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MAPPING SOUTH COASTAL VEGETATION DEGRADATION USING GIS TECHNOLOGIES GETTING, METHODS.

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Antation. *The current environmental crisis on the island, the degradation of vegetation on the island is one of the most pressing issues facing us. For this, first of all, it is necessary to study, analyze and map them.*

Anatatsiya*. Hozirgi paytda Orol bo'yida yuzaga kelgan ekologik inqiroz, Orol bo'yi o'simliklari degradatsiyasini ya'ni avvalgi xolicha keltirish oldimizda turgan eng muxum masalalardan biridir. Buning uchun avvalo ularni o'rganish, tahlil qilish va kartasini tuzish lozim.*

Keywords*. GIS technologies, degradation, rural land, desertification, aerospace photo.*

Relevance of the topic. The main goal of my research work is dedicated to the creation of maps of the degradation of the South Aral Bay vegetation on the basis of GIS technologies.

- Study of the current state of the ecology and vegetation of the South Aral Bay;
- Assessment of the emergence and formation of environmental problems on the island;
- Illumination of coastal vegetation and their damage degradation (1980-2015);

Studying the cartographic support of the methods of studying the degradation of coastal vegetation;

- Methods of creating plant maps to clarify the role and importance of aerospace materials;
- Studying the importance of GIS technologies in mapping vegetation degradation;

The level of research of the problem. Issues of research and mapping of wetlands are found in the work of a number of landscape scientists, soil scientists, cartographers, geomorphologists, ecologists, experts in remote sensing of the earth and other researchers. Among foreign scientists, T. Downing, H. Dowlatabadi, R. Fernandez, J. Herrick, E. Huber-Sannwald, H.

Jiang, R. Leemans, T. Lynam, F. Maestre, M. Ayarza, B. Walker and others engaged. CIS scientists V.S. Zaletayev, A.G. Babayev, N.F. Glazovsky, L.Y. Kurochkina, A.N. Zolotokrilin and others made important contributions to the study of destabilized and desertifying ecosystems. Y.F. Knijnikov, I.K. Lurie, V.S. Stolbova, in particular, for the Archipelago regions, Ye.A. Vostokova, V.I. Kravsova, G.S. Kust, A.V. Ptichnikov and others dealt with the issues of ecosystem mapping.

Many geographers and ecologists of our republic have studied the processes of transformation of the Aral Bay geosystems. Scientific works of A.A.Rafikov, A.Bakhiyev, T.Mirzaliyev, B.Jollibekov, N.I.Sabitova, A.K.Urazboyev, SH.S.Zokirov, E.Y.Safarov, V.A.Rafikov, R.P.Reimov and others are dedicated to this direction.

Although fundamental results have been obtained within the framework of extensive research programs, the newly formed ecosystems of the dry bottom of the Aral Sea and the desertifying Amudarya delta have not been sufficiently studied with the help of modern GAT programs.

Object and subject of research. The object of the research work is the region along the Southern Island. Based on GIS technologies, the research subject of creating maps of the state of degradation of vegetation of the Southern Isles was taken up.

Due to the high level of degradation of plants in the Arolboyi region, it is necessary to scientifically solve these problems in this region and to develop measures for the development and improvement of the flora of the region in the future.

The scientific novelty of these studies on the formation of plants in the Southern Arolbay region, the rational use of flora resources, the intensification of the process of plant degradation, the geographic basis of plant zoning and the optimization of plant-limited areas are as follows:

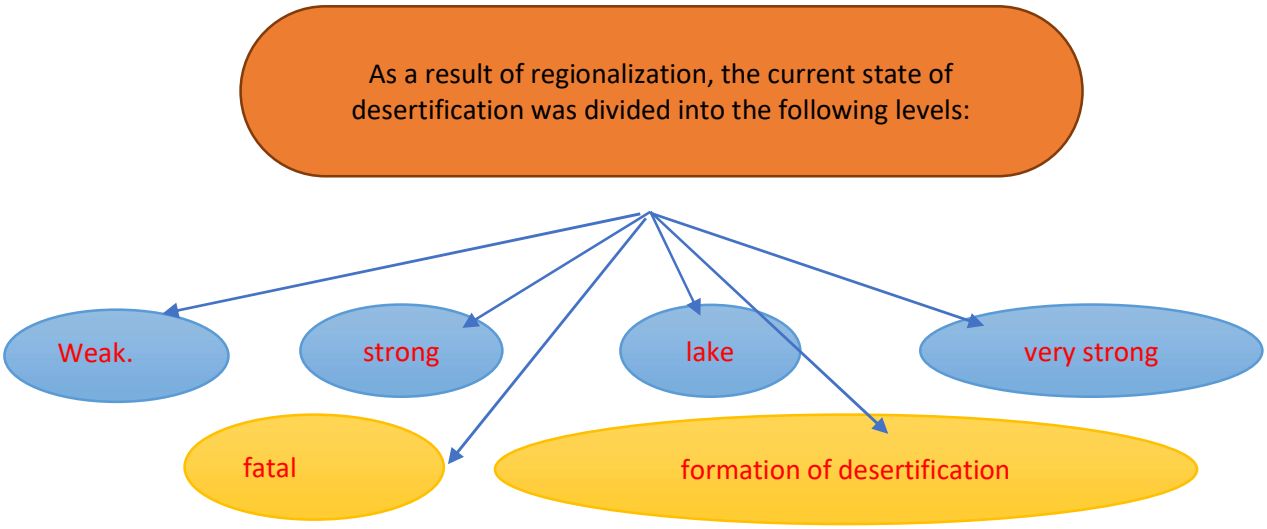
- The degradation of plants in the South Arolbay area was analyzed and zoning works were carried out on them;
- the geographical bases of the optimization of plant complexes were developed and practical recommendations were given.

Currently, more than 60% of the irrigated land in the Aral Sea basin is saline. At the same time, the salinity of irrigated agricultural lands is 21.7% higher than the average indicator for Uzbekistan in the Republic of Karakalpakstan and 23.9% higher than the Khorezm region.

Environmental and socio-economic consequences occurring on the island can be cited as an example. In fact, if the Aral Sea and the Aral Bay area are considered as two interconnected ecosystems of a certain scale, the interaction and influence between man and nature is fully macroecological. it is appropriate to consider it as a problem. Because this region has an incomparable change of nature, a sharp violation of the ecological balance, the unfavorable living conditions of people, the impoverishment of natural resources and other negative features confirm that an ecological problem has been formed and is now undergoing the stages of formation.

On the basis of carrying out the cartographic support of the methods of studying the degradation of the coastal vegetation, the cartographic support of the map "The current state of the desertification of the Southern Aral Sea" and on the basis of a number of data, from the content of the card to the preparation for the publication step by step was carried out. This map was created

on the basis of MapInfo Professional 12.0 of GAT (geographical information systems) and Adobe Photoshop CS5 Ark Gis programs. The main work was carried out in the Ark Gis 10.2 program. At the initial stage of the work, the aerial photo of the South Orelboi was uploaded to the Ark Gis 10.2 program, the known coordinates of the place were entered, and the geographical and mathematical basis of the map was created. At the next stage, decoding works were carried out based on the hydrographic elements of the geographical basis. During the decoding stage, the events and incidents of the South Arolbay region with the same content and amount were defined in open and closed contours.



Methods of creating maps of plants with the help of aerospace materials were carried out in another main stage of the Arg Gis 10.2 program. This process consists of choosing a color for cartographically separated regions, creating a map legend, choosing a map frame, placing its name and scale.

The "Current state of desertification of the South Aral Bay" map was created based on the decoding of space photographs of this scale, and the results of field research were also used. Each contour is represented by individual desertification classes that are whole. Where two classes are indicated on one outline, each column and class is shown in a color corresponding to each other. Such complex contours of wetlands are related to geo and ecosystem features.

As a result of anthropogenic influence, the drying up of the Aral Sea has fundamentally changed the geo-ecological conditions of the Aral Bay area, turning it into an ecological crisis zone. Over the next 40-45 years, the Aral Sea dried up from year to year and divided into two parts, i.e. the big and small seas (Table 1). In 2007, the sea level dropped by 29 meters, the area of the Aral Sea basin increased by 6 times, the volume of water decreased from 1064 km to 80 km, the salinity of water reached 110-112 g/l in the western part and 280 g/l in the eastern part.

Orolkum desert was formed in the dry part of the sea, and its area now exceeds 4.5 million hectares. Every year, from 75 million to 100 million tons of all kinds of dust and salts rise into the atmosphere from the dry bottom of the Aral Sea. As a result of the increase in ammonia and hydrogen peroxide concentrations in the atmosphere from the territory of the Vozrohdeniye

Peninsula, the oxidation and spread of organic compounds in the Arolboi region is very dangerous. Due to this, the number of species of flora and fauna is decreasing, the ecological and sanitary condition of the South Aral Bay is deteriorating, the process of desertification is accelerating, the failure of cultivated fields and various infectious diseases are increasing. In the lower and middle streams of the Amudarya and Syrdarya, due to the discharge of highly mineralized collector drainage water, the river water is strongly mineralized, and the sanitary condition is deteriorating. As a result of the lack of water resources in the region, many lakes in the Amudarya delta, along with the Aral Sea, are drying up. As a result, desertification has begun in the dry part of the sea and in the Amudarya delta. The hydromorphic and semi-hydromorphic soils here have changed their automorphic state. As a result of the change of soil cover, the previous hydromorphic and semi-hydromorphic plants were replaced by xeromorphic and halomorphic plants. The composition of the soil changes from sulfate and chloride-sulfate type of salinity to sulfate-chloride and chloride. The distribution of salts in marshy soils is from 0.23-0.45% to 0.23-0.53% in grassy soils from 0.57-0 It was found to be up to 82%. This process creates conditions for secondary salinization in hydromorphic soils. The presence of various pesticides in the dust rising into the air from the dry part of the sea poses a great danger.

The total cultivated land in the Republic of Karakalpakstan is made up of saline soils, of which 26.2% are slightly saline, 37.4% are moderately saline, 35.2% are strongly saline, and 35.2% are very saline. lands equal to 12%. The credit quality indicators of soils are on average 41 points, and the credit score continues to decrease even now.

According to the Ministry of Health of the Republic of Uzbekistan, in the Republic of Karakalpakstan, tuberculosis, goiter, anemia, cancer and diseases of the nervous system are spreading more and more in recent years. In order to prevent diseases, first of all, it is necessary to improve the economic and social condition of the population of the republic. Initially, it is very important to provide the population of the Republic with clean drinking water.

The reason is that currently 55.9% of drinking water in the region does not meet sanitary chemical requirements, 16.2% does not meet microbiological requirements. Water mineralization increased by 0.8-1.6 g/l in the watershed of Amudarya, and by 1.5-2.0 g/l in Syrdarya. As a result of the lack of water resources and a decrease in their quality, the vegetation and soil cover has been degraded, and the fauna and flora of the area have undergone a radical change. In the next 12 years, more than 200,000 hectares of desert-growing saxabule and other various plants are planted in the dry part of the Aral Sea (on average, 20,000 ha every year) (12).

It is necessary to study the ecological situation and the existing ecological situation in the Republic of Karakalpakstan, to develop measures to prevent it. It is appropriate to use aerospace materials to study the environmental situation and develop measures to prevent it.

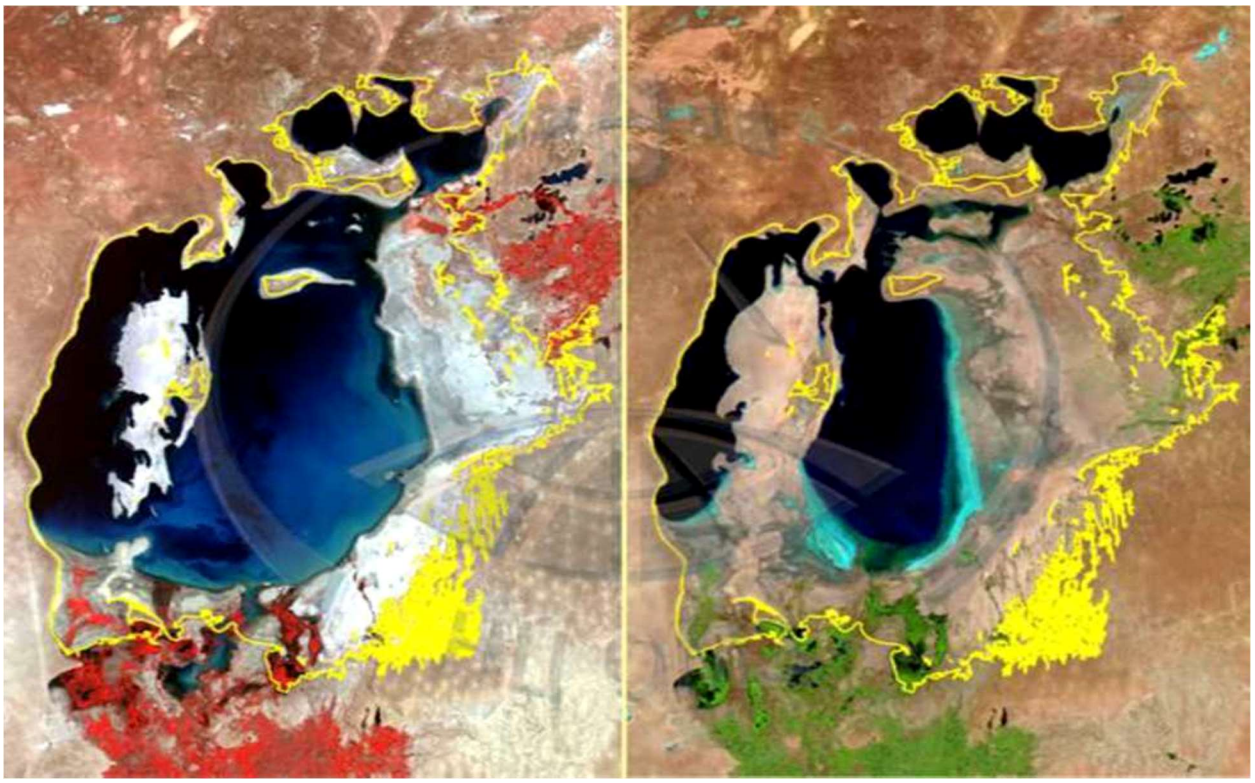


Figure 1. Changes of the Aral Sea in 1994 and 2004.

In recent years, aerial photographs have been used for a number of purposes, including ecological, environmental pollution, studying the state of natural resources and nature protection, and planning preventive measures. From this point of view, the information obtained from aerial photographs is of great importance, which, in turn, provides the opportunity to obtain useful and necessary information about the area of the change of the Aral Sea in 1994 and 2004. will give.

Decoding of aerial images The structure of the object view in the image is very important. The structure and signs of the appearance of some objects, their shade, type, size, size, geometric structure, that is, in general, the general appearance of the above indicators.

In geoecological studies, the shadows of objects are also taken into account when deciphering aerial photographs. The reason is that the appearance of objects in aerial photographs is very variable.

This variability can sometimes be determined by the type of plants, their composition and structure, and sometimes even by the phenological state of the most common plants. That's why a 7-point scale is used to rate an aerospace photo based on its appearance and color.

In the process of decoding pictures, symbols can be compared and distinguished from each other.

Color separation of objects in aerial photographs.

Table 1

Points to show color levels	**Names of colors**	**The separation principle**	**Upper and lower limits of optical density**
1	Very clear color	The color in the photo cannot be distinguished by the eye and it is not eye-catching	
2	Very light gray	To the extent that you can see the colors in the picture with your eyes	
3	Light gray	The minimum density of the color appearance of the object in the photo	
4	Gray	The average density of the image of the object in the image	
5	Dark gray	The minimum density of the image of the object in the image	
6	Black, gray	The maximum density and excessive color of the object in the photo	
7	Black color	The color of the object in the photo cannot be distinguished by the eye.	

Currently, Geographical Information Systems (GIS) are used to study, analyze and create maps from aerial photographs. When creating a geoecological map of the Republic of Karakalpakstan, it is first of all necessary to widely use aerial photographs of the territory. Data obtained from aerial photographs is one of the most important factors of the Geographical Information System. Spatial data can be collected by a GIS operator in tabular or photographic form. This collected spatial data is analyzed in combination with other collected statistical, cartographic, field expeditionary, geodetic data and entered into the database for the Geographical Information System.

When creating geoecological maps, first of all, it is necessary to get acquainted with the natural conditions and landscapes of the area by taking an aerial photo of the area.

We can analyze the changes taking place in the area and compare them with each other based on the photo taken from space. The quality of the results of the geographic information system directly depends on the knowledge of the specialist.

At the same time, the speed and quality of the results of the analysis of aerospace data and Geographic Information System will depend on what methods are used.

In the geographic information system, the process of gathering information or information continues from the collection of information to the bringing of this information to a certain system of tables. That is, the collected data must meet certain requirements. Then the process of integration goes, that is, work on secondary data, their analysis, and their manipulation. How this process is

implemented affects the quality of tertiary data. Third-level data is the process of implementation, that is, the use of third-level databases for specific purposes.

Arcview 9.2 from the Geographical Information System programs is designed for working with aerospace data when creating a geo-ecological map of Karakalpakstan, which includes tools for working with aerial photos. Arcview 9.2 software can convert aerial images from raster to vector.

With the help of this program, it is possible to connect to the coordinate system over the aerial photo. In this case, points from each angle of rotation of the photo are taken and connected to the WGS 1984 coordinate system. Here we know that the projection is selected given that a particular object is selected.

It is appropriate to choose the Gauss-Kruger projection for the Republic of Karakalpakstan. In the next process, a database is created based on the collected aerospace, statistical, cartographic, geodetic and other data, and using the created database, the card is equipped according to what purpose it will be used.

Mainly for the geoecological map of the Republic of Karakalpakstan, landscape types, contours, consequences and levels of anthropogenic impact on landscapes, types of natural and anthropogenic processes, flora, fauna, categories of industrial waste polluting atmospheric air, underground and ground it will be necessary to create a database such as surface water pollution levels and the current state of the Aral Sea, water and salt balances, dynamics of changes in the Aral Sea since 1961.

Based on the created database, the card program and legend will be developed. Then the map is designed in the Geographical Information System and its author's original is drawn. At the end of the work, a command is sent to a special device to print the ready card.

In the future, the study of the ecological situation of the Republic of Karakalpakstan, the development of measures to prevent it, the design and compilation of maps for nature protection, ecological, geoecological and other purposes, and the improvement of the socio-economic infrastructure of the territory are suitable for the use of aerospace data. we think that

The basis for deciphering the signs of desertification on the island is the layers of the earth's surface, relief forms, and vegetation cover. The level of water supply to the ecosystem, which is separated by the color of the photo image, is the easiest indicator. On the basis of photo-physiological analysis of landscape complexes, it is possible to determine the dynamics of natural processes and events through its different clarity spectrum. The decoding of desertification based on spatial information shows that the morphological adaptation of landscape fragments in certain areas is determined through the composition of the image.

Usually, three or four clearly separated colors are distinguished in Orolbayi komosurats: these are very light colors, while they are flat and distributed in areas in different areas, belonging to ordinary sorghums (soft and crusty). . Lighter colors usually belong to bare deserts

In connection with the acceleration of the development of desertification processes in the archipelago, the compilation of a number of thematic geographical maps is becoming important. It reflects the current state of desertification, the factors of its occurrence, the risk of development

and measures to combat desertification, etc. The use of maps is a reasonable and effective way of obtaining high-quality and abundant information about the occurrence of one or another process in the area.

Desertification is a complex, multifactorial natural-geographical process, its state, growth and danger are expressed on the basis of natural-anthropogenic factors. Desertification develops with the participation of many factors and complexes within the framework of the natural border area and its complex. The research is mainly based on a systematic, ecological and landscape approach.

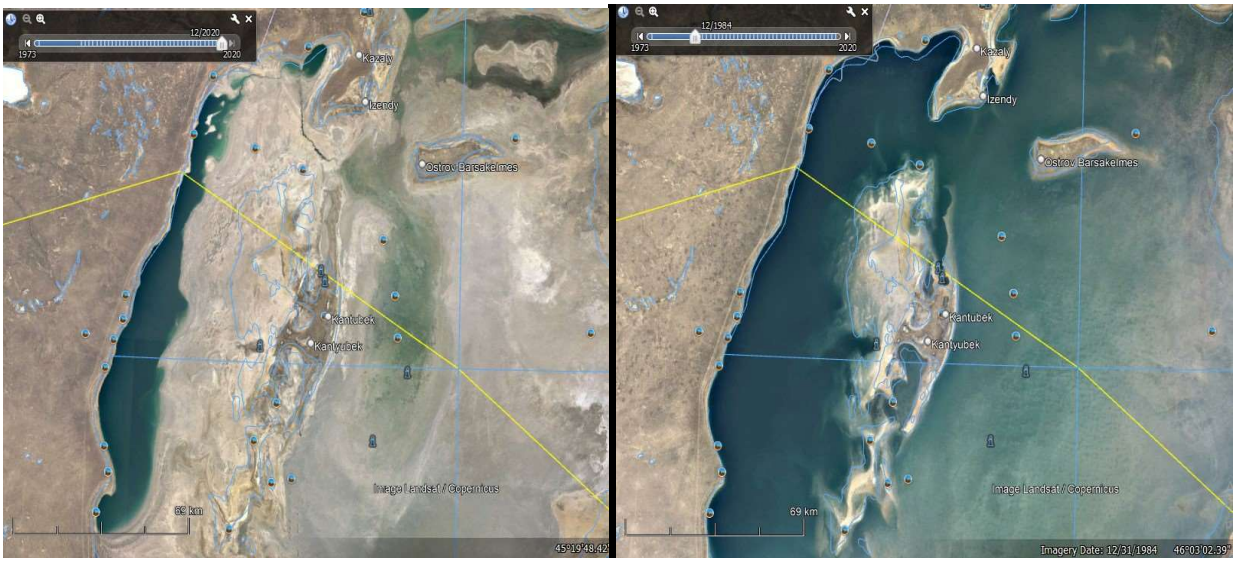
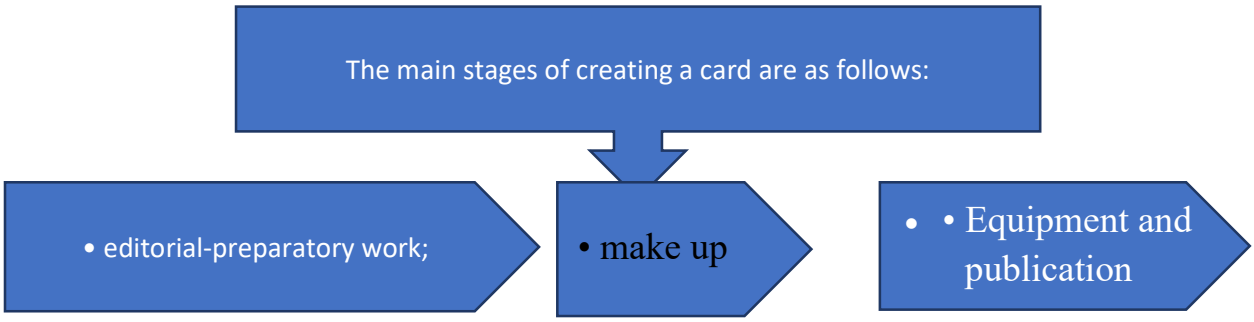


Figure 2.Methods of depicting the processes of desertification on the island coast.

From the above, it is known that GIS stores information about the real world in the form of a set of thematic layers, performed in geographic layers of one or another object.

Nowadays, GIS technology is widely used in scientific research in many developed countries of the world. It is time to study and map the degradation of vegetation along the Southern Island with the help of modern GIS technologies. The scope of work also covers these aspects. (15)

The work on making cards consists of many processes that differ in content, method of execution, and use of equipment. Specialists of different qualifications agree together when performing different processes.



The card's technical editor, engineer-cartographer-publisher manages the work in the process of preparing the cards for publication and their publication. Based on the cartographic support of the card we created and a number of data, it was carried out step by step from the content of the card to the preparation for publication. The creation of the card technology was created on the basis of Mapinfo, ArGis and Photoshop programs of GAT (geographical information systems).

In the ArgGis 10.2 program, another main stage was card composition (equipment) work. This process consists of choosing a color for cartographically separated regions, creating a map legend, choosing a map frame, placing its name and scale.

The desertification classes are shown in the corresponding colors on the map. All paddy fields are described as non-desertification areas because they are not affected by environmental degradation.

Each contour is represented by a separate desertification class that is complete. If two classes are indicated on the same outline (for example: 50:50 or 40:50 percent of the area), each column, class is shown in a color corresponding to each other. Such complex contours of wetlands are related to geo and ecosystem features.

The types of desertification in the current state of the Southern Aralboi desertification are as follows (2):

1. Plant degradation.
2. Deflation.
3. Water erosion.
4. Soil salinity.
5. Changes in groundwater level.
6. Man-made desertification.
7. Deterioration of soil condition.

Causes of desertification:

- man-made erosion, dust generated by automobile traffic;
- due to the wind, the soil moisture decreases and the process of vegetation thinning;
- salt and substrates spreading as a result of the drying of the top layer of soil and saline soils;
- accumulation of salt in the root system of plants as a result of evaporation of ground water;
- accumulation of salt in the soil as a result of drying up of lakes and swamps;
- Deterioration of the condition of shrubs and trees as a result of the stoppage of water supply;
- Deterioration of the condition of meadows and pastures as a result of the stoppage of water supply;
- expansion of the holophyte area as a result of the increase in soil salinity;
- cutting of bushes and trees;
- the low efficiency of the available useful work coefficient and the proximity of the ground water level to the surface of the earth;

- Deterioration of the condition of lakes and reservoirs as a result of sewage flow;
- drying up and salinization of water bodies as a result of falling water level;
- dust and salts rising from water bodies as a result of drying up;
- erosion of cliffs and washing of plains.

Based on the above indicators, the causes of desertification in these regions are quite complex, and the complexity of the spaces of eco-geosystems is the reason for the large number of contours. Various causes of human economic activity also affect the type of desertification. Three types of desertification are shown in the dry part of the Aral Sea:

1. Salt and substrates spread as a result of the drying of the top layer of soil and saline soils.
2. As a result of the lowering of the level of water bodies, their drying up and salinization.
3. Dust and salts rising from water bodies as a result of drying up. The remaining reasons relate to the formation of the Amudarya delta (3).

Since each contour is developed for more than one reason, each reason is also marked with separate letters ("a", "b", etc.). Thus, each ecosystem is labeled with a class (color), species (Roman letter), and cause of desertification (letter).

In the process of creating the geographic basis of maps based on aerospace methods and using GIS programs, desertification is a complex natural-geographical process that includes many factors, and its condition, growth and danger are expressed on the basis of natural-anthropogenic factors. Desertification develops with the participation of many factors and complexes within the framework of the natural border area and its complex. The research is mainly based on a systematic, ecological and landscape approach.

We consider this anthropogenic desertification based on large-scale mapping using a landscape approach

Figure 3. Aerial photo of the Aral Sea in 2020.

The landscape approach is the most effective method, each of its contours provides accurate information about the state of natural conditions in the area. These data are important in justifying the process of deterioration of the natural environment of the area. Based on the landscape approach, it will be possible to predict the area that is at risk of desertification to one degree or another, and it will be shown what type of desertification will occur. Therefore, on the basis of this information, it is possible to prevent the development of desertification.

A landscape map at an appropriate scale can be used as a basis for a desertification map. Such a card provides information about the economic use of the ecosystem and the natural environment. This is important in determining the components that lead to desertification in one or another contour.

The decoding of desertification based on spatial information shows that the morphological adaptation of landscape fragments in certain areas is determined through the composition of the image.

The consequences of desertification in the Southern Aral Bay region are intensifying due to the growing tension of the relationship between nature and man, the arid climate, the unstable ecological balance, and in some places it is disturbed. At the same time, since this area is around the Aral Sea, the negative consequences of its drying up are having an effect. Today, a lot of attention is focused on the solution of these problems, because without a positive solution to these problems, it is impossible to preserve biological diversity in the territory, prevent the disappearance of unique species of flora and fauna, increase the productivity of ecosystems, and optimize the productivity of irrigated lands. it is no longer possible to bring it up to standards, to drastically reduce and prevent desertification processes.

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Currently, the problem of desertification in the South Aral Bay region is considered one of the important issues that are waiting to be studied and solved. Therefore, it is necessary to deeply analyze the desert and desertification situation of the South Aral Bay region, to study its sustainable development in general and specific problems of desertification in an integral relationship, and in this way to solve them. drawing up maps of the desertification of this area is of urgent importance in the development of necessary scientific and practical proposals and measures (16).

Like all maps, the work on the creation of the "Current State of the Southern Oroboi Desert" map consists of many processes that differ in content, method of execution, and equipment. The process of creating a map in GIS technology is carried out in the following order:

1. Preparatory work. Collection of primary materials from image processing tools, digital research data, copyright originals, existing stock cards, etc. Scanning cartographic and stock materials, scaling raster images, and then storing them in computer memory.
2. Compilation of thematic layers of the created card and tables related to them, their analysis and creation of a database.
3. Table with object classification (attributes) and entering text data into the EHM memory.
4. Development of a conditional sign system.
5. Placing thematic layers of the map, creating a cartographic image and editing them.
6. Development of the composition of the card and its preparation for publication.
7. Card publication[1].

At each of these stages, various operations are carried out in a specific sequence. Usually, the work of creating cards begins with preparatory work according to the general method. After the preparatory stage, i.e., the necessary material and data are collected and entered into the computer memory, the database is created, and the work of the next stage is also carried out in the given sequence.

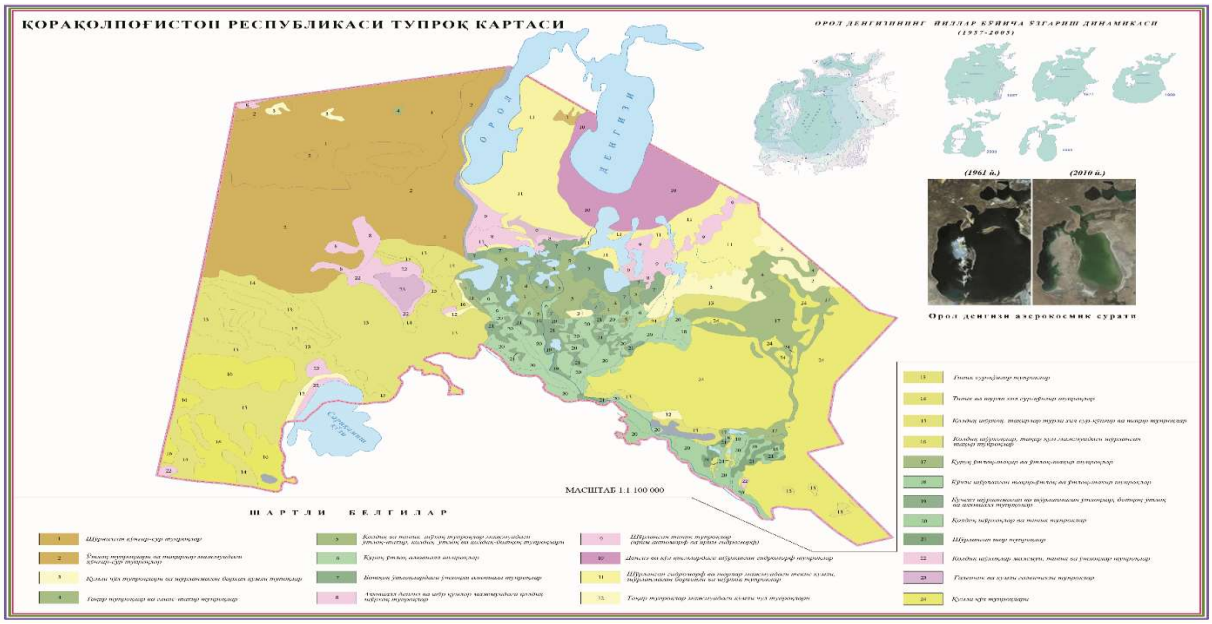

Figure 4. Map of soil composition and vegetation degradation of South Arolboi, Republic of Karakalpakstan.

The map "Current Status of Desertification of the South Aral Sea" shows the types of desertification in Roman numerals, with each contour showing one type or, rarely, two types. The two types of desertification are explained not only by geo-ecosystem complexity, but also by anthropogenic, i.e. human impact on natural reserves and natural complexes. On the other hand, the types of desertification are related to each other, and the appearance of one type affects the development of the other. Consequently, the accumulation of salts in depressions without water flow affects the degradation of plants, i.e. pre-existing phytocenoses, various herbaceous vegetation, one-year drought due to the increase of salts in the soil. 'r turns into yulgun, and then yulgun turns into a black leaf. That is why two types are preferred in the assessment of desertification, and on the basis of this, a method of operational mapping of the landscape of desert areas based on space monitoring was proposed and developed;

the concept of optimal polarization for arid regions and developed deltas of arid zones was developed, and based on it, measures of rational land use were developed to preserve biodiversity.

Summary.

In a word, optimization of desertification of the natural environment through the development of geoecological management technologies, strengthening of environmental safety in the current conditions, optimization of the rational use of nature, stabilization of ecological balance, reduction of emissions into the environment, study of desertification, it is advisable to create a map of this area and implement countermeasures on the basis of these maps.

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