums and health resorts.

Utilizing the water resources for construction of hydroelectric power plants, irrigation, municipal and industrial water supply is developing at an exceptional pace. Resolution of the major water management problems began with the building of a succession of hydraulic engineering systems on the Vakhsh River. According to the data of A. F. Nikitenko, the Vakhsh River has a potential of 14,500 kw for every kilometer of its length, whereas the comparable figures are 4,700 for the Yenisey, 5,300 for the Angara, 4,400 kw for the Lena and so on.[30]

As a mountain river the Pyandzh is of particular interest for hydropower and irrigation. There are good economic reasons for building hydroelectric power stations on it, and the capital investments will be paid off very quickly.

Scientifically sound solution of the water problem in Tajikistan is one of the most important of the acute economic problems confronted at the present time. Even now intensive consumption of water resources that does not have an economic-geographic justification has brought about a water shortage in the irrigation regions in the northern and southwestern parts of the republic.

The total discharge of all the rivers passing through Tajikistan is more than 80.4 billion cubic meters. For that reason life urgently requires that the comprehensive study and optimum planning of utilization of water resources in the interest of all the Central Asian republics should begin here. Tajikistan needs to have a water management register showing all water resources in quantitative and qualitative terms and also the economic geography of all the present-day water consumers.

A survey of the components of the natural-geographic context is being conducted in the republic mainly by geological, botanical, zoological, hydrological, soil science and other scientific institutions.

All components in nature, in the geographic context--the relief, the climate, hydrography, flora, fauna, the soil and all living organisms--are organically interconnected and interdependent. It is they which shape every component and nature, the geographic context as a whole. If, then, one of them is changed, the others and the geographic context as a whole will gradually undergo change. This is an inviolable law of nature and of the geographic environment. Underestimation of geographic patterns results in extremely serious geoecological

consequences. Destruction of the forests in mountain geosystems, for example, destroys centers for collection and storage of moisture, soil erosion begins, torrents, avalanches and slides become more frequent and so on.

Thanks to its geographic position and physical-geographic conditions, Tajikistan is a separate georegion of Asia. The general economic importance of optimum utilization and reproduction of natural resources and natural conservation extend outside the economic-geographic limits of the republic and are having a definite impact on the pace and proportions of development of the productive forces of the Central Asia georegion as a whole.

In the interest not only of the republics of Central Asia, then, but also of the country as a whole, it is important that the effort be made here to develop the scientific foundations for comprehensive study of natural conditions and natural resources, to forecast their change, to evaluate them in economic terms, and to develop constructive strategies for natural conservations, in some places for transformation of nature, for prevention of natural destructive processes (erosion, torrents, avalanches, etc.), and to identify natural complexes for optimum location of production and for the population's life and activity.

We should note that the interdisciplinary scientific problems related to performance of these tasks are hardly being worked on at all from the standpoint of the requirements imposed by the needs of economic and social development. It is a mistaken opinion that the natural resources and potential of the geographic foundation of Tajikistan are inexhaustible.

Construction of economic and cultural facilities is growing rapidly over 5-6 percent of the republic's area, especially in the foothill zone. V. L. Komarov, member of the academy, wrote as follows about this: "The foothill zone is from the economic standpoint the most important zone of Tajikistan both as a source of food and also as an area for production of the products of fruitgrowing for export. It is the country's principal task to see that it is preserved and developed and to increase the yield of its high-quality crops."[31]

In order to minimize production costs, planners and project designers often use for various types of construction areas which have a flat terrain and where the total annual temperatures above zero are 4,500-5,500°, i.e., at precisely those places which are more indispensable for development of valuable agricultural crops and for building up agroindustrial complexes.

For the sake of optimum development and utilization of natural conditions, natural resources and location of production it is indispensable that the natural complexes--Tajikistan's geosystems--be regionalized. Taking into account the geographic position, orography, climate, hydrography, and the diversity and use of physical-geographic conditions and natural resources within the republic, one can identify at least 1,000 geosystems of varying size.

There is a need at the present time to direct the research efforts of the republic toward elucidation of natural-economic capabilities of geosystems, especially in the area of construction of the succession of hydroelectric power plants on the Vakhsh and Pyandzh, which is of great importance to the national

economy. L. I. Brezhnev has remarked: "Stewardly and thrifty use of natural resources, concern about land, about timber, about rivers and about clean air, about the flora and fauna--all of this is a vital matter for us as communists."[32]

This also makes it especially necessary in the present stage of socioeconomic development that there be coordination of scientific research for correct solution of the numerous problems of optimum utilization of the geographic environment and natural and labor resources, of selection of the most effective lines of scientific-technical progress, of effective solution of vitally important problems in theory and practice, and of harmonious interrelationship among nature, man and production.

On the basis of practice in socialist construction these problems can be formulated as follows:

1. Not only the destiny of funds allocated to irrigation, but also the future rise in the yield of farm crops and ultimately the economic development and rise in the material prosperity of the republic's workers depend on optimum utilization of nature, of natural resources. That is why it is indispensable to make an economic (in money terms) assessment of the republic's natural resources (especially land), and this should in turn be taken into account in the planning and location of production and in production incentives.

2. In the interests of not only the republics of Central Asia, Tajikistan in particular, but indeed of the country as a whole it is indispensable to work out the scientific foundations of an interdisciplinary study of natural conditions and natural resources, to make forecasts of their change, to make economic assessments of them, to work out constructive strategies for natural conservation and in some places transformation of nature and prevention of natural destructive processes (erosion, torrents, slides, etc.), and to identify natural complexes (geosystems) and zones for optimum location of production and settlement.

3. It is indispensable to use biochemical and geophysical methods to study the present state of the geographic environment, population, production, cities and anthropogenic transformation.

4. Research needs to be widely organized on the basis of interdisciplinary study of the natural environment of the regions and the republic, and methods need to be developed for preventing the adverse effect of elements of scientific-technical progress on the geographic environment and on human health.

5. The peculiarities of Tajikistan's economic-geographic position and conditions show that all steps need to be taken--organizational, scientific, technical, etc.--in order to gradually convert production to a closed cycle. There is no other way.

6. The territory of the republic and the natural complexes need to be organized scientifically, and a determination made of the most correct use of each type of relief and locality for development and location of production, settlement and cities, since the relief has a direct impact on the cost of building any project.

7. Organize interdisciplinary study, use and economic assessment of mineral resources and mineral resource conservation for the republic as a whole and for each geoeconomic region.

8. Take into account cyclical changes in climatic conditions. Ignoring these indicators results in large economic loss.

The time has come to compile climatic descriptions and assessment of climatic conditions and resources of each economic region and of the republic. Methods of exerting an impact on the climate need to be worked out for regions with adverse physical-geographic conditions (the Eastern Pamirs and elsewhere).

9. Given the acute water problem, at the present time there is no accurate record of how much water is being used, say, in cottongrowing, and how much is being lost without any benefit whatsoever. The future development and location of the productive forces, of cities and of rural areas are organically bound up with water problems: the water exchange and formation of the water balance, and the bases for management of the water regime, water resources and water quality. There is a need to work out a method of forecasting the flow of water from glaciers and a theory of glacier fluctuations. In order to increase the yields of farm crops and to combat secondary salinization of the soil, especially in cotton-growing districts, a method needs to be worked out for annually forecasting standard rates of irrigation for each farm and for the republic as a function of climatic fluctuations. There should be a water management register describing in quantitative and qualitative terms all water resources and the economic geography of all water consumers. The problem of multiple use of water resources needs to be solved.

10. Solutions have to be found to the problems of biogeography, ecology, optimum utilization and reproduction of the flora and fauna, to the problems of interdisciplinary study and development of the timber industry of the republic as a whole, of each natural complex and especially of the basin of the Amu Darya.

11. There is a need to compile scientifically sound charts, and then also an atlas, of optimum utilization and conservation of natural resources, land, timber, water, flora and fauna, natural complexes, zones and the republic as a whole.

12. There is a need to forecast the impact of production and especially of major hydraulic engineering systems on the natural environment and on preservation of the geographic-ecological balance of the republic and of each natural complex.

13. Tajikistan is the principal physical-geographic factor in shaping the climate, hydrography, soils, flora and fauna, and natural peculiarities of the geosystem of Middle Asia and in general of Central Asia. That is why it is indispensable to organize the Institute for Problems of Interdisciplinary Research and Use of Mountains.

14. It is indispensable to reorganize the division for natural conservation and optimum utilization of natural resources of the TaSSR Academy of Sciences as the

Institute of the Geography and Ecology of Tajikistan with a division of overall and regional problems in which the relevant specialists in the natural sciences would on a basis of cooperation and interaction work on the scientific problems of natural conservation, optimum utilization and reproduction of natural resources and optimization of the environment of man's life and activity.

15. The need has arisen to reopen the School of Geology, Soil Science and Geography of the State University imeni V. I. Lenin.

It is indispensable to undertake the training of specialists in the following fields: economic geography, climatology, hydrology, glaciology, soil science, geomorphology, physical geography, biological geography, geophysics, geochemistry, cartography and other narrow and broad specialized fields, since solving the problems indicated above depends mainly on those specialists and on the relevant institutions.[35]

Unless solutions are found for the problems on this list, which is still incomplete, it will be difficult to achieve the optimum utilization and reproduction of natural resources and the conservation of nature as the prime source of Tajikistan's economic and social development.

FOOTNOTES

1. KOMMUNIST, No 4, 1981, p 34.

2. IZVESTIYA AN SSSR. SERIYA GEOGR., No 5, 1976, p 6.

3. Lenin, V. I., "Polnoye sobraniye sochineniy" [Complete Works], Vol 38, p 179.

4. KOMMUNIST, No 15, 1979, pp 91-92.

5. Marx, K., and Engels, F., "Sochineniya" [Works], Vol 10, p 432.

6. Ibid., Vol 6, p 441.

7. Ibid., Vol 3, p 20.

8. Lenin, V. I., "Polnoye sobraniye sochineniy," Vol 29, p 21.

9. Marx, K., and Engels, F., "Sochineniya," Vol 23, p 48.

10. "Narodnoye khozyaystvo SSSR v 1979 g. Stat. yezhegodnik" [The USSR National Economy in 1979. Statistical Yearbook], Moscow, Statistika, 1980, pp 219-220.

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12. "Osnovnyye napravleniya ekonomicheskogo i sotsial'nogo razvitiya SSSR na 1981-1985 gody i na period do 1990 goda" [Basic Directions for the Economic

and Social Development of the USSR Over the Period of 1981-1985 and up to the Year 1990], Moscow, Politizdat, 1980, pp 69-70.

13. Marx, K., and Engels, F., "Sochineniya," Vol 19, pp 5-6.

14. PRAVDA, 7 March 1981.

15. KOMMUNIST TADZHIKISTANA, 3, 4 December 1932.

16. "Problemy Tadzhikistana" [Problems of Tajikistan], Vol II, Leningrad, Izd. AN SSSR, 1934, p 13.

17. Brezhnev, L. I., "Leninskim kursom. Rechi i stat'i" [On Lenin's Course. Speeches and Articles], Vol 3, Moscow, Politizdat, 1972, p 386.

18. "Problemy Tadzhikistana," Vol I, Leningrad, Izd. AN SSSR, 1934, p 236.

19. Ibid., Vol II, pp 236-237.

20. Ibid., Vol I, p 6.

21. Ibid., Vol II, pp 14-15.

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23. Marx, K., and Engels, F., "Sochineniya," Vol 20, p 496.

24. KOMMUNIST TADZHIKISTANA, 3 December 1932.

25. "Problemy Tadzhikistana," Vol II, p 34.

26. Ibid., p 37.

27. PRIRODA, No 116, 1966, p 41.

28. "Atlas Tadzhikskoy SSR," Dushanbe-Moscow, 1968.

29. "Nurekskaya GES i zadachi nauki" [The Nurekskaya GES and the Tasks of Science], Dushanbe, 1961, p 16.

30. Nikitenko, A. F., "Prospects for Development of Tajikistan's Electric Power," in the book: "Narodnokhozyaystvennoye znacheniye Nurekskoy GES" [Importance of the Nurekskaya GES to the National Economy], Dushanbe, Irfon, 1964, p 75.

31. "Problemy Tadzhikistana," Vol II, p 34.

32. Brezhnev, L. I., op. cit., Vol 2, Moscow, 1970, p 103.

33-34. [Omitted both in text and at bottom of page]

35. USSR Academy of Sciences, "Osnovnyye napravleniya razvitiya yestestvennykh i obshchestvennykh nauk" [Main Lines of Development of the Natural and Social Sciences], Moscow, 1975, pp 286-295.

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