

HISTORICAL SCIENCES

SAKHALIN, KURIL ISLANDS: THE BIOGENIC POTENTIAL OF THE LOCAL BIOSPHERE AND THE ECONOMIC POTENTIAL OF THE LOCAL ETHNOSPHERE

(Views of Economists Historians)

(To the question of the forthcoming inventory of Biosphere resources)

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Abstract

One of the main tasks of economic science is «Identification of the possibilities of development of human economic activity under conditions of limited resources» [1].

The taxon of the Biosphere (foremothers of all life on Earth, including Man) are the main elements of the material-energy substrate (hereinafter MES). By extracting, processing, and consuming MES, man reproduces his flesh and life.

Until recently, and in our view, only a hypothetical level of understanding of the extent to which humans can extract elements of MES from Earth has been maintained.

In 2018, Yinon M. Bar-On, Rob Phillips, and Ron Milo [2, 3] published a global census of the biomass of living taxon of the Earth's Biosphere. The work has changed the way we think about the Biosphere, giving it new meaning. The biomass parameters of individual taxon and the Biosphere as a whole were presented to researchers.

The view of the Biosphere with its elementary and general biomass parameters, rose from abstract to empirical.

«Relying» on the methodical scheme and biomass characteristics of the taxon Yinon M. Bar-On (2018), we have taken the following step: we have combined biology and economics, solved several bioeconomic problems.

The biomass of SK-biosphere taxon and the economic potential of SK-ethnosphere for GDP production have been determined.

In the last section of the article, indicators of the potential of the SK-biosphere and SK-ethnosphere are compared with indicators of the actual use of bioeconomic potential, in modern economic activity of the ethnic group of Sakhalin and Kuril ridge (within Sakhalin Oblast).

Part of the research results published in the article.

Keywords: Sakhalin, Kuril Islands, local biosphere, age of local biosphere, biomass, potential of local biosphere, local ethnosphere, economic potential of local ethnosphere, rational eco-use, Norway, Hokkaido.

INTRO

The relevance of this study, we have no doubt.

World demand for food and water with the growth of the population of the Earth «up to 8.6 billion people in 2030 and 9.8 billion people in 2050» naturally increases [4].

In 2020, Lev Lukyanov, in an article «Biosphere: evolution of representation from the concept of worldview» [5] wrote: «Without changing the «worldview and attitude to studying the Biosphere - its natural resource possibilities - to solve the problem of how to feed, in 2037 and in 2050 - nine and ten billion people [6], society will not be able».

In order to develop a strategy to address the global challenge of 2037, in the next 5-8 years (in our view), a special UN structure should select and study the biopotential of a number of local territories in different countries and parts of the world.

Once significant biological «reserves» have been identified in the study areas, appropriate international decisions on how to integrate unused or underutilized bioresources into the international economy can be prepared and adopted.

In this article, in 2023, we solve a local complex problem, determine - the bio potential of «SK-biosphere» and some «potentially-possible» indicators:

- the volume of the «SK-biosphere»;
- some geological data on inert and bio-inert minerals «SK-biosphere»;
- biomass of «SK-biosphere» and its taxon;
- the number of the population «SK-ethnosphere», which can live and conduct economic activity in the «SK-biosphere»;
- the volume of biomass consumption of taxon by the population of «SK-biosphere», in the process of economic activity;

- the amount of GDP that the population of «SK-ethnosphere» can produce.

Our belief in the correctness of the methodological solution related to the isolation, consideration, and analysis of the local biosphere, within the framework of the Earth Biosphere, is based on the opinion of the mathematician Nikita Nikolayevich Moiseev. In the paper «Ecology of mankind through the eyes of mathematics» N.N. Moiseev (1988) considers the concepts of «Biosphere» and «Noosphere» as global mathematical models, and allows for their disintegration - on local mathematical objects [7].

The final goal of this study and the complex task solution is the definition of «natural available reserves», through a critical comparison of the potentials of «SK-biosphere», with the real level of production and consumption of the modern «SK-ethnosphere».

Indicators that compare: taxon of the biosphere - biomass; production of GRP and GRP/per person - US dollar.

In the process of solving the complex task, in order to deepen the understanding of the object and the subject of the study, we had to: make several analytical calculations; make compilation borrowings, with reference to authorship and priorities; use the results of own, as yet unpublished studies.

Let this article be one of the first, and perhaps not the most successful, experiments in solving the global problem of 2037.

If a deeply believing Orthodox Christian asks Us: «Why do we do it?». We have something to say: «On the one hand, we make an assessment of the natural resources that God gave us in management for the organization of life; on the other hand, we look at how the «Gift of God» is used for the benefit of man and society».

Next, we consider the concepts «Gift of God» and «SK-biosphere», in the present work, as synonyms.

1. TERRITORIAL BOUNDARIES, LAND AREA AND SEA «SK-BIOSPHERE»

Today it is possible to define the territory of «SK-biosphere» only in a hypothetical way. It seems that no one has set and decided this task. To determine the possible limits of development of «SK-biosphere» this task must be solved even on a hypothetical level.

Known data. Land area «SK-biosphere»: Sakhalin Island - 76.6 thousand km sq and islands of the Kuril ridge - 10.5 thousand km sq.

Area of the sea, where the inhabitants of islands and coastal areas of the mainland, according to the United Nations Convention on the Law of the Sea of 1982, [8] have the right to engage in marine fishing in the coastal (territorial) zone - 12 nautical miles (22.224 km) from the shore, to be determined.

The United Nations Convention defines a country (state) as a subject of law, but in a federal country such as Russia, the ruling entity that has received this right from the United Nations is simply obliged to delegate the right to operate the coastal marine area to the subject of the Federation: To the Government of the Sakhalin Region. The State, as a «subject of law» governed by the United Nations Convention, should retain control over the exclusive economic zone of 12 to 200

nautical miles and the right to extract resources from that economic zone.

When determining the area of the 12-mile coastal area around Sakhalin, we consider the island as a geometric object, the area of the object - 76.6 thousand square kilometers. The island fits into a regular rectangle, which is 948 km long and 81 km wide. We increase each length and width of rectangle by 22.224 km, we get - rectangle with geometric parameters: length 992.4 (948 + 44.4) km and width 125.4 (81 + 44.4) km, area 124 446.96 (992.4 125.4) sq km. The area of 124.5 thousand square kilometers corresponds to the area of «S-biosphere», on the surface of the Earth, where 76.6 thousand square kilometers (or 61.5%) - the land area, and 47.9 thousand square kilometers (or 38.5%) - the sea area.

When defining the area of the 12-mile coastal area of the islands of the Kuril chain, we consider the chain as a imaginable rectangle 1200 km long and 8.7 km wide. The linear parameters of the rectangle with a 12-mile coastal area are assumed to be: length - 1 244.45 km (1200 + 44.45), width - 53.15 km (8.7 + 44.45), area - 66,142 km². Consequently, the area of «K-biosphere» is 66.1 thousand km², of which 10.5 thousand km² (or 16%) - land area and 55.6 thousand sq km (or 84%) - sea area.

The area of «SK-biosphere», after calculations, is 190.6 thousand square kilometers (124.5 + 66.1), where 87.1 thousand square kilometers (or 45.7%) - land area and 103.5 thousand square kilometers (or 54.3%) - the sea area

2. VOLUME OF «SK-BIOSPHERE»

If we consider the global Biosphere as a kind of natural environment-limited living space of developing living matter, the local biosphere is a part of the life space of the global Biosphere within conceivable limits.

In this case, the characteristics of the local «SK-biosphere» represent the sum of parameters of individual local living spaces «S-biosphere» and «K-biosphere». In our view, individual local biospheres are two geometric objects - rectangular truncated pyramids with a top in the center of the Earth. The boundaries of the truncation from the center of the Earth are formed by the sphere of the Earth's mantle and the sphere of the Earth's ozone layer. To simplify subsequent mathematical calculations, spherical parts of the truncations of conceivable pyramidal spaces are treated as flat rectangles.

At the Earth's surface level, as defined in section 1, the rectangles have dimensions: for Sakhalin (992.4 km by 125.4 km); for the islands of the Kuril chain (1224.45 km by 53.15 km). Other average sizes of truncated pyramids according to Wikipedia: 6,371.0 km - from the center of the mantle the Earth; 47.5 km - from the mantle to the surface of the Earth [9]; and 25 km - from the Earth's surface to the ozone layer [10].

The corresponding mathematical calculations show that the volumes of spaces filled with living matter considered by the local biosphere are equal:

«S-biosphere» - 8 990 761.8 km cube;

«K-biosphere» - 4 701557.5 km cube;

«SK-biosphere» - 13 692 319 km cube.

3. «INERT» AND «BIO-INERT» FOSSILS «SK-BIOSPHERES»

We take information about the richness of the sub-soil «SK-biosphere» from the book «Minerals of the Sakhalin region» [11]. As the authors write: The book briefly describes the main types of minerals, the largest and most developed deposits, provides information on their industrial reserves as of 01.01.2000 and projected resources as of 01.01.1998. The book used numerous stock and published materials» [11, p. 3].

Total geological resources of hydrocarbons «SK-biosphere» are estimated at 7.8 billion tons of «conditional» fuel, including: oil - 3800 million tons; associated gas - 3300 billion cubic meters; condensate - 250.5 million tons.

The Sakhalin shelf accounts for 76% of oil; 90% of associated gas; 96% of condensate.

Prospective geological resources for oil and gas production in the Mid-Kuril Oil and Gas Basin are estimated to total 386 million tons of «conditional» fuel [11, p. 7 - 8].

Total estimated coal resources of Sakhalin are estimated at 52 deposits and coal-bearing areas. To a depth of 300 m, they amount to 14.107 billion. T; to a depth of 1.500 m - 17.913 billion tons. Of the total number of them, 77.6 %, or 10.943 billion tons, falls on hard coals with good quality characteristics [11, p. 25].

There is no information on the coals of the Kuril Islands.

There are about 200 peat deposits in Sakhalin. The total resources of peat, on an area of 264 thousand hectares, in an industrial depth of 1.047 billion tons (at 40% humidity).

There are three peat deposits and two manifestations in the Kuril Islands. The total resources of the raw peat on the islands 41 million cubic meters, or 6 million tons, in terms of the conditional (40%) humidity [11, p. 35].

Metallic minerals.

On the land «SK-biosphere» it is revealed 90 root ore phenomena and points of mineralization of gold. There are 23 deposits in Sakhalin and 67 deposits in the Kuril Islands.

Average gold content in the Sakhalin deposits: 13.5 g/t (Berezka field); 8.2 g/t (Rukosevskoye field). Total ore reserves on Sakhalin are estimated at 21 million tons.

In the Kuril Islands, reconnaissance was conducted only on the Kunashir. And only one Prasolovsky deposit.

Until 1945, Japanese companies developed separate polygons at this deposit containing 800 g/t of gold and 4 kg/t of silver.

In 1993, the Russian company developed one test site at the deposit with a gold content of 7.4 g/t. Total ore reserves at Kunashir are 85.9 million tons.

The industrial placer gold bearing is known only in Sakhalin, with four detached gold-bearing nodes. The estimated reserves for gold ore are estimated at 28.028 million cube m. Ore content of «gold» from 300 mg/cube m to 700 mg/cube m [11, p. 41 - 42; p. 51 - 54].

Germanium. The main growing customers of «germanium» in the world is the electronic and electrical industry. One of the largest consumers of «germanium» is Japan. A large amount of «germanium» is supplied to the world market by China, which develops large deposits containing «germanium» 244 g/t (dry matter). The price of «Germanium» in the last decade of the 20th century ranged from 1100 to 860 US\$/t.

On Sakhalin, about 300 «germanium-coal deposit» was identified. Industrial production of «germanium» was carried out only on one deposit - «Novikovskiy». Industrial ore resources for this deposit are defined in 7350 kt. Individual areas of the deposit have a «germanium» content in dry matter 427.5 g/t (Central) and 362.4 g/t (Southern) [11, p. 44 - 45].

The main deposits of iron and titanium in the territory of the region are connected with coastal and marine placers of the Kuril Islands.

Iron content ranges from 18.8% to 14%; titanium from 2.4% to 2%. Total discovered and projected metal reserves for the three placers on the island of Iturup (Rukarevskaya, Reidovaya, Wind) are determined by iron - 10.220 million tons; titanium - 1.646 million tons. [11, p.54 - 55].

The prospects for copper, zinc and lead in the Sakhalin region are linked to the Kuril Islands, where many polymetals are known.

The forecast resources for this group of metals have been identified for 20 sites in four ore areas: «Shumshu-Paramushirsky», «Urupsky», «Iturupsky» and «Kurilsky». In total, the forecasts are as follows: a total of 10,440 million tons, including zinc - 7,800 million tons, copper - 2,090 million tons, lead - 0,550 million tons [11, p. 46].

Mercury is a common fossil in Sakhalin. In some cases, mercury ores contain antimony, arsenic, tungsten and gold.

The projected resources for one «Palevskoye» ore field are «mercury» and «antimony» respectively 3,100 t and 4,262 t [11, p. 47].

Chromite ore is only known in Sakhalin. There are several deposits on the coast and in the mountains. As a promising field for chromite mining, geologists propose to consider a deposit in the southern part of the Schmidt peninsula. The deposit has two «ore bodies»: North-Tomiskoe and South-Tominskoye; the estimated chromium resources for the ore deposit are estimated at 20 million tons of ore with a content (Cr_2O_3) - 4 million tons [11, p. 48].

Rhenium is one of the rarest and scattered elements in the Earth's crust. It is widely used in the production of heat-resistant alloys (e.g. spacecraft cladding). From 1990 to 2000, the demand for rhenium on the world market doubled. The main consumers of rhenium are the USA, Western Europe, Japan. In the USSR demand for rhenium reached 8 tons/year. Currently, no rhenium is produced in Russia. The price of rhenium rose to 1,542 US\$/kg in 1990. From 1990 to 2000, the price of rhenium ranged from 1,455 US\$/kg to 1,655 US\$/kg. The price of rhenium rose to 1,525 US\$/kg.

In the territory of the Kuril Islands a number of ore projectors rhenium. Some of them can be considered as

sources of industrial extraction. One of the sources of rhenium can be the volcano «Curly» (o. Iturup). In the ores, the rhenium resource is estimated at 2.7 tons, and in the fumarole gases of the volcano «Curly» - more than 10 tons/year. The conducted technological research allowed to develop a scheme of extraction rhenium from volcanic gases [11, p. 49].

In addition to the above mentioned mineral resources in the subsoil «SK-biosphere» many more minerals have been explored: building materials 11 names; non-metallic minerals 13 names; underground mineral waters and mineral muds 6 names [11].

According to the website of the Government of Sakhalin region: «Mineral-raw materials base of the Sakhalin region includes 35 kinds of different minerals» [12].

4. BIO-POTENTIAL «SK-BIOSPHERE»

The method of calculation of biomass «SK-biosphere» applied in this section is a «calca» method of «census» of biomass «Global Earth Biosphere» applied in the works: Yinon M. Bar-On, Rob Phillips and Ron Milo (2018) «The Biomass on Earth» [2, 3] and Hannah Ritchie and Max Roser (2013) «Land Use» [13].

«Census» biomass «SK-biosphere» is «hypothetical character».

To calculate the total biomass of «SK-biosphere», individual Biosphere species are grouped into 18 taxonomic subgroups. Each taxonomic subgroup is assigned to one of the three environments of life (or «kingdoms» of life): land and sea; land; sea.

As a «unit of mass», to measure the biomass of taxon, we use «bioactivate» carbon «C» (hereinafter carbon «C»). The conversion from the biomass of the taxon in carbon units to dry and wet biomass uses appropriate conversion factors. With the grouping of taxon, and the justification of the possibility of using «C», to determine the amount of biomass of taxon, we met in the work: Yinon M. Bar-On, Rob Phillips and Ron Milo (2018).

The results of biomass calculation of the taxonomic subgroups «SK-biosphere» in volume (13 692 319 cubic kilometers) are given in section «Results of analytical calculations».

Given in (Tables 9, 10) quantitative values for hypothetical «SK-biosphere» show:

1. Total biomass of developing living matter in «SK-biosphere» or potential mass of species of living matter «SK-biosphere» - 298,818,957.00 million tons of carbon. Converting the value from dry carbon units to wet biomass, the estimated potential biomass of living organisms is 1,992,458.00 million tones.

The biomass of marine and terrestrial taxon, in the total biomass «SK-biosphere», is 11.7 per cent; of these, the biomass of terrestrial taxon is 88 per cent; the biomass of coastal marine taxon is 0.3 per cent.

2. In the total biomass of «SK-biosphere», the biomass of taxon «people's» is 0.012 percent, which is 2

times lower than the average for the global Earth Biosphere.

The necessity of differentiation of aggregates biomass indicators «SK-biosphere» (Table 9) and determination of biomass of taxon «S-biosphere» and «K-biosphere» separately (Table 10) is explained by significant differences in their geophysics and climatology of evolution.

The formation of climatic conditions of development of «S-biosphere» have a special influence from the West «CP Siberia» and straits of the Pacific Ocean, from the East - the Pacific Ocean. The formation of climatic conditions «K- biosphere» from the East and West is carried out by the Pacific Ocean.

Indicators of biomass calculation of taxonomic subgroups «S-biosphere», in the volume of 8,990,762.00 million cubic kilometers and «K-biosphere» in the volume of 4,701,558.00 million cubic kilometers are given in (Table 10), section «Analytical calculations».

Deciding task «verification» of calculated indicators, on biomass of taxon «S-biosphere» and «K-biosphere» (Table 10), we have critically reviewed the materials of the Strategy of conservation of biological diversity of the Sakhalin region [14], and a number of publications of researchers, publicly available.

(Due to the limited size of the article Authors' names and surnames, the names of their scientific publications are not given in the text of the article, but are in the list of literature. We apologize to the authors).

1. The works studied for verification of the obtained calculation indicators for «S-biosphere»: [15, 16, 17, 18, 19, 20] (kingdom of «Land») and [21, 22, 23] (kingdom of «Sea»).

2. The works studied for verification of the obtained calculation indicators for «K-biosphere»: [24, 25, 26, 27, 28] (kingdom «Land») and [21, 23, 28] (kingdom «Sea»).

Works that investigate the state of life of simple organisms from bacteria to nematodes living both on land and in the sea within the «SK-biosphere» are not freely available.

Studying the above-mentioned works (respected authors) shows us that the bulk of species of flora and fauna, which are not related to human activities, develops along a trajectory of almost crisis-free dynamics. Mass extinctions «not observed». «Living matter» within the boundaries of «SK-biosphere» and its condition today correspond to the parameters of the global Biosphere of the Earth.

The obtained «calculation» indicators of taxon, according to the average terrestrial estimates (Table 8), fit into real proportions of «SK-biosphere», do not violate global proportions.

Biomass indicators of flora and fauna (Table 8) can be used for further calculations. Some of the results of the hypothetical individual biosphere calculations are shown in table 1.

Table 1.

Some comparative results of calculations of «SK-biosphere», «S-biosphere» and «K-biosphere»

| № s/r | Indicator name | Unit | «SK-biosphere» | S-biosphere» | «K-biosphere». | information source |
|-------|--------------------------|---------------------------|----------------|---------------|----------------|--|
| 1 | Biosphere volume | cube km | 13 692 319 | 899 076.8 | 4 701 557.5 | calculating Section 2 |
| 2 | Living environment area | Thousand. sq km | 190.6 | 124.5 | 66.1 | calculating Section 1 |
| 2.1 | Land area | Thousand, sq km | 87.1 | 76.6 | 10.5 | Website of the Governor and the Government Sah.ob [12] |
| 2.2 | Coastal sea area | Thousand, sq km | 103.5 | 47.9 | 55.6 | calculating Section 1 |
| 3 | Summary biomass of taxon | tons «C» | 298 818 957 | 254 655 246 | 44 163 958 | Tables 9, 10 |
| | | Wet biomass, t | 1 992 106 455 | 1 697 684 665 | 294 423 435 | Tables 9, 10 |
| 3.1 | Taxon of land and sea | Wet biomass, t | 232 752 286 | 152 033 900 | 80 718 352 | Tables 9, 10 |
| | | Share in total biomass, % | 11.684 | 8.955 | 27.416 | calculating |
| 3.2 | Sushi taxon | Wet biomass, t | 1 755 485 612 | 1 543 860 395 | 211 626 896 | Tables 9, 10 |
| | | Share in total biomass, % | 88.122 | 90.939 | 71.878 | calculating |
| 3.3 | Taxon of the sea | Wet biomass, t | 3 868 557 | 1 790 370 | 2 078 187 | Tables 9, 10 |
| | | Share in total biomass, % | 0.194 | 0.106 | 0.706 | calculating |
| 4 | Taxon «people» | Wet biomass, t | 233 824 | 205 638 | 28 186 | Tables 9, 10 |
| | | Share in total biomass, % | 0.012 | 0.012 | 0.010 | calculating |

Source: calculated by the authors.

5. ECONOMIC POTENTIAL OF «SK-ETHNOSPHERE» IN «SK-BIOSPHERE»

5.1. «SK-ETHNOSPHERE» AND «POTENTIAL OF POPULATION»

The concept of «ethnosphere», as mentioned above, was introduced by L. Gumilyov: «Ethnosphere - a combination of all existing «ethno-landscape integrations» - «ethnoses» and «geobiogenoses». The structure and energy of the ethnosphere is determined by the course of past and modern ethnogenesis processes. «Ethnosphere» is a subsystem of the Earth biosphere» [29, 30].

The concept of «economic potential» to the real and theoretical Biosphere has no relation. This concept

is a product of development of ethnos and its «ethnosphere».

The indicator «number of people» who can live and conduct economic activity in «SK-ethnosphere» at this time, in our case (Table. 2, p. 4.1) has a calculated value.

Dividing the biomass of taxon «people» in «SK-biosphere» (table. 1, p. 4), on the average human mass in living matter, considering it equal to 50 kg [3], we get numerical value of indicator «SK-ethnosphere» - 4,676,480.0 people; including:

- «S-ethnosphere» - 4,112,760.0 people,
- «K-ethnosphere» - 563,720.0 people.

Potential «number» of inhabitants in the «SK-ethnosphere»

| № s/r | Indicator name | Unit | «SK-ethnosphere» | «S-ethnosphere» | «K-ethnosphere» | information source |
|-------|--|---------------------------|------------------|-----------------|-----------------|---|
| 1 | Biosphere volume | cube of km | 13 692 319 | 8 990 761.8 | 4 701 557.5 | calculating Section 2 |
| 2 | Living environment area | Thousand sq km | 190.6 | 124.5 | 66.1 | calculating Section 1 |
| 2.1 | Land area | Thousand sq km | 87.1 | 76.6 | 10.5 | Website of the Governor and the Government Sah.ob. [12] |
| 2.2 | Coastal sea area | Thousand sq km | 103.5 | 47.9 | 55.6 | calculating Section 1 |
| 3. | Summary biomass of taxon | tons «C» | 29 881 8957 | 254 655 246 | 44 163 958 | Tables 9, 10 |
| | | Wet biomass, t | 1 992 106 455 | 1 697 684 665 | 294 423 435 | Tables 9, 10 |
| 4 | Taxon «people» | Wet biomass, t | 233824 | 205638 | 28186 | Tables 9, 10 |
| | | Share in total biomass, % | 0.012 | 0.012 | 0.010 | calculating |
| 4.1 | Potential number of inhabitants on land, with an average human weight of 50 kg | people | 4676480 | 4112760 | 563720 | calculating |
| 4.2 | Potential average population density living on land | people/sq km | 54 | 54 | 54 | calculating |

Source: calculated by the authors.

After determining the number of people who can live in the «SK-ethnosphere», two questions arise:

1. What amount of potential resources of «SK-biosphere» can be used by residents of «SK-ethnosphere» for expanded reproduction of one's own life?

2. What volume of the product can and should be produced by the inhabitants of «SK-ethnosphere» within the potential of «SK-biosphere», providing an extended volume of reproduction of one's own life?

We cannot answer the questions that have arisen in the course of our research based on «analytics» of biological research. We are not aware of conducting such studies in developed countries and Russia. In this study, to answer the questions, we use utilitarian methods of «searching, analyzing and selecting» the necessary information.

In the search process, we consider the concepts of «ethnic education» and «ethnic subject» as synonyms.

5.1.1. SEARCH FOR ETHNIC SUBJECTS SUCCESSFULLY DEVELOPING IN A SIMILAR BIOSPHERE

The search for ethnic subjects successfully developing in the biosphere similar to the «SK-biosphere» takes place in 5 or 6 consecutive «steps».

With each «consecutive» step, we reduce information uncertainty and increase the recognition of the main features of the subjects of search.

To make a comparative assessment of the success of the development of ethnic subjects, we will use the GDP/resident indicator.

«Substantiation of possibility» of application of indicator (GDP/ resident), in comparative historical analysis of development of ethnic subjects, we found in the work: Rondo Kameron «A concise economic history of the world» (1993) [31].

In this section of research, empirical concepts - «country», «regional subject of the country» having territory with border, and development management body, we place without explanation, in the conceivable transcendental concept «ethnic subject». We further consider all the above concepts synonymous.

Step one. Parameters and «subgroup-1» ethnic subjects that are successfully developing.

After selecting the indicator - GDP/per capita, we use the electronic statistical directory UNCTAD [32, 33].

UNCTAD analyses and publishes the world rating for 195 countries [32], analyses the level of development of countries on the indicator «GDP/per capita» and its structure. Of 195 countries, UNCTAD «allocates» a «subgroup-1» - «successfully» developing countries.

In 2020, in «subgroup-1» - 27 countries conducting economic activity in different corners of the earth.

The indicator of the minimum level of GDP/per capita, for entering and leaving the «subgroup-1» is US\$ 30 thousand.

According to UNCTAD data in 2020, average GDP/per capita figures, taken together from 195 countries, matter: the world - US\$10,892; developed countries - US\$ 39,185; developing countries - from US\$5,290.

Indicators of the structure of GDP, countries with economies of different levels of development, in 2019 are presented in (Table 3).

Table 3.

Structure of GDP of countries of different levels of development in 2019 (%)

| Kind of activity | World | Developed economies | Developing economies |
|------------------|-------|---------------------|----------------------|
| Agriculture | 4,2 | 1,4 | 8,3 |
| Industry y | 27,9 | 22,8 | 35,3 |
| Servies | 67,9 | 75,8 | 56,4 |

Source: compiled from: Gross domestic product. UNCTAD Handbook of Statistics 2021 [33]

The first step of working with UNCTAD Information on «subgroup-1» has reduced the uncertainty. In our consciousness has formed an idea of the minimum economic indicators guided by which, the potential population of «SK-biosphere», numbering more than 4.5 million people can successfully reproduce itself, in an expanded scope. But how to quickly achieve such and really possible economic indicators under the conditions of «SK-biosphere», the question remains. Search for successful developing ethnic subjects from «subgroup-1», having experience in rapid solution of development problems, at a limited time interval, in conditions close or similar to «SK-biosphere», continue. Economic indicators of «subjects» search in «subgroup - 1». Population from 4.5 to 6 million people; GDP/per capita, at least US\$ 30000. Structure of GDP - services (more than 60%), industrial production (no more than 30%) and «food production» (no more than 10%).

The indicator «food» does not replace the indicator «agriculture» introduced by UNCTAD [34, 35]. From the indicator «agriculture», as the form and content of the indicator «primary food», we go up, by 5-6 steps along the chain of «adding» value. Our movement up the chain, through 5-6 transport technological changes, leads us to the concept of «food», where «primary food» is turned into a «product» and «commodity» capable of satisfying the needs of the individual.

If the cost of «primary food» in the field, on the farm we estimate in US\$ 2, then the cost of «food» as a «product» and «commodity», after 5-6 steps of adding value, for the individual, when buying, will cost at least US\$ 10.

Step two. «Shortening the geography of search».

We focus on ethnic formations «subgroup -1» developing in Eurasia. Five developing ethnic entities are excluded from further consideration: Canada (52.1), the United States (67.9), Greenland (59.1), Australia (66.2) and New Zealand (45.9). (Figures in parentheses, GDP/per capita, thousands of US\$).

As a result of the operation in «subgroup-1», a Euro-Asian (subgroup-2) of 22 ethnic entities is formed.

Steps three and four.

Step three. We form a «subgroup -3» on the grounds of) the obvious correspondence of biosphere of ethnic formations «SK-biosphere».

The main influence on the formation of the modern «SK-biosphere» are the «northern seas» of the Pacific Ocean: the Bering Sea, the Sea of Okhotsk and the Sea of Japan. Ethnic entities whose biosphere is not clearly influenced by the «North Seas» of the Pacific are not included in the «subgroup 3». This is Asia.

In Western Europe, by analogy with the Asian operation, we do not include in the «subgroup-3» ethnic entities whose biosphere is developing beyond the apparent influence of the «northern seas» of the Atlantic and Arctic Oceans.

Step four, we form a «subgroup -4» on the parameters of the accepted economic indicators: population (from 4.5 to 6.0 million people) and GDP/per capita (not lower than US\$ 30,000).

Because of the «biosphere discrepancy», in the «subgroup-3» from Asia, we do not include ethnic entities developing: on Taiwan (32.8), in South Korea (34.7), in Israel (97.7) and on the southern Ostrava's of Japan (39.7) [33, 36].

Japan has eight administrative districts. Developing on the island of Hokkaido, Northern Administrative District we include in the «subgroup -3» and in the «subgroup -4». The biosphere of Hokkaido Island, within which a regional ethnic subject is developing, is a practical twin of «SK-biosphere». Economic indicators of the ethnic entity developing on the island of Hokkaido: population and GDP/per capita (5.3 million people; US\$ 33,200; 2014) [36].

Due to «biosphere non-conformity», from «subgroup-2» of developed countries of Western Europe, in «subgroup-3» we do not include, ethnic formations developing: in Austria (53,3), in Italy (35,4), in Luxembourg (132,9), in Switzerland (93,6) [33].

As a result of our «step 3» operations 14 ethnic entities remain in «subgroup 3», including several large ethnic entities representing a complex of regional ethnic entities.

France. In France, the North Atlantic Coast, have 5 administrative regions; hence 5 regional ethnic entities we include in «subgroup-3».

According to economic indicators, of the five regional ethnic entities, only two are included in the «subgroup-4»: «Hauts-de-France» (6.0 million people; US\$ 32,400) and «Nouvelle-Aquitaine» (6.0 million people; US\$ 35,000). We do not include in the «subgroup -4» three regional ethnic entities: «Normandy» (3.3 million people; US\$ 29,900), «Pays de la Loire» (3.9 million people; US\$ 35,700), «Brittany» (3.4 million people; US\$ 33,700) [37].

England. In England, we have seven regions with a sea coast. All seven regions we include in the «subgroup -3». And, all seven regional ethnic entities, according to economic indicators, we do not include in the «subgroup - 4»: North East England (2.7 million people), North West (7.1 million people), South East (9.3 million people), Yorkshire and the Humber (5.3 million people; US\$18400), South East (4.8 million people; US\$ 17,700), East (6.3 million people; US\$ 24,000), South West (5.3 million people; US\$ 28,200) [38].

Republic of Ireland. The Republic is developing on an island in the northern Atlantic. By «biosphere attributes», we include the island in «subgroup-3». «The ethnic entity» carrying out economic activity on the territory of the republic, according to economic indicators, we include in «subgroup -4» (5.1 million people; US\$ 101500) [39].

Iceland. A very interesting island in the North Atlantic Ocean. By «biosphere features» the island can be included in «subgroup-3». According to economic indicators, the ethnic «subject» - developing on the island, in the «subgroup-4» does not fit (387.8 thousand people; US\$ 74,000) [40].

Germany has three regional federal lands with access to the North and Baltic Seas. By «biosphere attributes» of the German land can be included in «subgroup-3». By economic indicators, and especially by the population size of «ethnic subjects», the federal states of Germany are not included in the «subgroup -4». Bremen (683.0 thousand people; US\$ 47600), Mecklenburg-Vorpommer (1.6 million people; US\$ 25000), Schleswig-Holstein (2.9 million people; US\$ 31200) [41].

Denmark, one of the northern countries of Western Europe. Land resources of Denmark: Jutland peninsula and archipelago - of 406 islands. The shores of the peninsula and 406 islands are bounded by the North and Baltic Seas. On «biosphere attributes» and «economic indicators» Denmark are included: in «subgroup-3», and «subgroup-4» (5.9 million people; US\$ 65,700) [42].

Belgium, northern country of Western Europe. Within the ethnic structure of Belgium, there are three regional ethnic entities and three ethnic entities.

The Flemish region has access to the North Sea. By «biosphere characteristics» the Flemish region is included in the «subgroup-3». According to economic indicators, the Flemish «ethnic entity» is not included in the «subgroup-4» (6.6 million people; US\$ 50,600) [43].

The Netherlands, a northern country of Western Europe with significant coastline boundaries and artificial structures in the North Sea. According to «biosphere attributes», the Netherlands is included in «subgroup-3», but not in «subgroup-4». The administrative structure of the Netherlands is divided into 12 administrative districts. The largest administrative districts «South Holland» and «North Holland» have access to the North Sea. But the population of these counties is less than 3 million. With such population figures, we cannot include the largest administrative districts of the Netherlands in the «subgroup-4». Economic indicators of the Netherlands (17.8 million people; US\$ 57,800) [44].

Sweden is a Nordic country in the north of Western Europe with access to the Baltic Sea and the Gulf of Bothnia. By «biosphere attributes» Sweden is in «subgroup-3». In the conditional administrative division, Sweden has three historical lands: Norrland, Svealand and Gotaland. According to «economic indicators», in «subgroup-4» we have included one «ethnic entity», developing on the ground «Gotaland» (5.0 million people; US\$ 56,400). Economic indicators of Swedish ethnic education (10.5 million people; US\$ 56,400) [45].

Norway, the second Nordic country in the north of Western Europe. The country that has a long coast in the Barents Sea. The biosphere of Norway is in «Subgroup 3» according to «biosphere traits». According to «economic indicators», ethnic education - developing in the territory of Norway, is in the «subgroup 4» (5.4 million people; US\$ 92,600; 2022 year) [46].

Finland, the third «Nordic» country in northern Western Europe. The country, which has access to the Gulf of Bothnia to the west; in the south, has access to the Gulf of Finland. According to «biosphere attributes» Finland is in «subgroup-3». According to «economic indicators» ethnic education developing in the territory of Finland is included in «subgroup-4» (5.6 million people; US\$ 53700) [47].

After conducting probing of ethnic subjects of different nationalities, in «subgroup-4» there are 7 regional biospheres and 8 ethnic subjects which can be considered as analogues of «SR-biosphere» and a potential analogue of «SK-ethnosphere».

Step five. From the «subgroup-4» of successfully developing ethnic subjects, we select two ethnic subjects, based on our own opinion, which can best use the resources of «SK-biosphere».

The first ethnic entity is developing on Hokkaido (5.3 million people; GDP/per capita US\$ 33,200; 2014). [36]. The second ethnic entity is developing in the Scandinavian Peninsula, within the borders of Norway - (5.4 million people [46], per capita GDP US\$ 58,800; in the year of the pandemic) [48].

5.1.2. ECONOMIC POTENTIAL OF HOKKAIDO ETHNOSPHERE

Ethnosphere and Ethnos, developing on the island of Hokkaido, for us are especially interesting. Hokkaido Island - its local biosphere - evolves slightly south of «S-biosphere» and «K-biosphere». The sea distance between Sakhalin and Hokkaido is 43 km, from Kunashir to Hokkaido - 20 km. Hokkaido biosphere, with some approximations, can be considered adequate with «S-biosphere» and with «K-biosphere». But, as geology shows, the biosphere of Hokkaido is poorer than «S-biosphere» and «K-biosphere». There are no industrial deposits in Hokkaido: oil, gas, gold.

The ethnosphere of Hokkaido is an organic subsystem of the ethnosphere of Japan. GDP/per capita in Japan, according to UNCTAD data in 2020, is US\$ 39,420. The country is steadily «developing», among the developed countries, both in terms of GDP per capita and GDP structure [36].

A comparison of the structures of the GDP of Japan and Hokkaido (Table. 4) shows that they have some differences, determined by Japan's internal specialization of prefectures.

1. Hokkaido is the breadbasket of Japan. Hokkaido farmers produce 13.5 percent of Japan's total agricultural production. Hokkaido's food self-sufficiency rate in 2015 was 221% [49].

Agricultural production in Hokkaido is 3.9 per cent of GDP. The agricultural product produced and consumed by the island's population does not exceed 2

per cent of GDP. Agricultural products that are not consumed in Hokkaido, that is more than 2% of GDP, are exported to other regions of Japan [49].

2. Hokkaido formed powerful: scientific, educational and production structures. The structures set up address scientific, educational and production challenges for the island, the country and the Asia-Pacific region [50].

Hokkaido's science and education structure includes 37 universities (including 25 private universities), 34 junior colleges and 5 technological colleges. One of the main scientific and educational flagships for the existing scientific and scientific-industrial structures is the national «University of Hokkaido», its institutes and faculties. The professorship of the University (6,250 persons) has 11,950 master's and 6,300 graduate students each year [51]. The scientific and production structure defined itself in 2002 as the «Forum of the industrial cluster of biotechnology Hokkaido» includes (as of September 2011) 124 scientific and production companies. [52] Actively developing business partnerships with European business [53].

An in-depth analysis of the already mentioned sources characterizing the development of economic activity in Hokkaido shows: The Prefectural Government is trying to bring the Hokkaido economy to the level of the developed country. The central government of Japan allocates 11% more budget to Hokkaido than the national average [54]. Table 4 provides a comparison of the most common structural GDP of the developed economies, Japan and Hokkaido.

Table 4

GDP structure of developed economies, Japan and Hokkaido in 2013, %.

| Kind of activity | Developed economies | Economy of Japan | Economy of Hokkaido |
|------------------|---------------------|------------------|---------------------|
| Agriculture | 1,4 | 1,2 | 3,9 |
| Industry y | 22,8 | 24,3 | 16,5 |
| Servies | 75,8 | 74,5 | 79,6 |

Source: compiled from: Ministry of the Environment web site Ministry of Internal Affairs and Communications, Statistics Bureau [The World Statistics 2016] URL: <https://www.mlit.go.jp/en/hkb/content/001404373.pdf> [55]

5.1.3. ECONOMIC POTENTIAL OF THE NORWEGIAN ETHNOSPHERE

The fact that Norway's biosphere could be considered an analogue of «SK-biosphere» in terms of climate, vegetation and fossil resources was a pleasant surprise for us.

Sakhalin and the islands of the Kuril Range, on the map of the Earth, are located well south of Norway, located on the northern coast of the Scandinavian Peninsula (57 and 81 degrees north latitude, 4 and 32 degrees east longitude).

Norway's land area is 385 207 square kilometres.

The factor that equalizes the climatic conditions of the evolution of the Norwegian biosphere and the «SK-biosphere» is the Gulf Stream.

Keppen's climatic indicators for Sakhalin (Dfa, Dfb, Dfc, ET) and Norway (Dfc, Dfb, Dsc, ET, Cfc) are similar. [46, 56, 57] The natural climatic similarity determines a significant similarity between the plant and animal worlds of the biosphere [46, 58, 59].

Norwegian population: 5,425,270 (2022).

The mineral resources of Sakhalin, the islands of the Kuril range (see Radel 3) and Norway are remarkably similar.

We have familiarized ourselves with the Norwegian fossil resource nomenclature when studying the work of Rognvald Boyd and Håvard Gautneb (2016) [60].

Here are some names of the resource nomenclature from this work:

Metals: titanium, iron ore, beryllium, copper, gold, magnesium, molybdenum, nickel, niobium, scandium, rare earth elements and zinc.

Industrial minerals: feldspar, flourspar, phosphate minerals and talc [60].

Another basic similarity between the biospheres of Sakhalin and Norway is their oil and gas fields discovered in the 20th century. In Sakhalin, oil fields were discovered in the first quarter of the 20th century [61]; in the Norwegian North Sea, oil fields were discovered in 60 [62].

The historical analysis of Norway's economic performance since 1960 tells us that 60 years of oil and gas

exploitation in the North and Barents Seas have transformed the country. The status of Norway's economy and population has changed: in the Scandinavian Peninsula, in Europe and in the world.

After 40 years of development, Norway, from an economy that pushed people into immigration, has now become a country that attracts skilled immigrants.

Norway's GDP is \$541 billion (nominal; 2022 est).

Per capita GDP in 2020 (the year of the pandemic) was US\$67,385; in 2021 it was US\$88,792 [33, 63].

GDP by sector is presented in (Table 5).

The average net salary in Norway in 2021 is €3,548 per month [63].

With its GDP per capita, Norway ranks among the top ten developed countries [33], according to UNCTAD statistics.

Table 5.

GDP structure of developed economies in 2020 and Norway in 2016%, %

| Kind of activity | Developed economies | Economy. Norway |
|------------------|---------------------|-----------------|
| Agriculture | 1,4 | 1,6 |
| Industry y | 22,8 | 34,7 |
| Servies | 75,8 | 63,5 |

Source: Economy of Norway. From Wikipedia, the free encyclopedia. Edited on 21 December 2022, https://en.wikipedia.org/wiki/Economy_of_Norway [63]

The industry of modern Norway is a complex multisectoral complex, which is successfully developing in parallel with the development of enterprises producing and exporting oil, gas, oil and gas processing products.

In addition to the oil and gas industries, the Norwegian industrial business sector has been successfully represented by the following enterprises: transport, fishing, aquaculture, food processing, shipbuilding, pulp and paper production, the production of metals and chemicals, wood harvesting and processing, the development and extraction of «minerals», the production of fabrics from natural materials [63].

In response to the needs of industrial enterprises, in parallel with the development of industry, Norway is developing primary, secondary and higher education [64, 65].

The educational process was well integrated in 2003 into the Bologna system [65]. The number of educational institutions: colleges, university colleges and universities is growing. Higher education in Norway today is offered by eight universities, nine specialized universities, twenty-four university colleges. The ultimate responsibility for education lies with the Norwegian Ministry of Education and Research» [65].

The scientific and research «corps» of Norway, including a number of universities, is today represented by fifty-four scientific organizations [66]. Judging by the name of research organizations, the range of tasks they solve is extensive. There are organizations that solve sectoral and intersectoral tasks; social development tasks of Norway, Europe, the world community; general theoretical global tasks.

It seems to us that some scientific organizations in Norway, on certain thematic tasks, and especially those

related to the influence of «economic Man» on the ecology of the country, the ecology of the Earth and «Biosphere», occupy leading positions. The scientific atmosphere in the country allows them to do so.

Agriculture in Norway is a special subject. And as it seems to us, after acquaintance with a number of documents [67, 68], the Government of Norway, against the background of the general turbulent economic development of the country, considers the industry as «Achilles heel». There is a reason for this Government view. Norway's self-sufficiency in food fluctuates at a level of 50 per cent [67]. Food shortages are met through exports.

Based on the information available to us, the task facing Norwegian agriculture, with limited arable land (2.7 per cent of Norway's land area) is not simple, requires «brains», resources and time.

In Norway there is a Government that has the resources and wants to solve this problem, there are agricultural and social institutions, and therefore scientists who know the history of this task and specialize in solving similar problem tasks.

We believe that Norway will meet the challenge in the next five to eight years.

The evolution of European ethnic history favours it and goes to meet it.

We return to our task.

5.2. POTENTIAL OF «SK-ETHNOSPHERE»

After obtaining a reasonable idea of the possible per capita GDP of the ethnospheres of Hokkaido and Norway, we determine, by ethnosphere analogues, the average GDP per capita for the «SK-ethnosphere» in (Table 6).

Table 6.

Determination of average GDP per person for «SK-ethnosphere»

| | GDP/per capita in analog ethnospheres; in US\$ | | GDP/per capita «SK-ethnosphere» in US\$ |
|------------------------|--|----------|---|
| | Hokkaido Prefecture | Norway | |
| Value of the indicator | 33217 | 88792 | 61004 |
| Indicator source | [36] | [33, 63] | calculation |

«Average indicator» US\$ 61,004 per capita (Table. 6), in this section, we consider as a potential indicator of possible GDP/person production on «SK-ethnosphere».

By multiplying the potential indicators of «population» and GDP per capita of «SK-ethnosphere», we get a potential GDP output of «SK-ethnosphere» 285265.28 million US\$ (Table 7).

The calculation made by us of the potential structural indicators of GDP according to the «percentage weights» adopted in section 5.1.1 (Table 7) shows that the potential population of «SK-ethnosphere» can produce:

- food for the amount of 28,526.53 million US\$;
- industrial products - for 85,579.58 million US\$;
- provide services - 171,159.17 million US\$.

In this section, we do not dwell on the nomenclature and volumes of agriculture, industrial products, volume of services that can be produced by residents of the potential «SK-ethnosphere». This task can and should be solved by specialists and scientists of Norway and Hokkaido, who can or should be part of the working group, on the development of a special strategy «development» of economic potential, on the territory of «SK-biosphere». They have the knowledge and experience to deal with similar tasks within their biosphere.

We are interested in the indicator «food», which represents the sum of value of annual «food baskets» of potential population of «SK-ethnosphere».

In looking for a possible analogue to the indicator of the «cost of the food basket» among the developed ethnic entities, we focused on the indicator of the ethnic community of Australia. GDP/per capita in Australia in 2021 was US\$ 66,209. [33]. The cost of the weekly «food basket», for a family of four with two children in Australia is US\$ 336 [69]; the cost of the annual «food basket» for the family, (year-52 weeks) is US\$ 17,472.0 Indicator of annual value of «family food basket» of the family (from 4 people) of Australia, we consider as an indicator of analogue for the potential family, population «SK-ethnosphere».

The «estimated» number of inhabitants of the potential «SK-ethnosphere» is 4,676,480.0 inhabitants. Average number of families (from 3-5 people) - 1169120.0 «Estimated» value of total annual «food basket», for 1169120.0 families in «SK-ethnosphere» - 20426.86 million USD.

«Food», which will not find a consumer in the «SK-ethnosphere», in the amount of 8099.67 million dollars, can be exported outside the «SK-biosphere» (Table 7).

Table 7.

Potential volume of GDP production by population of «SK-ethnosphere» in «SK-biosphere»

| s/r | Indicator name | Unit | «SK-biosphere» | «S-biosphere» | «K-biosphere» | information source |
|-------|---|----------------------|----------------|---------------|---------------|---|
| 1 | Biosphere volume | cube km | 13 692 319 | 8 990 761.8 | 4 701 557.5 | calculating Section 2 |
| 2 | Living environment area | Thousand, sq km | 190.6 | 124.5 | 66.1 | calculating Section 1 |
| 3 | Land area | Thousand, sq km | 87.1 | 76.6 | 10.5 | Website of the Governor and the Government Sah.ob. [12] |
| 4 | Coastal sea area | Thousand, sq km | 103.5 | 47.9 | 55.6 | calculating Section 1 |
| 5 | Potential number of inhabitants on land | thousand people | 4676.48 | 4112.76 | 563.72 | Table 2 |
| 6 | Potential GDP/per capita | Thousand US\$/person | 61.00 | 61.00 | 61.00 | Table 6 |
| 7 | Potential GDP | Million US\$ | 285265.28 | 250878.36 | 34386.92 | calculating |
| 7.1 | Food (10%) | Million US\$ | 28526.53 | 25087.84 | 3438.69 | calculating Section 5.1.1 |
| 7.1.1 | Food own consumption | Million US\$ | 20426.86 | | | calculating Section 5.2 |
| 7.1.2 | food export | Million US\$ | 8099.67 | | | calculating Section 5.2 |
| 7.2 | Industrial production (30%) | Million US\$ | 85579.58 | 75263.51 | 10316.07 | calculating Section 5.2 |
| 7.3 | Services (60%) | Million US\$ | 171159.17 | 150527.02 | 20632.15 | calculating Section 5.2 |

Source: calculated by the authors.

The small share of human biomass in the «SK-biosphere» 0.012% (Table 1) tells us that people in the «SK-biosphere» are not the dominant taxon. When deciding on the strategy of behavior and development, people should weigh each step, choose a development trajectory that does not harm the surrounding taxon, does not disturb biological equilibrium and preserves biodiversity in the «SK-biosphere».

With special attention, people working out the strategy of development of «SK-ethnosphere» should refer to taxon - biomass producers «SK-biosphere». Comfortable conditions of development of biomass producers taxon, to a large extent, affect the viable potential of the population «SK - ethnosphere». The names of some of the biomass producers that occur in the «SK-biosphere» and their annual biomass productivity are given in (Table 8).

The need to understand that approach is dictated today by another pandemic that has taken millions of lives.

Table 8.

Some taxon-producers of biomass «SK-biosphere» in the order of decreasing of their performance

| s/r | Taxon name | Biomass productivity, grams of carbon/m ² per year) | link at source (*) |
|-----|----------------------|--|--------------------|
| 1 | Swamps and marshes | 2500 | [3] |
| 2 | Tropical rainforests | 2000 | [3] |
| 3 | River estuaries | 1800 | [3] |
| 4 | Temperate forests | 1250 | [3] |
| 5 | Cultivated lands | 650 | [3], [55] |
| 6 | Tundras | 140 | [3], [55] |
| 7 | Open ocean | 125 | [3], [55] |

Source: Biomass (ecology) From Wikipedia, the free encyclopedia. Edited on 28 April 2022 URL: [https://en.wikipedia.org/wiki/Biomass_\(ecology\)](https://en.wikipedia.org/wiki/Biomass_(ecology)) [70].

(*) reference number in specified source:

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5.3. POTENTIAL OF «SK-BIOSPHERE» AND REALITY OF CONSUMPTION FOR SOME TAXONS

To form an idea of the level of use of the potential of «SK-biosphere», for some groups of taxon, and the general development we shall restore the concepts: «Governor of the Sakhalin region», «Government of the Sakhalin region».

In Sakhalin and Kuril Islands (where, the total land area of «SK-ethnosphere» is 87.1 thousand. sq. km., the total area of the «coastal» sea 103.5 thousand. sq. km.) 4676000.0 people can live and develop normally. The potential density of the population living on land in «SK - ethnosphere» can be 54 people/ sq km.

At present, the Sakhalin region is home to almost one tenth of the potential population. The population is declining.

According to the site «Governor», «Sakhalin Region Governments» and «Sakhalinstat»: «As of January 1, 2019, the population of Sakhalin Region is 489.6 thousand people, compared to the same date of 2018 decreased by 0.5 thousand people (by 0.1%)» [12]. In January-December 2020 only natural population loss was 1.104 people. Migration growth amounted to 705 people. In January-December 2021 natural population loss was 2.149 and migration loss was 1,532 people [71].

The current population density in the Sakhalin region is 5.6 inhabitants/sq. km.

In the total humid biomass «SK-biosphere», the weight of which is determined in 1,992,106 thousand tons; human biomass can make 234 thousand tons or 0.012 percent (Table 7). Currently, in «SK-biosphere» human biomass is 24 thousand tons or 0.001 percent.

In the «subsoil» of Sakhalin and the Kuril Islands, over the years of evolutionary development, reserves of inert and bioinert minerals have accumulated in large quantities.

According to the website of the Government of Sakhalin region: «Mineral-raw materials base of the Sakhalin region includes 35 kinds of different minerals» [12], which can have international practical signif-

icance. Currently, out of 35 minerals, only 4 are extracted and sold on the world market: oil, «gas condensate», gas, coal [12, 71].

«Governor» and the Government of Sakhalin region total geological hydrocarbon resources «SK-biosphere» estimate 7.8 billion tons of «conditional» fuel, including: oil - 3,800 million tons; free gas - 3,300 billion cubic meters; gas condensate - 250.5 million tons; coal - 280 billion tons [12].

Production of hydrocarbons January - December 2021: oil and gas condensate 15.9 million tons; gas 32.2 billion cubic meters; coal 13.1 million tons [71].

The surface of the land «SK-biosphere» is rich in plant species. «Wild species» of plants «SK-biosphere» occupy 34 percent of the land area. The wet potential biomass of plant species (above-ground biomass) is 1,238,157 tons (Table 9). Terrestrial, wild plant biomass includes: «Forests, wooded lands, natural meadows».

According to calculations, the «total area» of the forest fund of Sakhalin region on 01.01.2021 is 6.9 million hectares, including covered by forest - 5.7 million hectares, which is 83 percent of the forest area.

The estimated volume of forest raw material - 640.89 million cubic meters. Annual volume of logging «roundwood», in the Sakhalin region, is: 250-300 thousand cubic meters [12, 71].

Multiplication of the average density of sawn softwood trees (700 kg/ kub m) by the average volume of roundwood, gives us an idea of the average annual mass of «harvested» roundwood on the territory of the Sakhalin region - 192.5 thousand tons. The ratio of harvested wood to the weight of wet plant biomass gives us the indicator of the level of utilization of forest potential - 0.043 per cent, it is «nothing». Trees age and rot standing. The export of roundwood is prohibited.

Agriculture of the Sakhalin region.

Crop Production. The potential for growing plant products on arable land (constituting 7.4 per cent of the land area) is estimated at 38,787,000 tons (Table 9).

The needs of the population living in the region according to «Medical standards» approved by the

Ministry of Health of the Russian Federation (per person per year: potatoes 90 kg, vegetables and melons - 140 kg, fresh fruit - 100 kg.) [72] To meet the needs of the population, agriculture of the region must produce: potatoes 43,920 tons; vegetable crops 68,320 tons; berry products 48,800 tons.

According to the website of the «Governor» and the Government of the Sakhalin region, the harvest of vegetables in 2021 amounted to 38.4 thousand tons. Potatoes 61.2 thousand tons [71].

The bulk of berry products consumed by the population of the region are imported by entrepreneurs. The other part of the berries is supplied to the markets by owners of country plots and «pickers» of wild berries.

Indicators of self-sufficiency of the population of the region on individual products of crop production Governor and Government of the region do not give [12, 71].

Birds and domestic animals. Potential for cultivation and consumption: Poultry (7.4% of land) is 387 876 t. (para 2.5, table 9); Domesticated animals on artificial grasslands (27% of land) is 391,662 t (para 2.7, table 9).

In contrast to crop production, the Governor and the Government of the region in the report for 21 years {40} give data of production: milk - 52.8 thousand tons; meat of cattle and poultry - 16.1 thousand tons; eggs - 142.8 million pieces. Data on self-sufficiency of the population of the region in 2021: «milk - 65.0%; meat - 22.6%; egg - 94.2%» [71].

Seafood. In the coastal waters of the Sakhalin region, the potential for catch of seafood (wet biomass) - 3869 thousand tons (para 3.7, table 9).

According to the website of the Governor and the Government of the Sakhalin region, the enterprises of the fisheries management complex caught in 2021 only 623970 tons of fish and seafood [71].

As for the economic indicators of development of the Sakhalin region, the values of the indicators: GDP, GDP/per capita and the budget of the region, which Statistics gives, do not correspond to the actual indicators.

The revenues that the regional budget receives from the sale of oil and gas extracted in its territory are held annually by the Federal Government, under «item» «Internal debt of the Sakhalin region» [73]. The sum of annual deductions from the regional budget is several tens of billions of rubles. The annual «retention» of the Federal Government, makes the Sakhalin region's budget scarce [73].

Due to the Federal Government's withholding of «revenues» from oil and gas from the regional budget, the «indicator» of GDP and «indicator» of GDP/per capita should also decrease. The indicator of GDP of the region should be reduced by the amount of «sales» of regional oil and gas; the indicator of GDP/per capita, due to the decrease in the indicator of GDP of the region, recalculated. Statistics don't do that.

The GDP of the region and GDP/per capita indicator, which are shown in the report Governor and Government of Sakhalin region [71], without statistical adjustment, cannot be compared with the same indicators of potential «SK-ethnosphere» (Table 7).

A short comparison of the potential indicators of the «SK-biosphere» and «SK-ethnosphere» with the indicators of the real use of the resource and potential of the Sakhalin region; we do not conduct further.

CONCLUSION

If a deeply believing Orthodox Christian asks us: «What is revealed by the research?» and «How are things with «Gift of God?». We will answer without thinking: «Everything is very bad».

«God's gift» or potential of «SK-biosphere» is not used even by 10 percent.

On the islands of «SK-biosphere», where 4676 thousand people can live without poverty and successfully develop (producing GDP/soul 61.00 thousand US\$), today 486 thousand people live in poverty.

The Federal Government withdraws tens of billions of rubles annually from the regional budget. These funds are transferred to the budget of the region, in the form of taxes, state monopolies «Gazprom» and «Rosneft». [73]

According to our calculations, if we remove from the regional GDP volumes of oil and gas sales, which is 78 percent [71], then the real GDP/per capita of the region, will also decrease by 78 percent and will be about 10.00 thousand US\$; as in international statistics for 2021 [33].

Based on the GDP/per capita indicator, 10.00 thousand US\$ (or 736 thousand rubles/per person) income of residents of Sakhalin region is formed. In search of a better life, from the lands of the «Gift of God» every year migrate from 1.0 -1.5 thousand people [12, 71].

As for reserves of potential «SK-biosphere».

The utilization rate of terrestrial bioresources, as we have calculated, does not exceed 10 per cent. Among these resources we include «taxon»: wild plants and «forest», pastures, land resources of crop production, domestic species of birds and animals.

The development of a targeted programme that includes the necessary resources and technologies to be used in the field of food production for supply on the international market, in our situation, is to be entrusted to the scientists of Hokkaido University [51].

The reserves of biopotential of the Pacific Ocean waters, «washing» the shores of the islands «SK-biosphere», are huge and require special treatment.

Entrepreneurs - fishermen, who today live on the «territory» of «SK-ethnosphere», due to the circumstances, are practically not able to involve in the economic circulation, in full, the resources of the sea in the 12-mile zone. The bio-resources of the 50-mile zone for entrepreneurs- fishermen «SK-ethnosphere» are almost completely inaccessible.

The volumes of marine bioresources that can be involved in the international economic circulation can be determined by scientists and specialists of Norway, Hokkaido, the Far East of Russia. Norwegian and Hokkaido specialists should be behind the production, processing and sales of marine bioresources on the world market.

Potential reserves of bioinert and inert resources, which are hidden in the interior of the land and seas «SK-biosphere», require new geological assessment

and further exploration. Oil, gas and coal produced in the territory of Sakhalin region for export contracts are «cream», which state monopolies and individual entrepreneurs «pump» from the subsoil «SK-biosphere». There is no comprehensive program of extraction and use of bioinert and inert resources of «CK-biosphere».

To solve the problem of effective complex use of bioinert and inert resources of the subsoil «SK-biosphere» requires serious long-term activity of the working group of scientists and specialists of Norway, Hokkaido, Far East of Russia.

If a deeply believing Orthodox Christian asks us: «What is missing for successful development of «SK-ethnosphere»? ». We will answer without thinking: «Reason and Freedom». «Reason» is necessary for the ruling class; and «Freedom» is necessary for the class of entrepreneurs.

As for the methodical scheme, which we use to calculate potential of «SK-biosphere» and possibilities of its use, we do not say: that it is the only and correct; that it can be used to solve similar task. We do not «build» such illusions. But the «implemented» methodical scheme led us to the solution of the formulated task. Let the reader and the critic speak about the results of the task decision.

The core of our methodological scheme is the «Global Census of Biomass of Living Taxon of the Earth Biosphere», the work of Yinon M. Bar-On, Rob Phillips, and Ron Milo (2018) [2, 3].

We are grateful to the authors: Yinon M. Bar-On, Rob Phillips, and Ron Milo, and their assistants for the enormous work and the publication done.

Results of analytical calculations

Table 8 presents the results of calculations for three taxon and their main components (subgroups), the purpose of which was to estimate the biomass of taxonomic groups (and their subgroups) of the «SK-biosphere». At the same time, we proceeded from the known global (i.e., calculated on the scale of the Earth) indicators of biomass, presented for convenience in Gt of carbon units (column 3 of the table), the area of the living environment of the corresponding taxon on the globe (column 4 of the table) and the area living environment occupied by this taxon in the «SK-biosphere» (column 6 of the table).

The value obtained in carbon units (column 7 of the table) is converted into wet biomass by performing elementary mathematical transformations of the algorithm from [3, p. 34, 38, 97]: the conversion factor of carbon mass C into dry biomass is 2. The proportion of dry matter in living (or wet) biomass, for most taxon, is 30%.

Note that the absolute error between the values obtained as the sum in the lines «Total» and «Total» does not exceed 0.001%. The presence of an error is explained by the rounding of the results when calculating the rows and columns of the table.

Table 9

Calculation of the biomass of taxonomic subgroups of the «SK-biosphere» according to the average terrestrial estimates

| | Earth | | | | | «SK-biosphere» | | | Note: habitat parameters |
|--|------------|---|---|---|---|------------------|-----------|------------------|--------------------------|
| | Taxon name | Global biomass indicator, 10 ⁹ t C | Living environment area thousand sq. km | The relative indicator of biomass, t C / thous. sq km | Living environment area thousand sq. km | Local indicators | | Wet biomass in t | |
| | | | | | | Biomass in t C | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | |
| 1. Taxon of land and sea. (The share of the area of the living environment «SK-biosphere» in the area of the living environment of the Earth is 0.037%) | | | | | | | | | |
| 1.1 | Bacteria | 70* | 510 000.0** | 137255 | 190.6 | 26 160803 | 174403609 | | |
| 1.2 | Fungi | 12* | 510 000.0** | 23529 | 190.6 | 4 484627 | 29897214 | | |
| 1.3 | Archaea | 7* | 510 000.0** | 13725 | 190.6 | 2 615985 | 17439726 | | |
| 1.4 | Protists | 4* | 510 000.0** | 7843 | 190.6 | 1494875 | 9965734 | | |
| 1.5 | Viruses | 0.2* | 510 000.0** | 392 | 190.6 | 74715 | 498095 | | |
| 1.6 | Animals | 0.2* | 510 000.0** | 392 | 190.6 | 74715 | 498095 | | |
| 1.7 | Nematodes | 0.02* | 510 000.0** | 39.2 | 190.6 | 7472 | 49813 | | |
| 1.8 | Total | 93.42 | | | | 34913192 | 232752286 | | |

| 2. Land taxon (The share of the land area «SK-biosphere» in the land area of the Earth is 0.058%) | | | | | | | | | |
|--|---|---------|-----------|---------|-------|-----------|------------|--|--|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | |
| 2.1 | Plants (terrestrial and underground biomass) Including: | 450* | 149000** | 3020134 | 87.1 | 263053671 | 1753673603 | Living space 100% sushi | |
| 2.1.1. | Forests, wooded lands, natural grasslands (aboveground biomass) | 320* | 51000** | 6274510 | 29.6 | 185725490 | 1238157552 | Living space 34% sushi. The biomass of the taxon is accounted for in section 2.1. | |
| 2.1.2. | Vegetable products in arable land | 10* | 11000** | 909091 | 6.4 | 5818182 | 38787492 | Living space 7.4% sushi. Taxon - takes into account the weight of the product produced | |
| 2.2 | Arthropods, terrestrial | 0.2* | 149000** | 1342 | 87.1 | 116888 | 779246 | Living space 100% sushi. | |
| 2.3 | Chordates, wild birds | 0.002* | 149000** | 13.42 | 87.1 | 1169 | 7794 | Living space 100% sushi. | |
| 2.4 | Chord wild mammals terrestrial | 0.003* | 51000** | 58.82 | 29.6 | 1741 | 11607 | Living space 34% sushi. | |
| 2.5 | Chordates. Poultry | 0.1* | 11000** | 9091 | 6.4 | 58182 | 387876 | Living space 7.4% sushi. | |
| 2.6 | Chordates. people | 0.06* | 149000** | 403 | 87.1 | 35074 | 233824 | Living space 100% sushi. | |
| 2.7 | Chordates, domestic animals, in artificial pastures | 0.1* | 40000** | 2500 | 23.5 | 58750 | 391662 | Living space 27% sushi. | |
| 2.8 | Итого Total | 450.465 | | | | 263325475 | 1755485612 | | |
| 3. Taxon of the sea*** (The share of the area of the coastal sea of the «SK-biosphere» in the area of the sea of the Earth is 0.029%) | | | | | | | | | |
| 3.1 | Animals (mostly marine) | 0.02* | 361 000** | 55.40 | 103.5 | 5734 | 38226 | | |
| 3.2 | Arthropods, marine | 1* | 361 000** | 2770 | 103.5 | 286704 | 1911341 | | |
| 3.3 | Chordates, fish | 0.7* | 361 000** | 1939 | 103.5 | 200693 | 1337940 | | |
| 3.4 | Chordates, mammals | 0.004* | 361 000** | 11.08 | 103.5 | 1147 | 7646 | | |
| 3.5 | Molluscs | 0.2* | 361 000** | 554016 | 103.5 | 57341 | 382270 | | |
| 3.6 | Cnidarians | 0.1* | 361 000** | 277 | 103.5 | 28670 | 191131 | | |
| 3.7 | Total | 2.024 | | | | 580290 | 3868560 | | |
| 4.0 | Only | 545.91 | | | | 298818957 | 1992106458 | | |

Note, symbols (*) and (**) in the table indicate sources of information and features:

(*) – indicators from the study «Distribution of biomass on Earth» [3, p. 6507 – 6508].

(**) – Earth. From Wikipedia, the free encyclopedia. Edited on 17 November 2022. <https://en.wikipedia.org/wiki/Earth> [9].

(***) – rationale for the «Taxon of the Sea» indicators from the authors: «In our study, we focus on estimating biomass in marine, terrestrial or deep subsoil. Biomass is also present in inland waters such as lakes or rivers, but its contribution to the global biomass of each taxon is insignificant due to the small area that covers inland waters» [2, p.61].

The calculations in table 10 are similar to those used in table 9, but the biomass values of the «taxon» «SK-biosphere» have now been used as the basis obtained in Table 9. The result of calculations in Table 10 are quantitative values of biomass of taxonomic subgroups «S-biosphere» and «K-biosphere».

Table 10

Calculation of the biomass of the taxonomic subgroups «S-biosphere» and «K-biosphere» according to the average estimates of the «SK-biosphere»

| Taxon name | «SK-biosphere» | | | | «S-biosphere» | | | | «K-biosphere» | | | | Note: habitat parameters |
|---------------------------|---|------------------|----------------|---|----------------|------------------|---|----------------|------------------|---|----------------|------------------|--------------------------|
| | Living environment area thousand sq. km | Local indicators | | Living environment area thousand sq. km | Biomass in t C | Wet biomass in t | Living environment area thousand sq. km | Biomass in t C | Wet biomass in t | Living environment area thousand sq. km | Biomass in t C | Wet biomass in t | |
| | | t Wet biomass in | Biomass in t C | | | | | | | | | | |
| 1 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | | | |
| 1. Taxon of land and sea. | | | | | | | | | | | | | |
| 1.1 | 190.6 | 174403609 | 26160803 | 124.5 | 17088248 | 113920511 | 66.1 | 9072555 | 60483095 | | | | |
| 1.2 | 190.6 | 29897214 | 4484627 | 124.5 | 2929360 | 19528871 | 66.1 | 1555264 | 10368323 | | | | |
| 1.3 | 190.6 | 17439726 | 2615985 | 124.5 | 1708763 | 11391640 | 66.1 | 907221 | 6048080 | | | | |
| 1.4 | 190.6 | 9965734 | 1494875 | 124.5 | 976453 | 6509622 | 66.1 | 518421 | 3456105 | | | | |
| 1.5 | 190.6 | 498095 | 74715 | 124.5 | 48804 | 325357 | 66.1 | 25911 | 172738 | | | | |
| 1.6 | 190.6 | 498095 | 74715 | 124.5 | 48804 | 325357 | 66.1 | 25911 | 172738 | | | | |
| 1.7 | 190.6 | 49813 | 7472 | 124.5 | 4881 | 32540 | 66.1 | 2591 | 17273 | | | | |
| Total | | 232752286 | 34913192 | 124.5 | 22805313 | 152033900 | 66.1 | 12107874 | 80718352 | | | | |

| 2. Land taxon | | | | | | | | | | | |
|---------------------|---|-------|------------|-----------|------|-----------|------------|------|----------|-----------|--|
| 2.1 | Plants (terrestrial and underground biomass) Including: | 87.1 | 1753673603 | 263053671 | 76.6 | 231342264 | 1542266337 | 10.5 | 31711407 | 211407266 | Living space 100% sushi |
| 2.1.1 | Forests, wooded lands, natural grasslands (aboveground biomass) | 29.6 | 1238157552 | 185725490 | 26.0 | 163137255 | 1087570824 | 3.6 | 22588235 | 150586727 | Living space 34% sushi. The biomass of the taxon is accounted for in section 2.1. |
| 2.1.2 | Vegetable products in arable land | 6.4 | 38787492 | 5818182 | 5.6 | 5090909 | 33939054 | 0.8 | 727273 | 484844 | Living space 7.4% sushi. Taxon - takes into account the weight of the product produced |
| 2.2 | Arthropods, terrestrial | 87.1 | 779246 | 116888 | 76.6 | 102797 | 685306 | 10.5 | 14091 | 93939 | Living space 100% sushi. |
| 2.3 | Chordates, wild birds | 87.1 | 7794 | 1169 | 76.6 | 1028 | 6853 | 10.5 | 141 | 940 | Living space 100% sushi. |
| 2.4 | Chord wild mammals terrestrial | 29.6 | 11607 | 1741 | 26.0 | 1530 | 10200 | 3.6 | 212 | 1413 | Living space 34% sushi. |
| 2.5 | Chordates. Poultry | 6.4 | 387876 | 58182 | 5.6 | 50910 | 339397 | 0.8 | 7 273 | 48486 | Living space 7.4% sushi. |
| 2.6 | Chordates. people | 87.1 | 233824 | 35074 | 76.6 | 30846 | 205638 | 10.5 | 4228 | 2886 | Living space. 100% sushi. |
| 2.7 | Chordates, domestic animals, in artificial pastures | 23.5 | 391662 | 58750 | 20.8 | 52000 | 346663 | 2.8 | 7000 | 46666 | Living space 27% sushi. |
| | Total | | 1755485612 | 263325475 | | 231581375 | 1543860395 | | 31744352 | 211626896 | |
| 3. Taxon of the sea | | | | | | | | | | | |
| 3.1 | Animals (mostly marine) | 103.5 | 38226 | 5734 | 47.9 | 2654 | 17691 | 55.6 | 3080 | 20 535 | |
| 3.2 | Arthropods, marine | 103.5 | 1911341 | 286704 | 47.9 | 132687 | 884568 | 55.6 | 154017 | 1 026773 | |
| 3.3 | Chordates, fish | 103.5 | 1337940 | 200693 | 47.9 | 92880 | 619199 | 55.6 | 107813 | 718741 | |
| 3.4 | Chordates, mammals | 103.5 | 7646 | 1147 | 47.9 | 531 | 3539 | 55.6 | 616 | 4107 | |
| 3.5 | Molluscs | 103.5 | 382270 | 57341 | 47.9 | 26537 | 176915 | 55.6 | 30804 | 205355 | |
| 3.6 | Cnidarians | 103.5 | 191131 | 28670 | 47.9 | 13268 | 88455 | 55.6 | 15402 | 102676 | |
| | Total | | 3868557 | 580290 | | 268558 | 1790370 | | 311732 | 2078187 | |
| | Only | | 1992106455 | 298818957 | | 254655246 | 1697684665 | | 44163958 | 294423435 | |

Note: the absolute error between the values obtained as the sum in the lines Total does not exceed 0.001 percent. The presence of an error is explained by the rounding of the results when calculating the rows and columns of the table.

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