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Estimation of the Influence of Height Parameters on Landscape Transformation in the Middle Zerafshan Landscape Based on Modern Methods

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Abstract: Special attention is paid to the issue of carrying out landscape-reclamation measures in the field of ecology and environmental protection in the world, stratification of landscapes and their structure by modern methods, including the study of territories using aerospace, remote sensing, geoinformation systems. It is necessary to conduct landscape research based on modern methods, analyze and evaluate their existing capabilities, identify current problems and develop ways to solve them on a scientific basis. Priority is given to the implementation of three-dimensional models of Regions, mathematical modeling of geographical phenomena, the introduction of mathematical statistics in the study of individual components, in turn, the study of complex dynamic processes occurring in landscape classes and their morphological units, their differentiation and transformation in connection with the peculiarities of regions. This article analyzes the topographic features of the area, the relationships between them, and the impact of these relationships on plant vegetation indices (NDVI).

Keywords: landscape, factors, 3D model, slope, aspect, algorithm, correlation, matrix, links, vegetation indices (NDVI).

Introduction

Due to the intensive use of landscapes in the world to provide humanity with natural resources, man-made degradation, desertification, land reclamation, soil erosion, degradation, deflation, desertification and other negative geo-ecological and natural geographical processes are increasing day by day. International organizations pay great attention to combating these problems.

In particular, the UN Sustainable Development Program until 2030 sets the tasks of "protection and restoration of terrestrial ecosystems, their rational use, rational forest management, combating desertification, stopping land degradation and preventing the loss of biodiversity." These tasks, especially the development of irrigated agriculture in arid climates, require a comprehensive landscape and reclamation activities based on data from the system-structural analysis of the area.

Resolution of the President of the Republic of Uzbekistan dated November 27, 2017 "On the State Program for the development of irrigation and reclamation of irrigated lands in 2018-2019", Decree of February 7, 2017 "On the Strategy for further development of the Republic of Uzbekistan" and December 28, 2018 In accordance with the requirements of the Address to the Oliy Majlis, this research work to a certain extent serves in the implementation of the tasks set out in other regulations related to the activity.

Methods of the study. In carrying out the study, techniques such as Field Research, Laboratory, benchmarking, cartographic, aerospace, mathematical, statistical analysis,

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imitation and systematic, cartography using Geoinformation systems were used.

Level of study of the problem. Natural geography studies of the Zarafshan Basin area Komplex S.P.Suchkov, N.I.Sabitova, A.Zire " Lost In Test MatchH. Abdurakhmonova, O.Sh.Ro performed by zhikulova and others. In the study of landscapes in modern methods, foreign scientists found that P.A.Burrough [1], G.Eichorn [2], C.Le So M.Jamagne [4], I. Katorgin and A.A.Kashin developed landscape design.

However, in the study of landscapes of the Middle Zarafshan basin to date, little attention has been paid to the application of modern methods, including geoinformation systems, aerospace methods, probability equations in mathematical modeling of natural processes. The main purpose of this work is to fill the above gaps.

The results of the study: a model and method of mapping the effect of erosion processes and hydrographic networks on changes in landscape types based on satellite images and digital model of relief; It is possible to analyze the dynamic changes in the landscape through multi-zone space images, to use vegetative indices as an indicator of landscape dynamics.

Main part

Determination of slope (Fig. 1) and exposure (Fig. 2) using slope and aspect algorithms representing relief based on 3Dmodel, correlation correlation matrices with changes in vegetation cover of landscapes, regression statistics and change of vegetation and soil cover with landscape components dynamics can be analyzed [3].

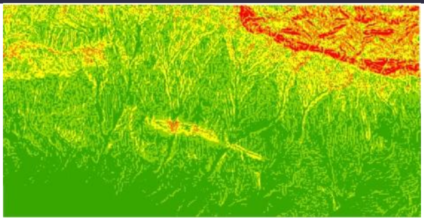

Figure 1. A slope card based on a 3D model

After the creation of these maps, the images taken in 3 periods were converted to NDVI values in the form of three-dimensional models and slope and aspect values. On this basis, the extent to which the calculated NDVIs of the base plot were related to slope, aspect, and height was calculated (Figure 3).

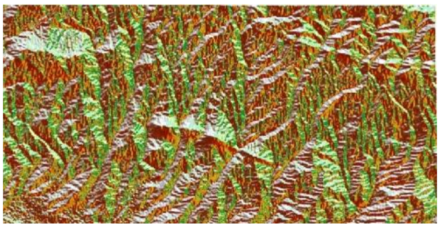

Figure 2. Aspect card based on 3D model

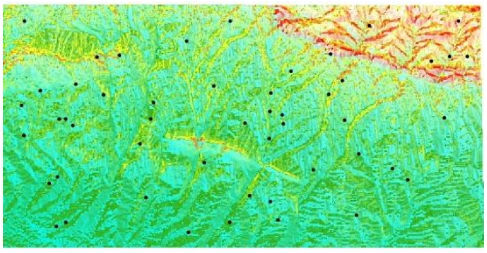

Figure 3. Create Random Point Random Point Placement Card (Analysis Card)

As a result of combining all the above-mentioned cards and placing 50 points at random on them, the ArcMap program automatically calculates the Attribute Table. Based on this table, it is possible to perform correlation correlation matrices, regression statistics, and make graphs of them.

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Table 1

General regressive statistics on all factors taken into account

Multiplicity R	0,591
R-square	0,350
Normalized R-square	0,276
Default error	0,109
Number of observations	50

Table 2

Sampling statistics by coordinates

Coordinates	***Coefficients***	***Standard error***	***t-statistics***	***P-value***	***less than 95%***	***higher than 95%***
Y-intersections	11,416381	25,897683	0,440826	0,661497	-40,776970	63,609732
X 1 variable	0,000371	0,000234	1,589170	0,119183	-0,000100	0,000842
X 2 variable	-0,010487	0,006003	-1,746785	0,087653	-0,022586	0,001612
X 3 variable	0,000119	0,000208	0,571191	0,570777	-0,000300	0,000537
X 4 variable	0,000003	0,000002	1,731164	0,090430	-0,000001	0,000007
X 5 variable	-0,000003	0,000006	-0,554423	0,582096	-0,000014	0,000008

Table 3

Landscape change in 2017 according to NDVI

correlation bond matrix

	2017	***Height***	***Inclined***	***Exposition***	***Coordinate X***	***Coordinates Y***
2017 ndvi	1					
Height	-0,0257	1				
Inclined	-0,1345	0,781	1			
Exposition	0,3490	-0,073	-0,121	1		
Coordinate X	0,2242	0,588	0,381	-0,044	1	
Coordinates Y	-0,2367	0,791	0,647	-0,160	0,152	1

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We will look at the data in this matrix and the table of attributes through the following graphs. Since NDVI values were quoted only in 2017 year in the matrix, then the full Binding of all parameters was not well reflected in it. Therefore, we will consider how much the height, exposition and slope are connected by the average values of the NDVI in 2013, 2015 and 2017 years.

Here it is clearly seen that there is a correct and obvious Association of height with the average NDVI values. That is, as the height increases, the NDVI values also increase. This implies that the vegetative index increases when the height increases, decreases when the height decreases. It can be seen that this has the right connection, when not taking into account some anomalous cases (irrigated lands). The vegetation index of agricultural crops is carried out on the basis of another methodology. Since the main area of the base area is an irrigation erosion plain, the algorithm for calculating the irrigated lands NDVI is not included. A similar link can be seen when looking through the exposition and seeing the correct link.

Here, 19 out of 50 cases of the western side, 14 cases of the northern side, the remaining 17 cases of the southern and eastern side are suitable.

From this graph it can be seen that the slope has an inverse relationship with the vegetation index. That is, with an increase in slope, the index decreases, and vice versa. This is due to the strong erosion of washing on large high-slope surfaces, as well as the opening of the bottom rocks.

Conclusion

Each of the space images of the base plot, taken in the Landsat spacecraft, were automatically calculated and downloaded to the card by a separate NDVI (vegetation index). This yearlarar made it possible to create a differential card for determining the dynamics of change.

Maps reflecting the slope (slope) and aspect (exposure) properties of the base plot were created. After that, all the created layers were merged and random points were optimally placed on it using the Create Random Points command line in ArcGIS. On this basis, it is possible to determine the extent to which the calculated NDVIs of the base section are related to slope, aspect and height.

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