Development of Land Cover Monitoring System based on Satellite Observation in Azerbaijan

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SUMMARY

The objective of the development of the Land Cover Monitoring System in Azerbaijan is to provide the rational use of land, prevent land pollution, and apply the optimization in land use.

The project will help automate:

- Observation and definition of structural changes on land cover;
- Obtaining the reporting and mapping on structural changes and crops, in particular their classification.

Expected outcomes:

- Improving the real estate cadastre, increasing the efficiency of land use and land secure in the Republic of Azerbaijan;
- Observe and definition of any changes on all land parcels irrespective of the ownership type - state, municipal and private;
- Support to the avoidance of discrepancies on the distributed land parcels (as a result of the Land Reform);
- Analysis of satellite images and definition of arable land parcels;
- Creation of up-to-date hydrological scheme of the country;
- Definition of more populated areas.

Economic efficiency:

- Increase of quality and speed of digital land inventory;
- Increase of land management efficiency;
- Regulation of the land market;
- Applying of modernization, automation and optimization in land governance;
- Simplification of decision making in land cover changes.

Целью развития системы мониторинга земельного покрова в Азербайджане является обеспечение рационального использования земель, предотвращение загрязнения земель и применение оптимизации землепользования. Проект поможет автоматизировать:
- наблюдение и определение структурных изменений на земельном покрове;
- получение отчетности и картирование структурных изменений и культур, в частности их классификации.

Ожидаемые результаты:
- совершенствование кадастра недвижимости, повышение эффективности землепользования и защищенности земель в Азербайджанской Республике;
- наблюдение и определение любых изменений на всех земельных участках независимо от формы собственности - государственной, муниципальной и частной;
- поддержка во избежание расхождений в распределенных земельных участках (в результате земельной реформы);
- анализ спутниковых снимков и определение участков пахотных земель;
- создание современной гидрологической схемы страны;
- определение более населенных районов.

Экономическая эффективность:
- повышение качества и скорости цифровой инвентаризации земли;
- повышение эффективности землеустройства;
- регулирование рынка земли;
- применение модернизации, автоматизации и оптимизации в управлении земельными ресурсами;
- упрощение принятия решений об изменениях земельного покрова.

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Purpose of the Land Cover Monitoring System Project

People are constantly working on various lands, and good agricultural lands are under construction, lands are destroyed, forests are cut down. To prevent illegal land use, the State Committee on Property Issues is developing the Land Cover Monitoring System (LCMS) to monitor and detect any changes to the cover. As the LCMS improves, it will assist the Committee in many other cases, including changes in the land cover.

As users of the project, these government structures will be able to benefit from LCMS: State Committee on Property Issues, Ministry of Agriculture, Ministry of Ecology and Natural Resources, Ministry of Emergency Situations, State Committee on Urban Planning and Architecture, State Tourism Agency, Executive Authorities, Municipalities and other government agencies.

About Sentinel satellites, which provide the system with satellite data

The System uses continuously formed data on the basis of the cover which is obtained via Sentinel-2 and Landsat satellites of the European Space Agency, and Azersky satellite of the Republic of Azerbaijan.

Satellite shots provide a unique set of cover tracking data along with the ground cover. In addition to the visible spectrum, these also include infrared, short wave infrared, and other multispectral data. This allows you to monitor plant cover, vegetation, cycles and health.

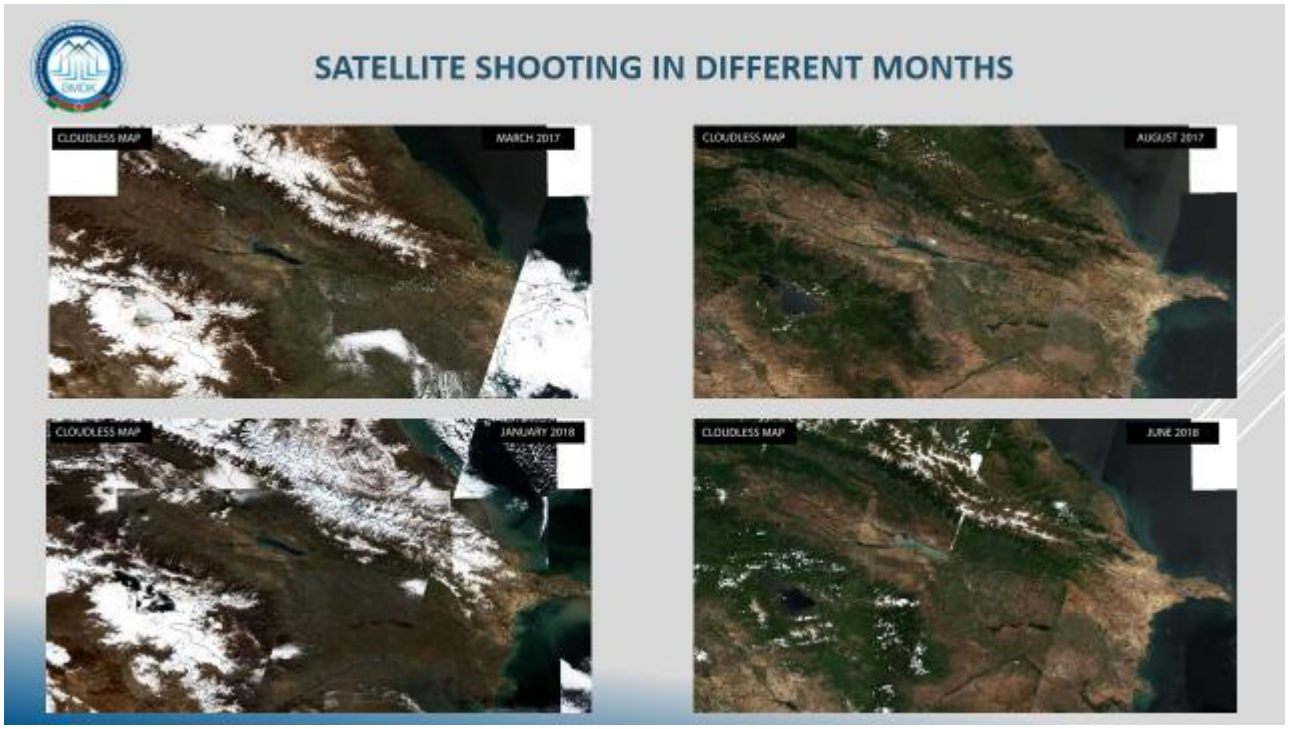
The Sentinel Satellite will be able to analyze the changes taking place on the Earth's cover by conducting a five-day shooting around the world. At the same time, once a month territories of Azerbaijan Republic is shot via Azersky satellite and integrated into the system.

Main monitoring

The State Committee on Property Issues has been using satellite imagery and satellite data for several years. This data also includes footage from the Azersky satellite. Monitoring of land cover changes at the national level gives our country a new perspective in terms of efficient land use and land management.

The scope of LCMS activities is to identify crops planted on agricultural lands, forest fires during emergencies and monitoring of environmental damage, and changes in forestry areas. The main functions of the project are to keep track of rising and decreasing intensities

of water in rivers and reservoirs, to provide state control over land use, to monitor areas by central and local executive bodies, municipalities.



About development of construction sector in Azerbaijan

The construction sector in Azerbaijan has expanded considerably over the past decade, and this process is continuing today. About ten years ago, ambitious real estate projects were launched by companies as a result of large international investments. In Baku, there were large construction sites, the city expanded and it became even more beautiful as a result of new buildings. All of this can be monitored through the Land Cover Monitoring System.

Multispectral images

Apart from its ability to track all these major construction projects, the Sentinel satellites help investigate cover changes in depth. Spectral data can be obtained through satellite sensors. These include special wavelengths along the electromagnetic spectrum that are invisible to the human eye.

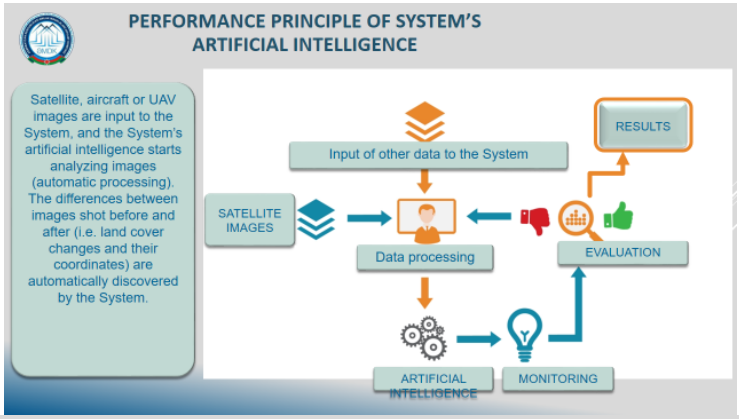
NDVI (Normalized Difference Vegetation İndex) analise

NDVI is one of the multi-dimensional spectral indexs that determines the dynamics of remote plant cover development. Its values allow us to identify important facts about the state of vegetation and the basic indicators of agriculture. Generally, NDVI is a standardized method for measuring plant health. The high NDVI index of the plant indicates that it is a healthy, well-developed plant cover.

Artificial Intelligence is used to automatically detect land cover changes and vegetation based on satellite imagery data.

Artificial Intelligence

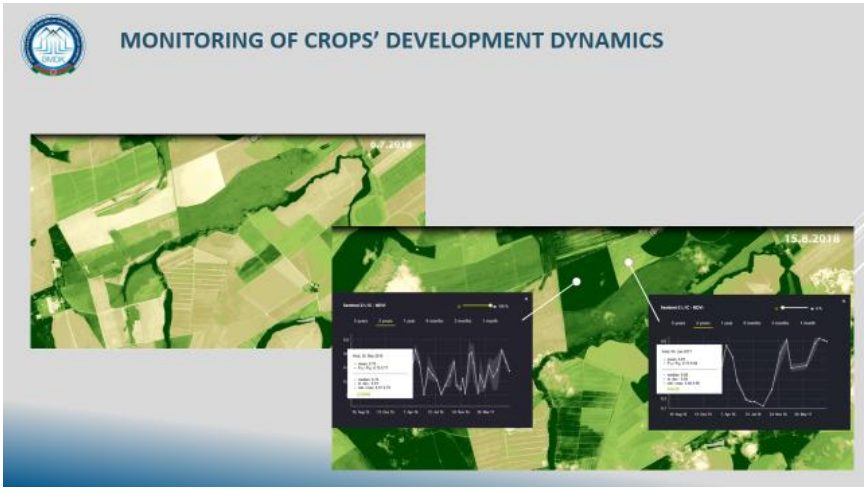
Artificial Intelligence technology has recently become a powerful tool for exploring and analyzing BIG Data. This sample has evolved from recognition studies and has the ability to automatically analyze complex data on a scale equal to human perception. In other words, it provides measurable and manageable insights from large-scale data, and can automatically detect various parameters, including land cover and product type.



The results of artificial intelligence

The Land Cover Monitoring System lets us continuously monitor the land to determine where changes occur. This will allow the Committee to monitor land cover changes and take appropriate action.

Using a similar method for plant identification, we can calculate product prediction and statistics at the regional or national level.



Other duties

This system can be used for a variety of tasks, such as better management of agricultural subsidies, while at the same time helping to monitor drought, floods or other natural disasters.

Result

As a result, satellite imagery of the territory of Azerbaijan Republic will be obtained, the project will ensure efficient use of land, monitoring of agricultural lands, and environmental damage in the event of an emergency. With the use of a centralized monitoring platform to prevent illegal land use, the number of such cases will be minimized.