THE ROLE OF TRADITIONAL AND INNOVATIVE METHODS IN GEOBOTANICAL RESEARCH OF PASTURE

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Abstract. *It is critical in managing pasture to assess quantity and quality of pasture precisely and on time using satellite data. Remote data can be used to predict the quantity and quality of pastures. This study is used to predict various pasture quality and quantitative parameters by using Sentinel-2 multispectral lines collected from proximal hyper spectral data. Sentinel-2 is used to implement data and calculate standardized difference of indices. The adequacy of these indices was assessed to predict pasture parameters.*

The results of this study will provide information in the development of future pasture quantity and quality models, focusing on vegetation cover.

Keywords. *Pasture quality; amount of pastures; remote sensing; Sentinel-2; near infrared light, short-wave infrared light, transect.*

Introduction. Pastures are one of the most important land ecosystems on earth, according to the Food and Agriculture Organization of the United Nations (FAO) on August 19, 2019, currently 26% of the world's land area and 70% of agriculture's grasslands are not only a source of food for basic and relatively cheap livestock, but also considered as a sign of biodiversity. [1:] It also supports ecosystem services such as storage and absorption of soil carbon. According to the National Report on the state of land resources of the Republic of Uzbekistan, as of January 1, 2021, the total land area in the country is 21244.3 thousand hectares of natural hayfields and pastures, the total land area of irrigated pastures is 18645.2 thousand hectares. [4:] Permanent pastures (in other words, lands used as pastures for five years or more) make up about 47% of the total agricultural area in Uzbekistan. Effective pasture

management plays an important role in economy by providing food and raw materials to the industry, such as wool and leather. The need for accurate methods currently to estimate and predict the amount of vegetation cover of pastures is a critical issue today. Current methods used by livestock farmers for pasture monitoring include field observations through field walks, transect meters for pasture biomass, chamber work after field surveys, and ancillary equipment; these methods extend the required time for a qualitative and timely survey. Therefore, monitoring of pastures using modern software and mathematical processing today requires the reduction of laboratory, chemical or field analysis data, and emphasizes the use of modern monitoring methods (remote sensing, global climate database) on the nutritional value and grass cover of pastures. That is because; it has a significant impact on issues such as time, labor and cost reduction.

Object and methods of research. The study area was selected from the agricultural map of Burchimullo massif of Bostanlyk district of Tashkent region and the agricultural map of 1: 10000 scale, and the study points were identified. The study of the natural conditions of the farm revealed various natural and economic contours, orthography, soil, metrological conditions, water supply. [5:]

The main part. Pasture management using remote sensing data has advantages over traditional methods, such as real-time data transmission, large area coverage, repetitive measurements, and selection of different spectral ranges, i.e., near-infrared (NIR) with remote vision and the observation of various pasture parameters from short-wave infrared rays (SIR) and their application in pasture monitoring in remote sensing have already been demonstrated in various studies. Despite these advantages, the widespread use of remote sensing methods for operational monitoring of pastures is still limited. For example, there are cases where the spatial and temporal dimensions of the data set do not match, the minimum resolution of the data is 250, and the Sentinel-2 data only updates the data every 5 days. This means that the data of the study area should be constantly analyzed.[2:]

Most importantly, high-resolution remote sensing data sets (e.g., SPOT, WORLDVIEW, and IRS) are usually not available for free. Frequent cloud cover, especially in areas near reservoirs and hydrographic objects, affects the quality of work.

Launched on 23 June 2015 as part of the European Commission's Copernicus program, the Sentinel-2 is a satellite specifically designed to transmit large amounts of data and images. Sentinel-2 dual multispectral imaging satellite data, on the other hand, potentially reduces the above shortcomings and limitations. The technical specifications of the Sentinel-2 include 13 multispectral ranges, including three new red-edge ranges for plant monitoring, high spatial resolution altitudes (10, 20 and 60 m), and review time (using two satellites every 2-5 days). day), large area width, higher signal and noise ratio, as well as no problems in obtaining data and a free database. Sentinel-2 data has already been found to be effective for obtaining structural parameters of pastures, such as the efficiency of identification and use of hydrographic objects for pastures, the determination of vegetation cover.[2:]

The capabilities of Sentinel-2 tapes are widely used to obtain plant nitrogen concentrations using traditional field research data. Sentinel-2 images are also used to map plant chlorophyll content. Scientific research scientist B. Khakimov studied the possibilities of Sentinel-2 images for a map of crude protein and vegetation cover on the basis of comparison and remote sensing data of field surveys of pastures of Bustanlik district of the Tashkent region . Field research conducted in 2018 (pasture geo-botanical research of the State Scientific Research and Design Institute on land management,"Uzdaverloyiha") was also used to predict the composition of pastures related to the parameters of nutritional quality of Sentinel-2 data. Using remote sensing data, its climate, pasture location, and transaction points were studied on a smaller scale [2:]

Picture 1.

Boundary of pastures of Burchimullo massif of Bostanlyk district in Tashkent region.

The following plant species were identified in the data obtained from the transect points.

Picture 2.

Transaction points from pastures of Burchimullo massif of Bostanlyk district in Tashkent region.

Transaction points from the pastures of Burchimullo massif, Bostanlyk district, Tashkent region.

The anterior roots are elongated, 40 cm long, 4-5 elliptical. It blooms in May-June. The flowers form an umbrella-shaped inflorescence. The fruits ripen in June-July. It is elongated cylindrical, purple in color, with winged edges. It is harvested in the blue and stored as hay. **(Picture 3)** [6:]

It is a perennial herbaceous plant, belonging to the family of spikes, reaching a height of 50-190 cm. Its underground part forms a bulb resembling a smaller onion. It blooms in May-June and bears fruit. It grows in arable lands, in cereals, in the foothills, in the plains.

(Picture 4)

A perennial rooted, ephemeroid plant that grows to a height of 4 cm to 30 cm, belonging to the family of color-like chloras. The root is sometimes up to 6 meters long, but the main mass is 5-8 cm deep. From the root the branches grow into a separate set, between which there is 1 generative branch. **(Picture 5)**

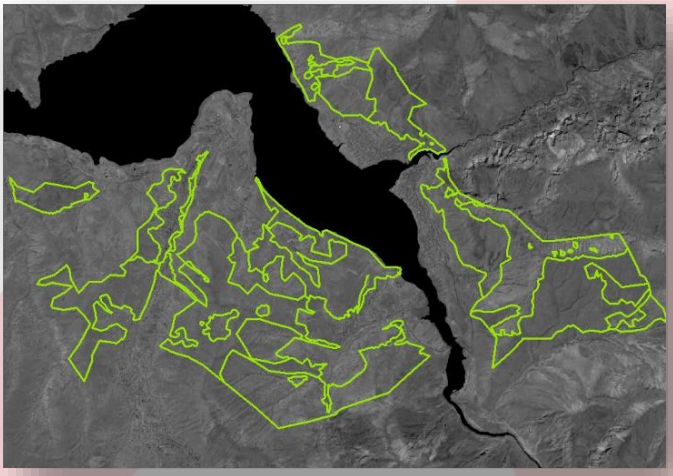
Other similar plants were also identified, and the main part of the work was to determine climatic and vegetative indicators by comparing field surveys and remote sensing data.

Results and Discussion. In 2018, a comparison of traditional data obtained by State Scientific Research and Design Institute on land management "Uzdaverloyiha" with the Vegetation Normalized Difference Index (NDVI) showed that the data obtained were

almost identical. In our opinion, firstly, the growth and development of plants during the growing season is associated with the highest point, and secondly, the moderate period of air temperature can be explained as a good period for vegetation processes. [7:]

For the Vegetation Standardized Difference Index (NDVI), a regularity of -1 to 1 is introduced, and it is advisable to determine the same vegetation period of the traditional vegetation and remote sensing methods in the first decade of the summer season, June-July.

In general, according to the data obtained during the study period at the studied object, water and hydrographic objects, vegetation coverage levels were found to be -0.79 and .99. [8: 15676-15682 schematic map 1.]

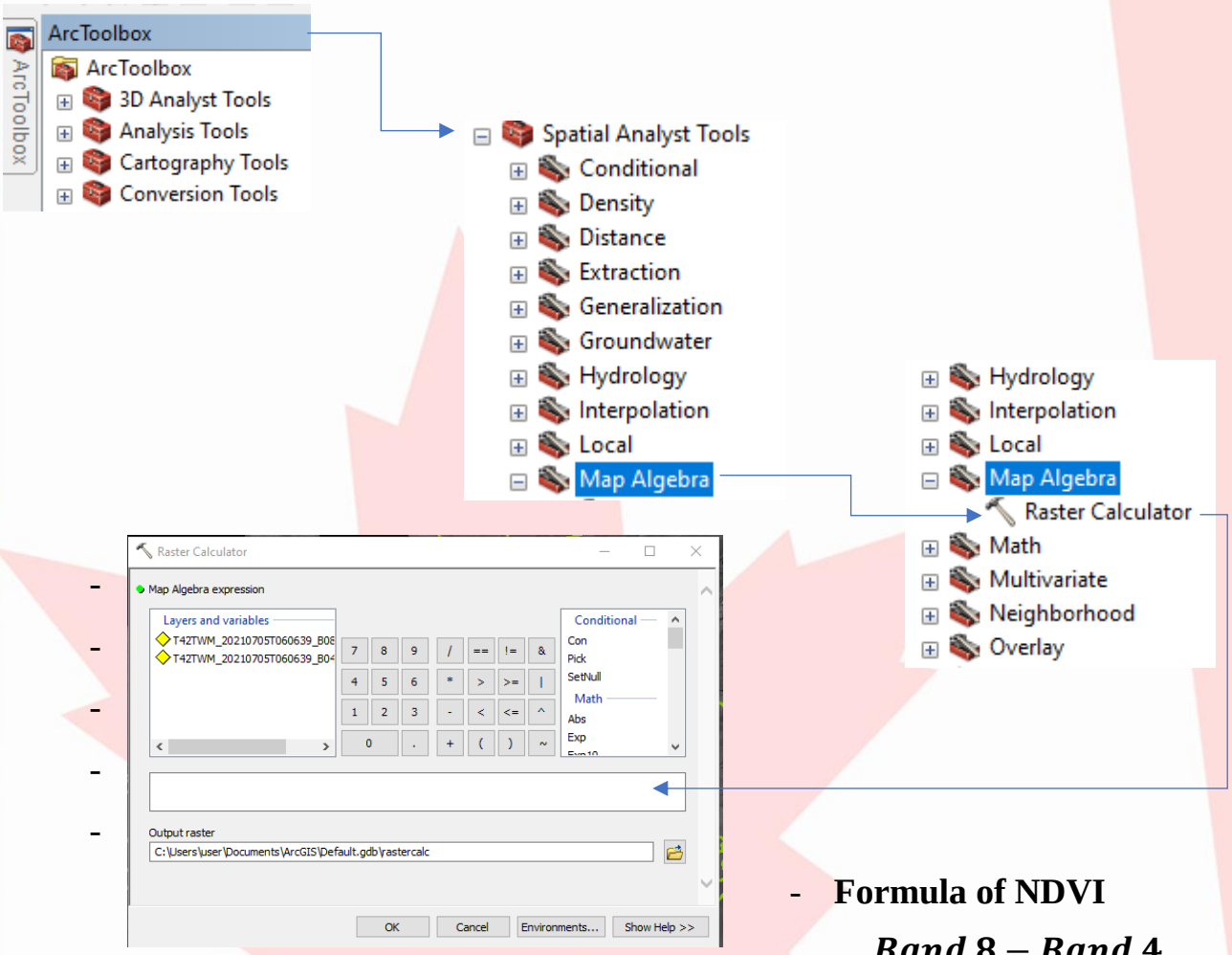


Remote Sentinel-2 8-4 level raster images (2021.07.05)

Picture 6.

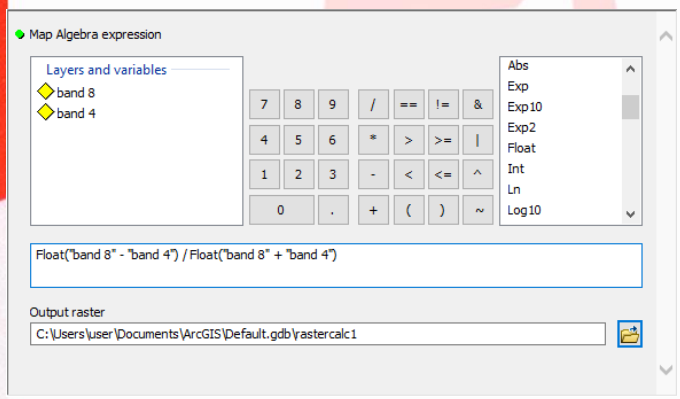
1.schematic map.

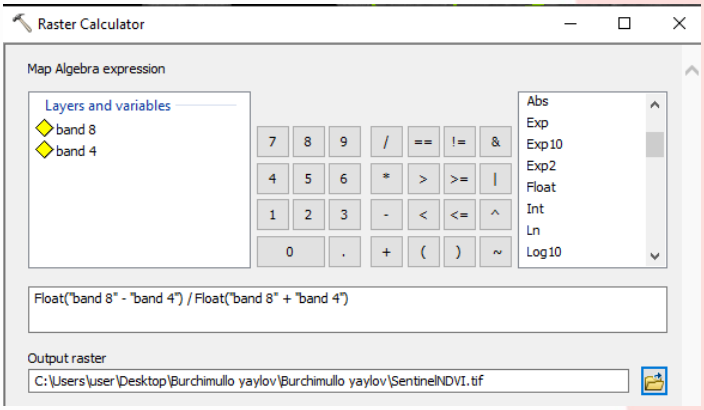
Spatial analysis on raster images:



- **Formula of NDVI**

$$\mathbf{NDVI} = \frac{\boldsymbol{Band\ 8 - Band\ 4}}{\boldsymbol{band\ 8 + Band\ 4}}$$





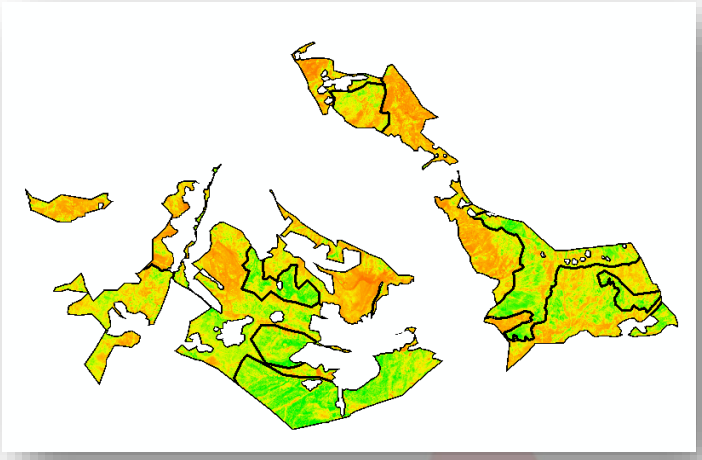


Image 7.
NDVI analysis of Burchimullo massive
2021 year 5^{th} of july

As a conclusion and a recommendation, it should be noted that while traditional methods require a lot of time and manpower, the use of Sentinel 2 from innovative methods (remote sensing) methods is economically viable for today's demand. However, the analysis of its data requires a real-time approach in the context of Bostanlyk district of Tashkent region, as well as the correct choice of transaction points. It is advisable to determine the vegetation indices of plants in the first decade of July in the summer.

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