



3rd Meeting of ECO Geomatics Committee

Country presentation: *Republic of Azerbaijan*

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Azercosmos, Azerbaijan

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About me

Sona Guliyeva

Education:

- Bachelor's degree – Azerbaijan State Oil and Industry University – Environmental Engineering – 2016
- Master's degree – National Aviation Academy– Environmental Engineering (aerospace monitoring) – 2018
- PhD - National Aviation Academy – Aerospace Remote Studies – 2022 (expected)

Career:

- Azercosmos – GIS trainer at Earth observation department
- National Aviation Academy – Lecturer at Aerospace Monitoring of Environment department

Membership:

- The International Society for Photogrammetry and Remote Sensing Student Consortium (ISPRS SC) – Board of Director

Outline

- **History of Azerbaijan National Space Industry**
- **About Azercosmos**
- **Implemented projects**
- **Activities**
- **International collaboration**

Timeline of Azerbaijan National Space Industry

- 2008  Decree on the **creation of aerospace industry** and launch of **telecommunication satellites** into orbit was signed.
- 2009  State Program on the **creation and further development of aerospace industry** in the Republic of Azerbaijan was approved.
- 2010  The decree on the **incorporation of Azercosmos** was signed by the President of the Republic of Azerbaijan.
- 2011  **Azercosmos** was registered as a legal entity at the Ministry of Taxes of the Republic of Azerbaijan and started its commercial activity.
- 2013  **Azerspace-1** - The first telecommunication satellite of the Republic of Azerbaijan was launched into orbit.
- 2014  **Azersky Earth Observation satellite**, which has the capacity of producing high-resolution satellite imagery, was launched into orbit.
- 2018  **Azerspace-2** - The second telecommunication satellite was launched into orbit.
- 2021  Decree on the creation of “**Space Agency of the Republic of Azerbaijan (Azercosmos)**” legal entity of public law was signed.

Company Profile

Company name: Azercosmos

Industry: Satellite Operator

Headquarters: Baku, Azerbaijan

Administrative Office 1:

Uzeyir Hajibayli str. 72
Central Post building, 5th floor
Baku, AZ1000

Administrative Office 2:

Khagani str. 45 A
Landmark II,

Main Control Ground Station:

37 km on the Baku-Shamakhi-Yevlakh
highway

Back-up Control Ground

Nahadjir town, Babak district

Phone: +994 12 310 00 55
+994 12 565 00 55

Fax: +994 12 565 00 66

Email: info@azercosmos.az
geosales@azercosmos.az

Founded: May 3, 2010

Staff: 120-130 employees

Website: www.azercosmos.az

Administrative Offices

Baku office



Landmark office



Azercosmos Satellite Ground Control Stations

Main Satellite Ground Control Station in Absheron Peninsula



Back-up Satellite Ground Control Station in Nakhichevan Autonomous Republic

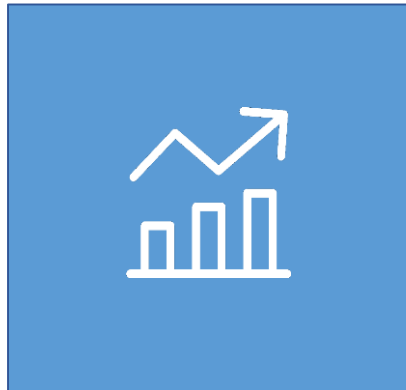


About Azercosmos

Azercosmos – the satellite operator in South Caucasus region, was established by the Decree of H.E. Mr. Ilham Aliyev, the President of the Republic of Azerbaijan, on May 3, 2010.

By Decree No. 1326 of the President of the Republic of Azerbaijan dated April 27, 2021, a legal entity of public law “Space Agency of the Republic of Azerbaijan (Azercosmos)” was established under the Ministry of Transport, Communications and High Technologies of the Republic of Azerbaijan.

- Activities of Azercosmos are carried out in five main areas:



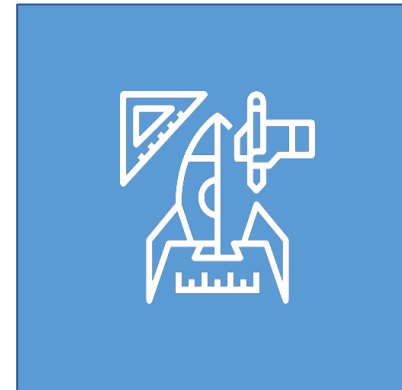
Supporting the socio-economic development of Azerbaijan



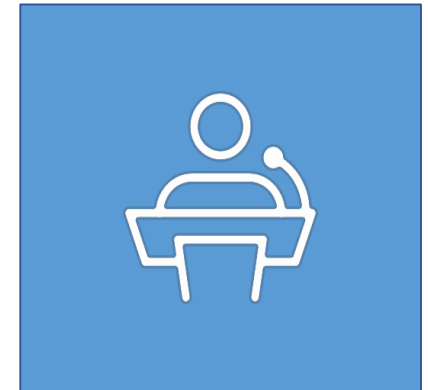
Supporting national security



Expanding commercial activities



Supporting space R&D activities



Representing Azerbaijan on the international space arena

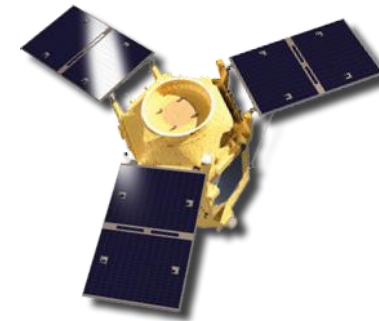
Azercosmos' Satellite Fleet

Azercosmos is a satellite operator in the **South Caucasus**, provides highly reliable broadband and broadcast solutions to its customers in **Europe, Africa, Middle East** and **Central Asia**.

Currently, appropriate works are being done to increase the fleet.

Application areas:

- Media & Entertainment
- Military & Government
- Enterprise, Oil, Gas, Cellular Backhaul & Data
- Mobility & Transportation
- Agriculture & Environment



Services of Azercosmos



TELECOMMUNICATION

Video Services
Data Services



GROUND STATION

Teleport
Direct Receiving Station



EARTH OBSERVATION

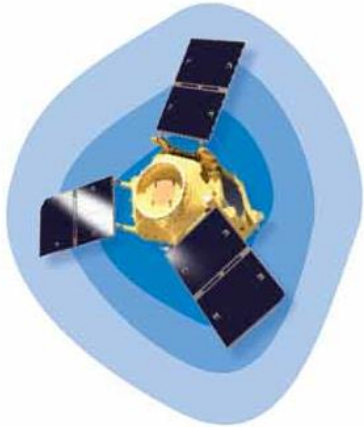
Pansharpened Orthorectification
Mosaicking & Radiometric Balancing
Image Change Detection
Imagery Collection & Data Analysis
Object Detection & Classification
Site Monitoring



RESEARCH & DEVELOPMENT

Satellite engineering
Small launchers
Orbital mechanics
Unmanned aerial vehicles
Artificial Intelligence
Corporate software

Earth Observation Satellite



Type of satellite:

Earth Observation Satellite

Present status:

operational

Launch date:

30 June 2014

Resolution:

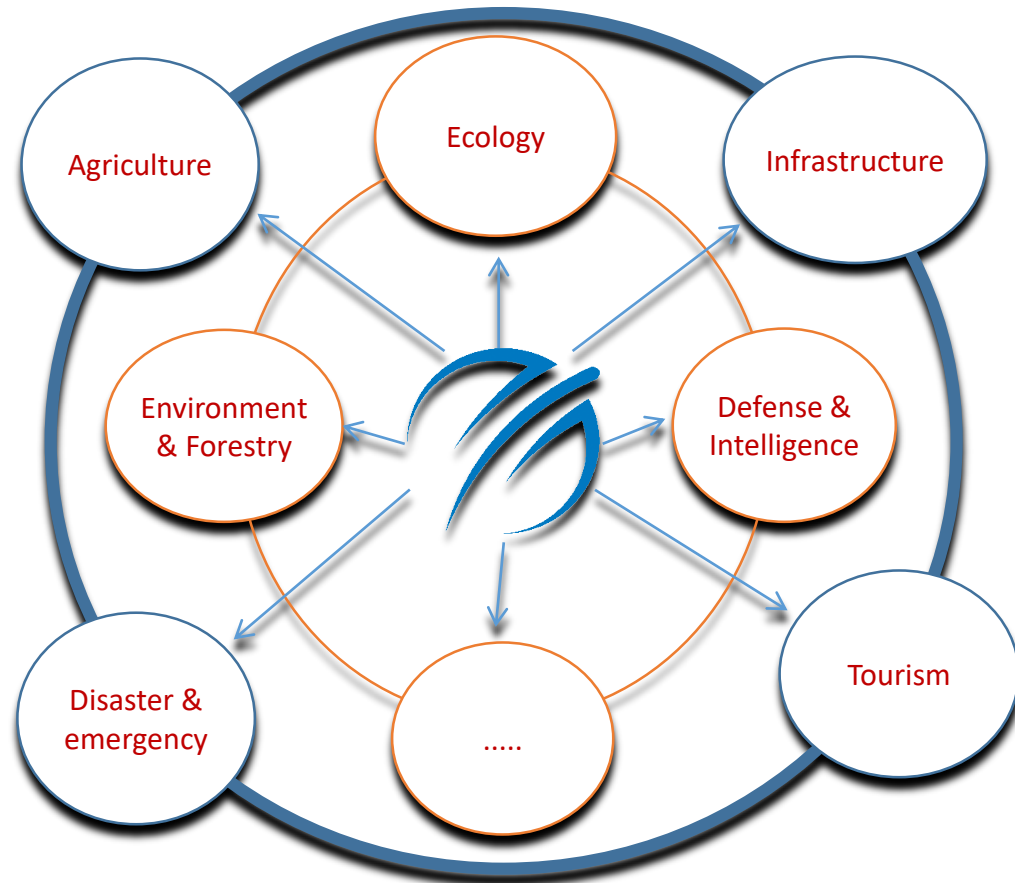
1.5 m Panchromatic / 6 m Multispectral

Spectral bands:

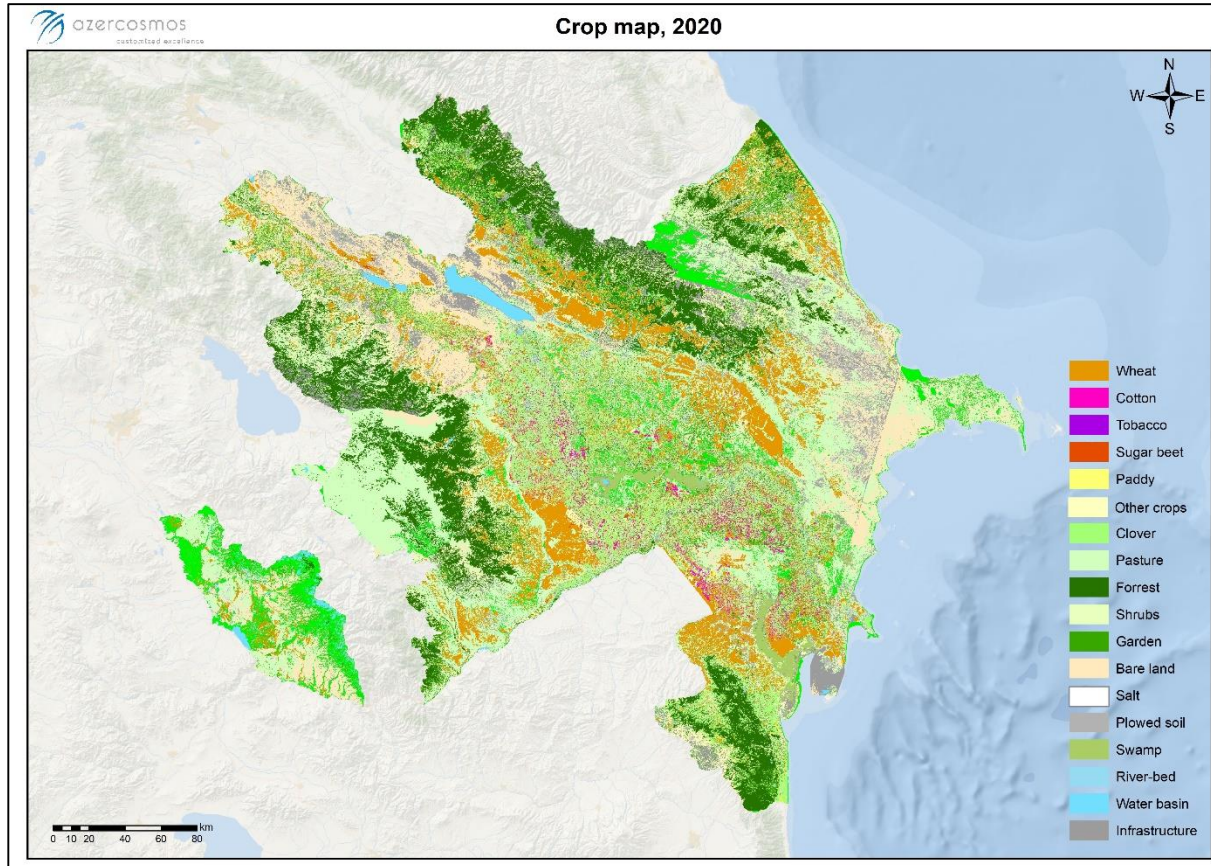
1 Panchromatic and 4 Multispectral bands
(Red, Green, Blue, near-infrared)

-
- **SPOT 6/ Azersky** (SPOT 7) constellation is composed of two twin satellites operating as a true constellation on the same orbit and phased 180° from each other
 - **SPOT6/Azersky** products can be easily integrated in GIS environment or used to derive thematic geoinformation while combined with other satellite, airborne or ground information.
 - SPOT6/Azersky satellites imagery offer an affordable **source of information** for analysing, monitoring, forecasting and managing resources and human activity on our planet.

Application areas of satellite images



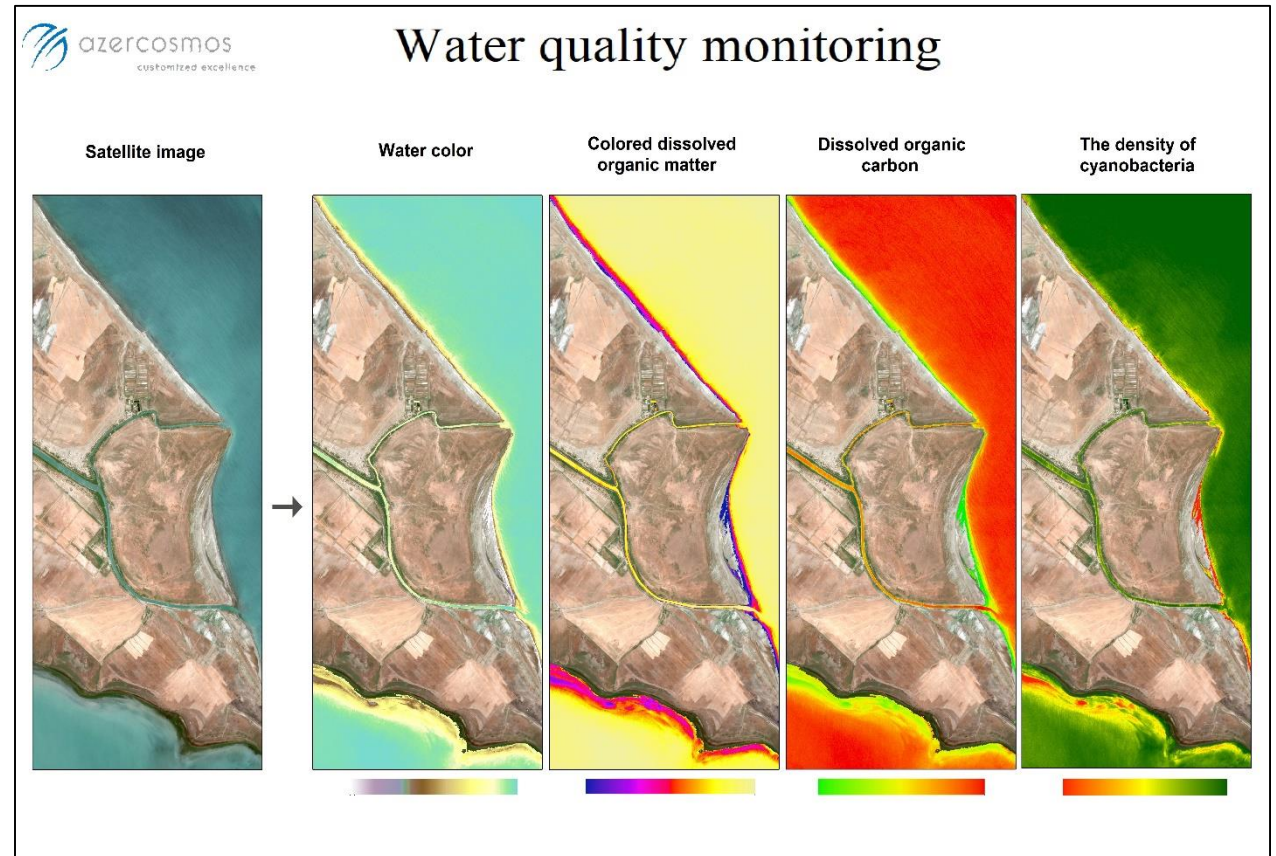
Agriculture – crop mapping



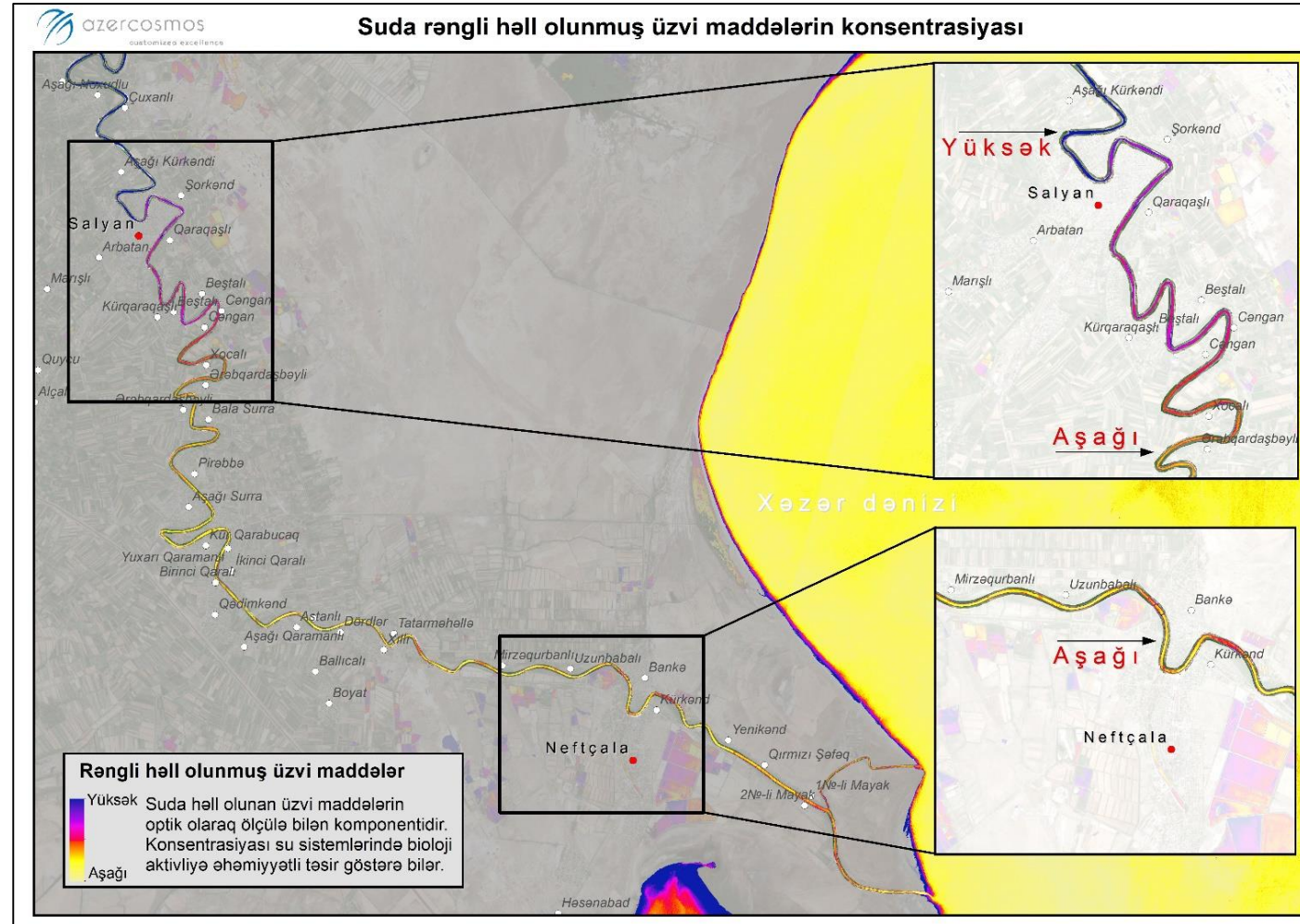
- Agriculture plays an important role in the **economy** of the Republic of Azerbaijan.
- Agricultural lands are dominated by grain, cotton and tobacco crops. Inventory crop map is used by **the Ministry of Agriculture** as the main source of information in subsidy management in agricultural planning.
- Every year, a **crop map** is compiled by Azercosmos and provided to the government.

Ecology – water quality monitoring

- **More than 70%** of water resources are formed outside Azerbaijan. Existing water resources need to be managed using more modern technologies. According to recent hydrometeorological data, water resources have **decreased by 10-15%**.
- The **Kura River** is one of the main rivers of the Republic and is used for drinking and irrigation purposes. Recently, due to the **low water level** of the river, there are some problems, there is a shortage of water, and at the same time there is **sea water intrusion** along the river.



Water quality monitoring - Distribution of color dissolved organic matter

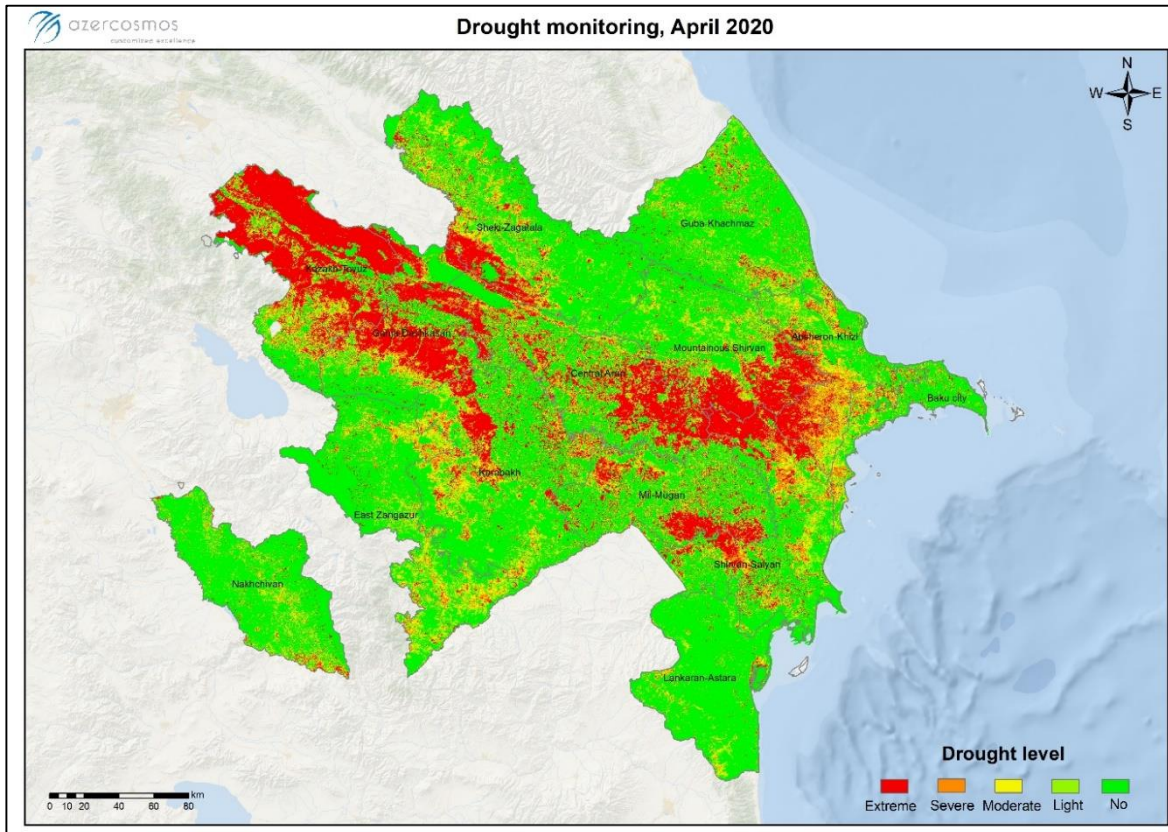


Environment – water cadastre

- Information about **water** is fundamental to national and local economic well-being, protection of life and property, and effective management of water resources.
- Water bodies are the most precious and life-sustaining resources. Availability of reliable and **updated information** about water bodies is necessary for their sustainable management and planning.
- **Water bodies inventory** project performed by Azercosmos, mainly focused to mapping existing water reservoirs and lakes.



Disaster management – drought monitoring

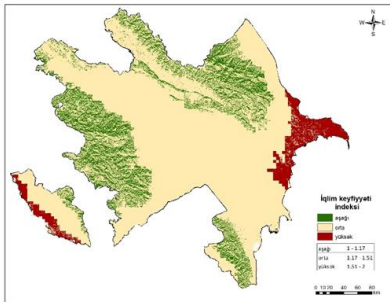


- **Drought** is a **complex hazard** caused by the breaking of water balance and it has an impact on ecological and socio-economic spheres. Droughts, especially in the most extreme form, have an accelerating effect on the **development of desertification**, the main cause of which is excessive anthropogenic pressures, which intensify under conditions of frequent and intense droughts.
- In this regard, the development and improvement of **modern systems for monitoring and early forecasting of droughts**, as well as ensuring preparedness for them and mitigating their consequences, becomes extremely important.
- Drought monitoring on the territory of Azerbaijan from **2000 to 2020** is carried out by using the vegetation condition index which, due to its simplicity and effectiveness, has become popular in such studies.

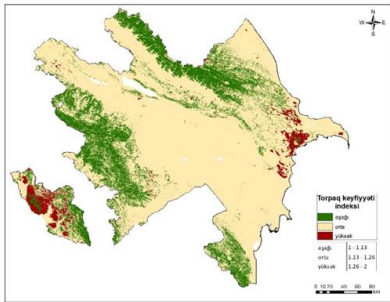
Disaster management - Desertification hazard mapping



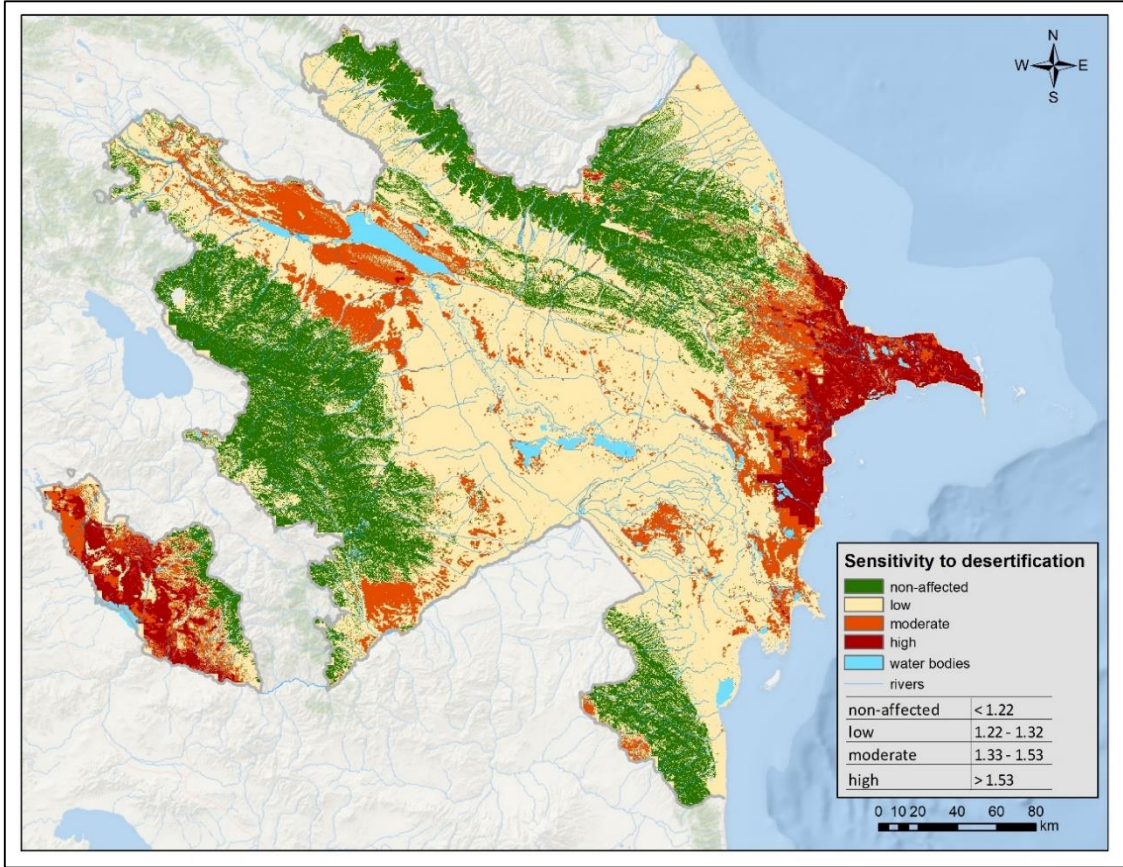
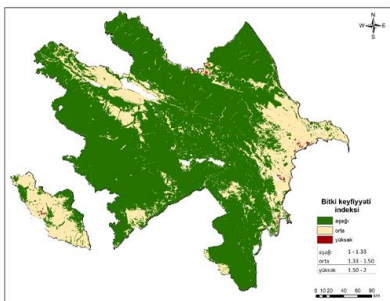
Climate quality index



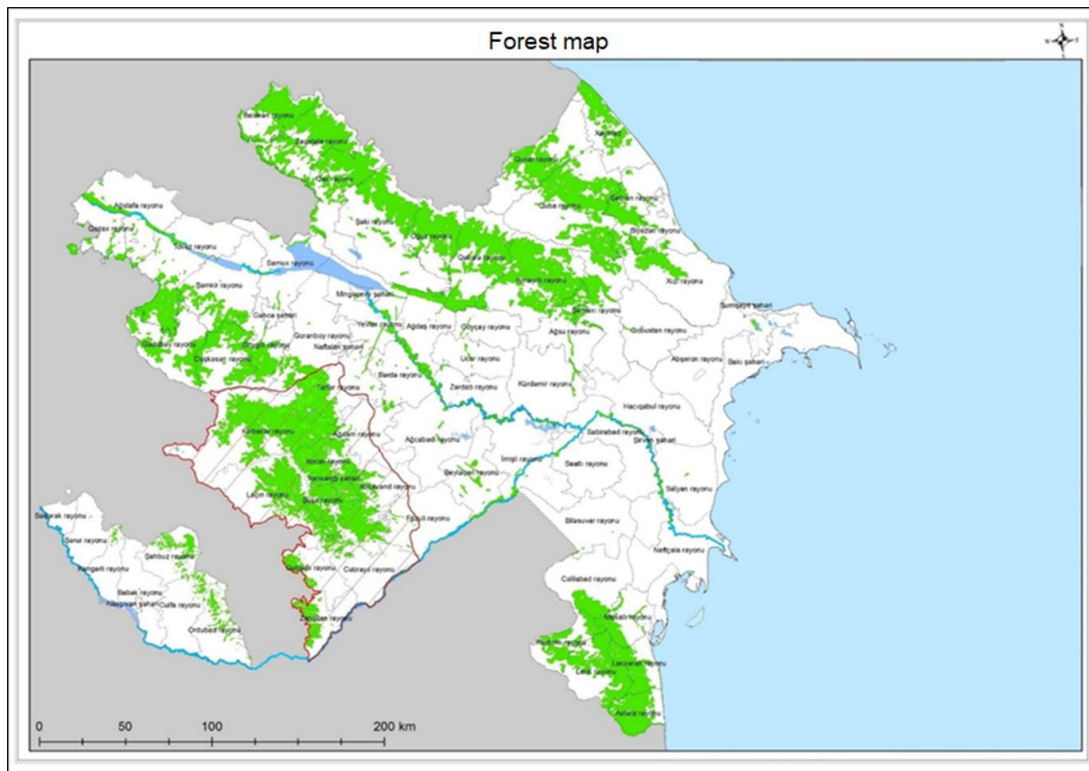
Soil quality index



Vegetation quality index

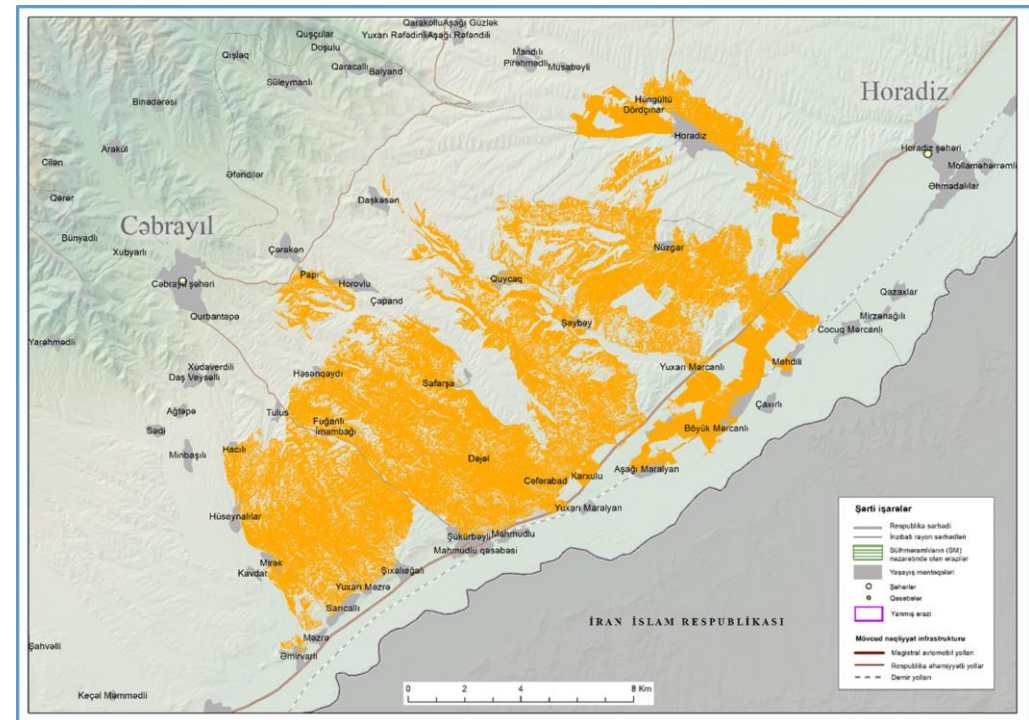


Forestry – forest mapping



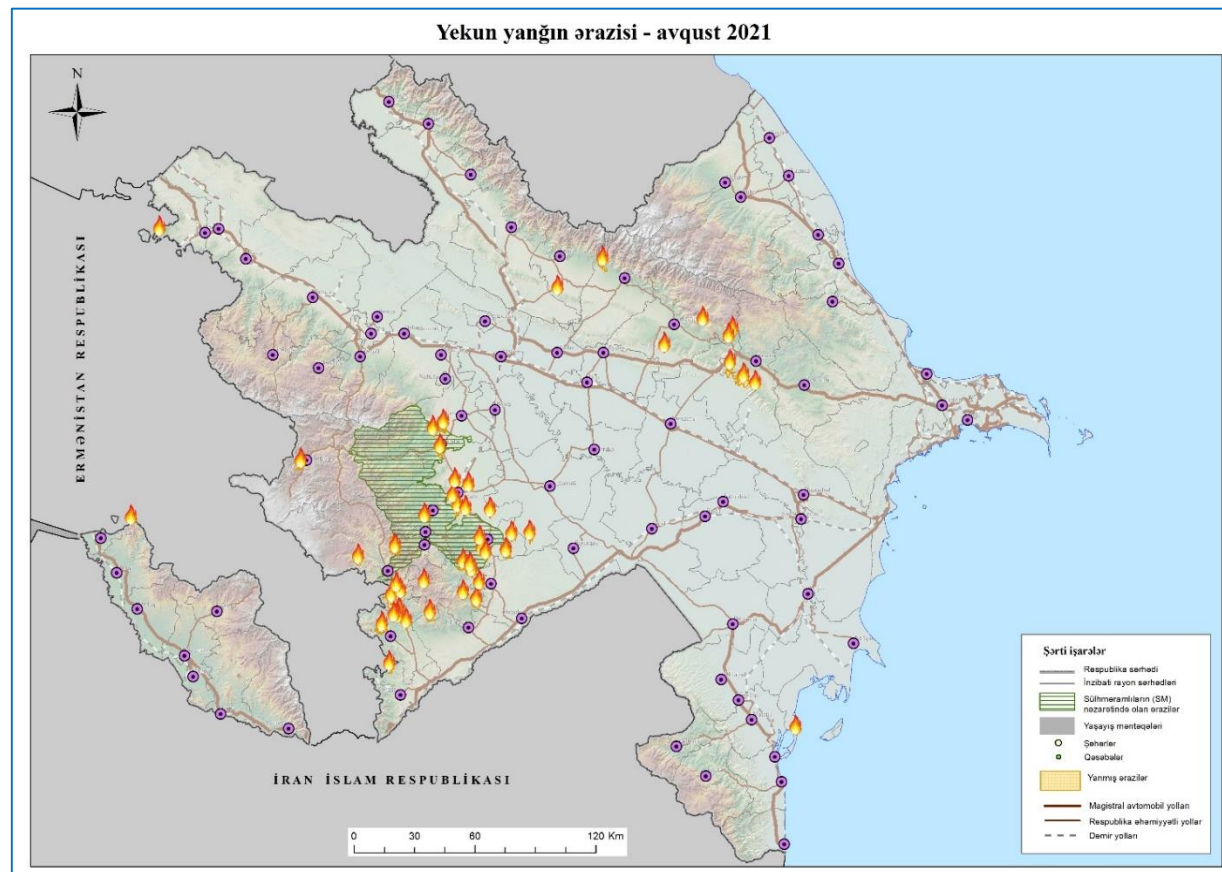
- The information that supports **forest management** is stored primarily in the form of **forest inventory** databases within a **GIS** environment. A forest inventory is a survey of the location, composition, and distribution of forest resources. As one of the principal sources of forest management information, these databases support a wide range of management decisions from harvest plans to the development of longterm strategies.
- **The forest cover in Azerbaijan** is not used economically, it is protected by the government. Changes in the forest cover area, such as forest fires, illegal logging, etc. regularly monitored on the basis of geospatial data.

Emergency – forest fires mapping

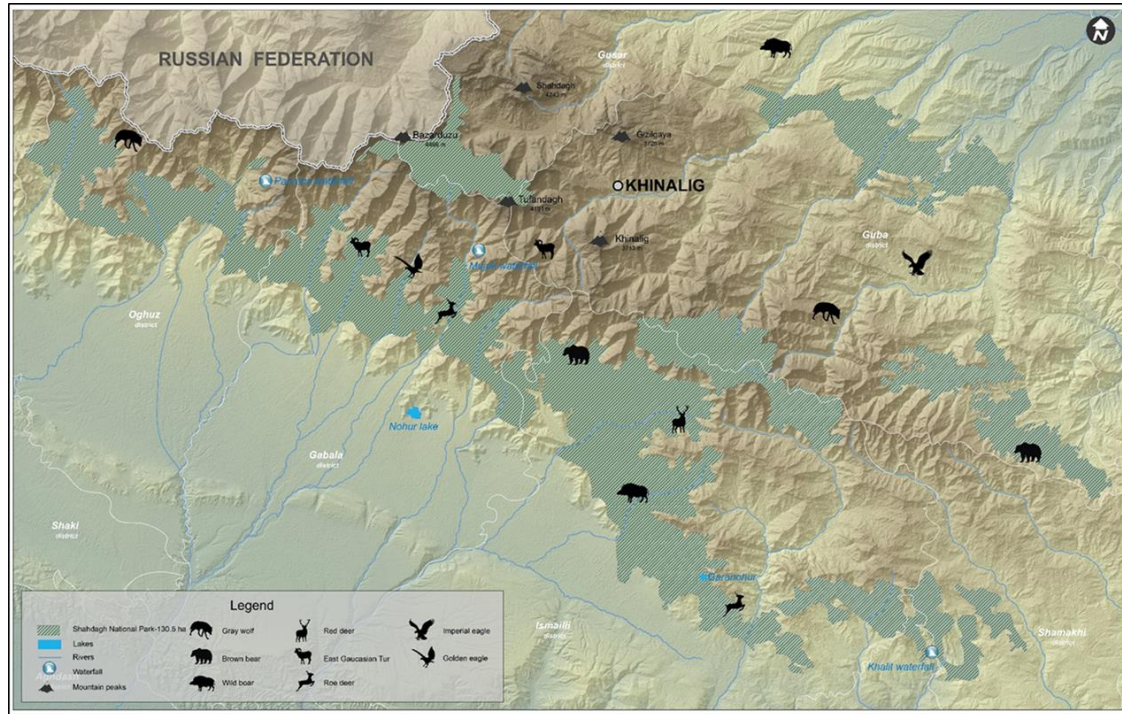


Emergency – forest fires

- **Forest fires** have increased at an alarming rate in recent years, with multiple consequences in **Azerbaijan's forest ecosystem**.
- Wildfires have major environmental and ecological issues, threaten human lives, causing massive losses of lives and properties. **Geospatial data** can help detect forest fires in different land use and the GIS and remote sensing techniques have been used widely to assess and predict the fire frequency.



Tourism - Tourism Mapping



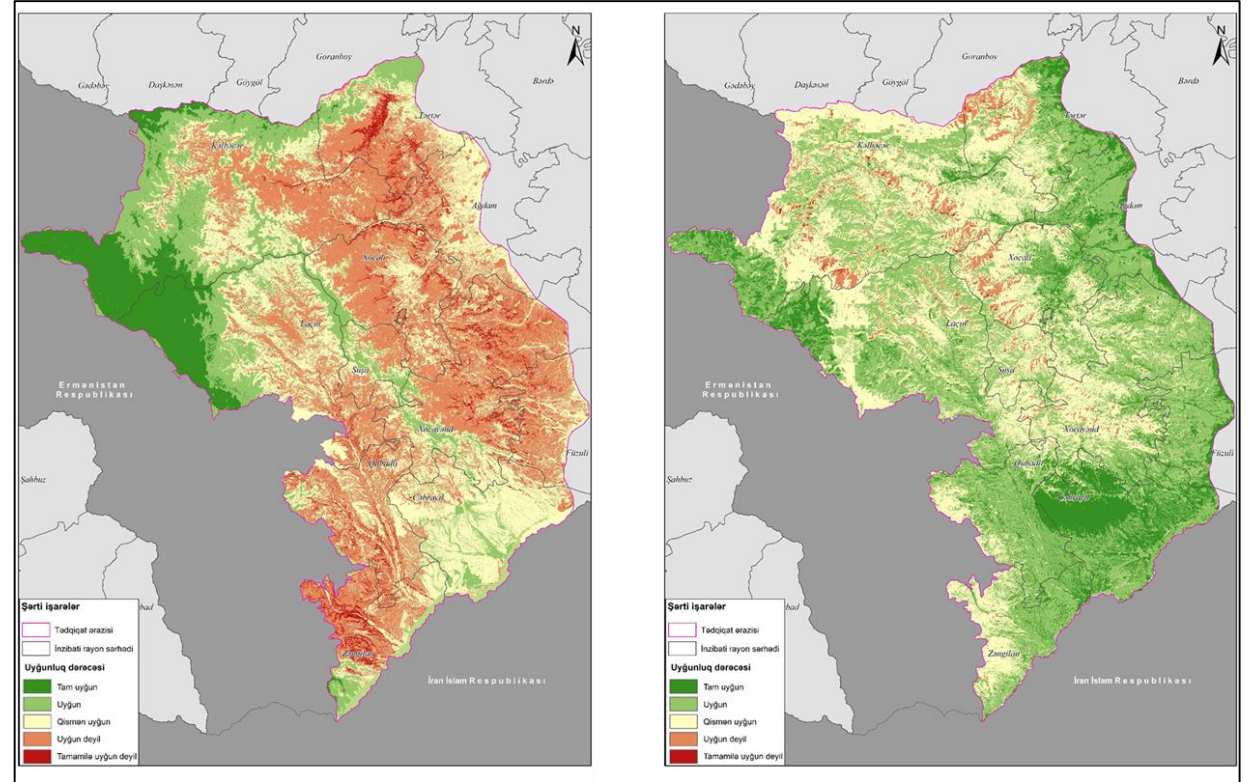
- **Tourism sector** is a spatial phenomenon that requires spatial data collection and processing, namely to identify features relationships and to analyse those relationships in a spatial context.
- **The functional capabilities of using spatial data** in GIS related to tourism sector, namely tourism resources inventories, identifying most suitable locations for development, measuring tourism impacts, visitor management and visitor flows, analysing relationships associated with resources use, and assessing potential impacts of tourism development.

Pilot projects on liberated territories

Large infrastructure projects are being carried out intensively in the liberated territories:

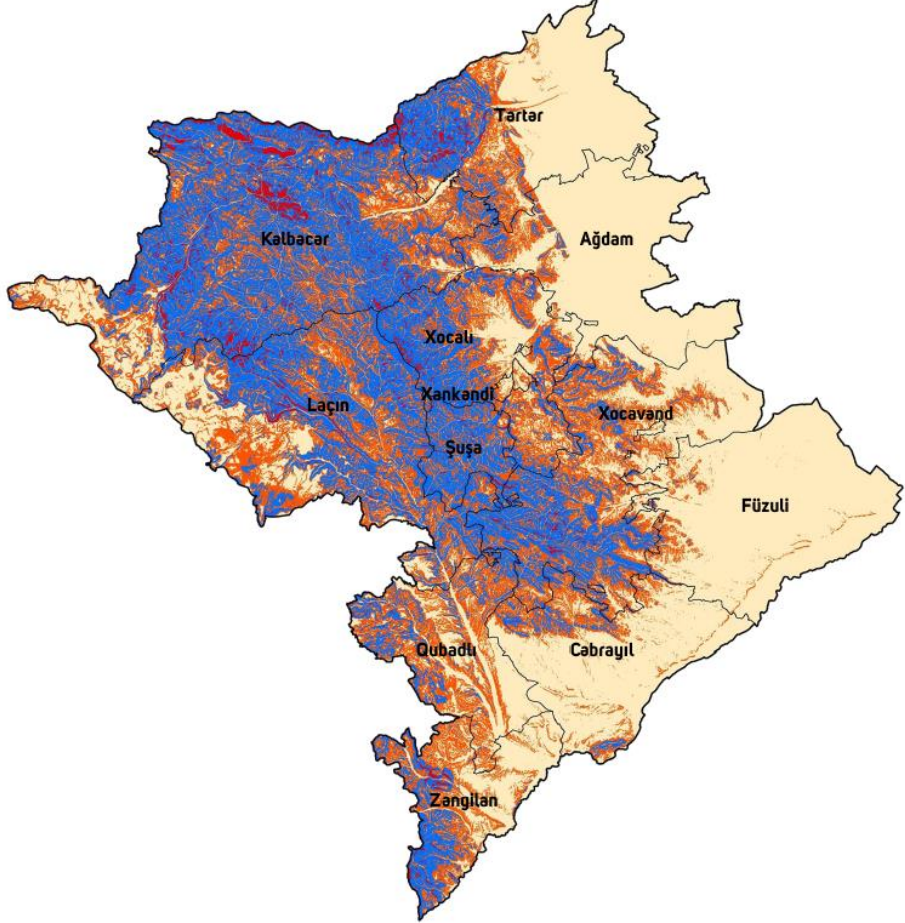
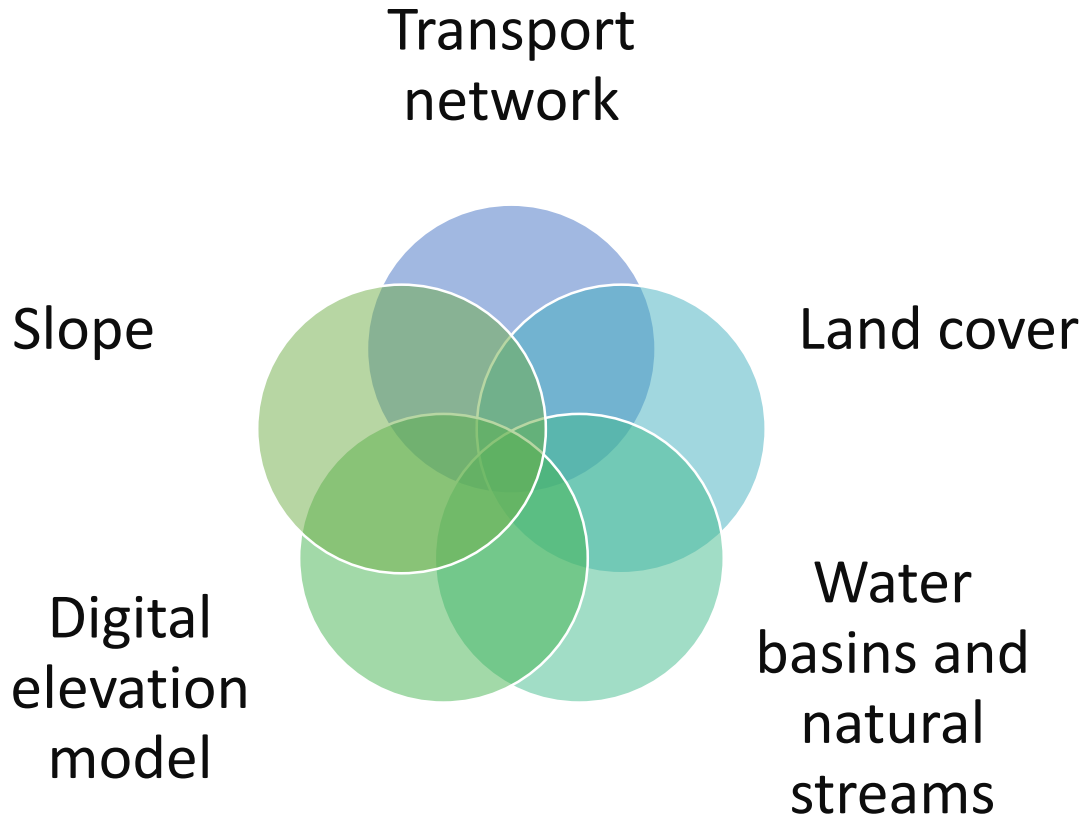
- road infrastructure, highways, railway, airports, creation of gas, water, electricity networks, agriculture, urban planning, smart cities, green energy and so on.

For this purpose, a **local SDI** was established to cover these areas as a pilot project.

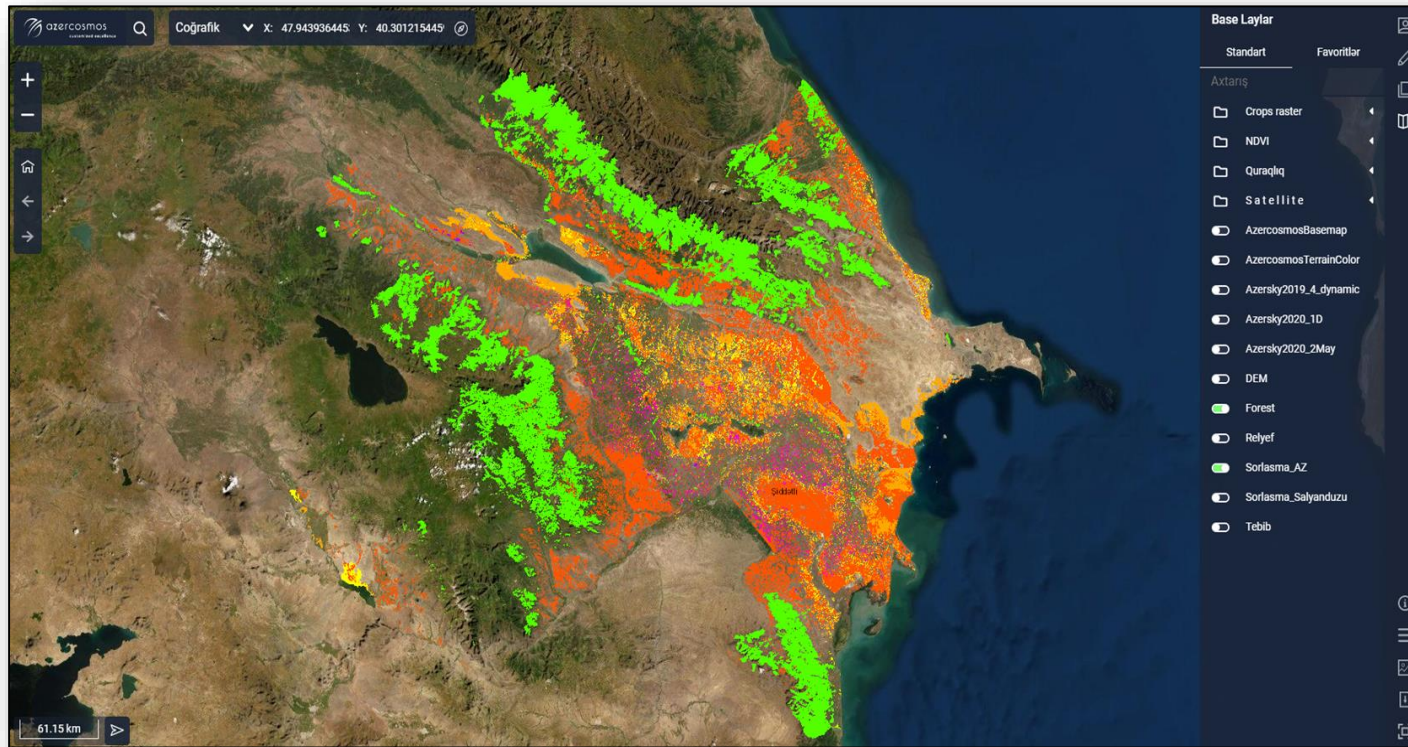


**Identification of suitable areas for alternative energy sources
(Azercosmos)**

SDI for rebuild Karabakh



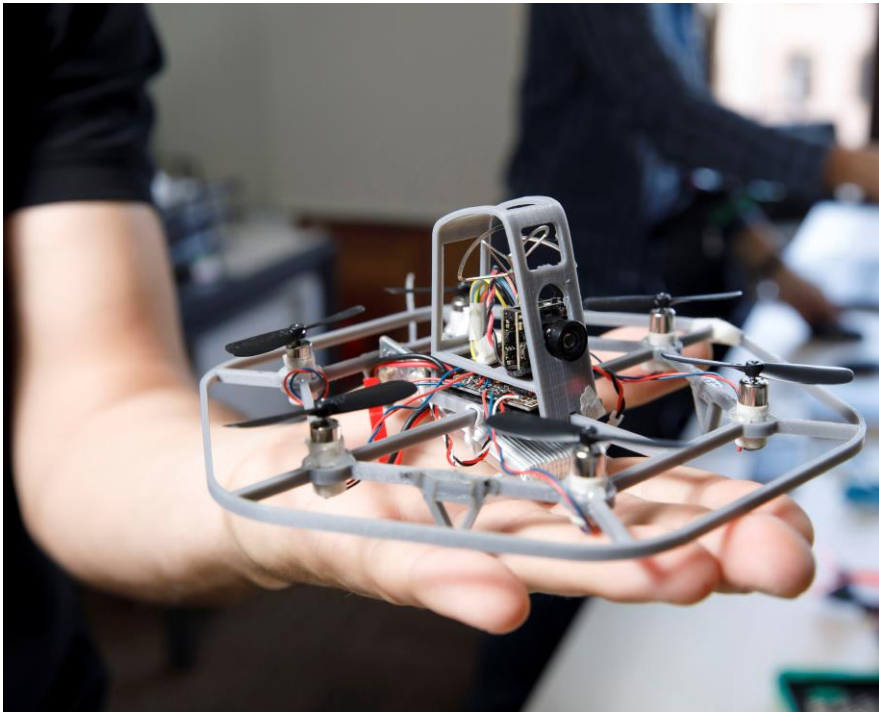
Web GIS platform



- **The results of implemented projects by Azercosmos are integrated into the Web GIS platform.**
- **At some stage all of this data will be integrated into NSDI.**

Research and development activities

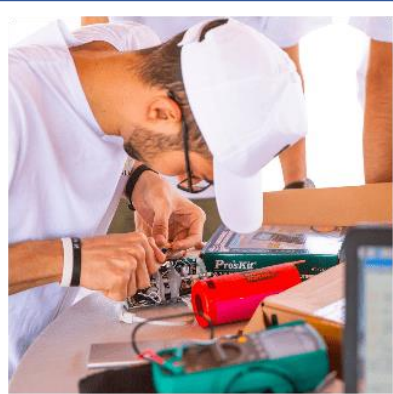
Azercosmos is carrying out scientific research and development activities for conducting scientific and experimental research in aerospace and supporting the development of the space industry in the country.



Main areas of activities are:

- Satellite engineering
- Small launchers
- Orbital mechanics
- Remote Sensing
- Unmanned aerial vehicles
- Artificial Intelligence
- Corporative software
- Events and competitions

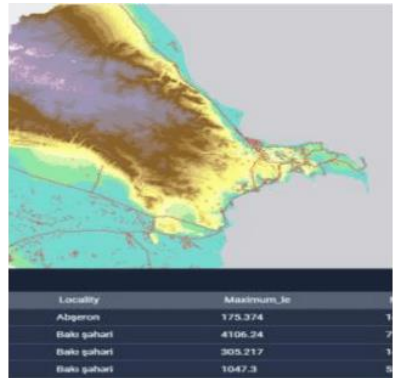
R&D Projects and Competitions



CanSat Azerbaijan model satellite competition is held annually with the purpose of sharing experience and raising awareness of satellite projects in Azerbaijan.



NASA Space Apps hackathon, organized for the first time in Azerbaijan in 2019 at the initiative of Azercosmos, was held uninterruptedly for 48 hours, during which participants tried to find solutions to challenges assigned by NASA.

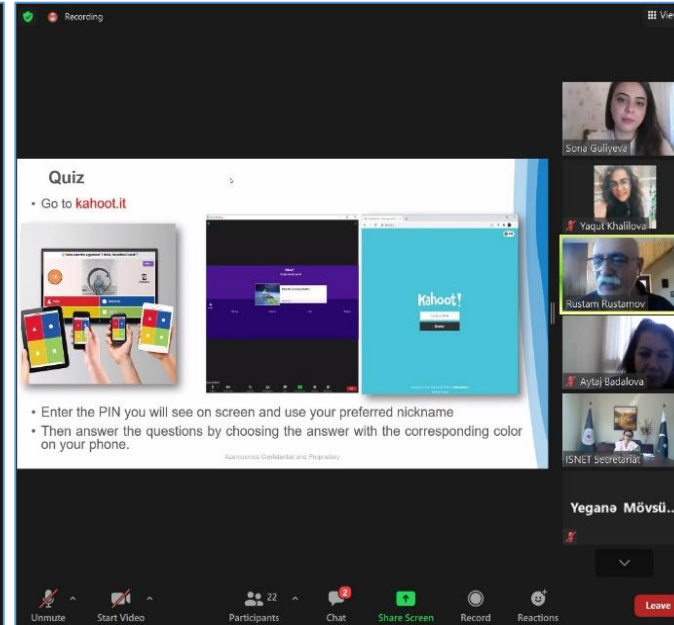
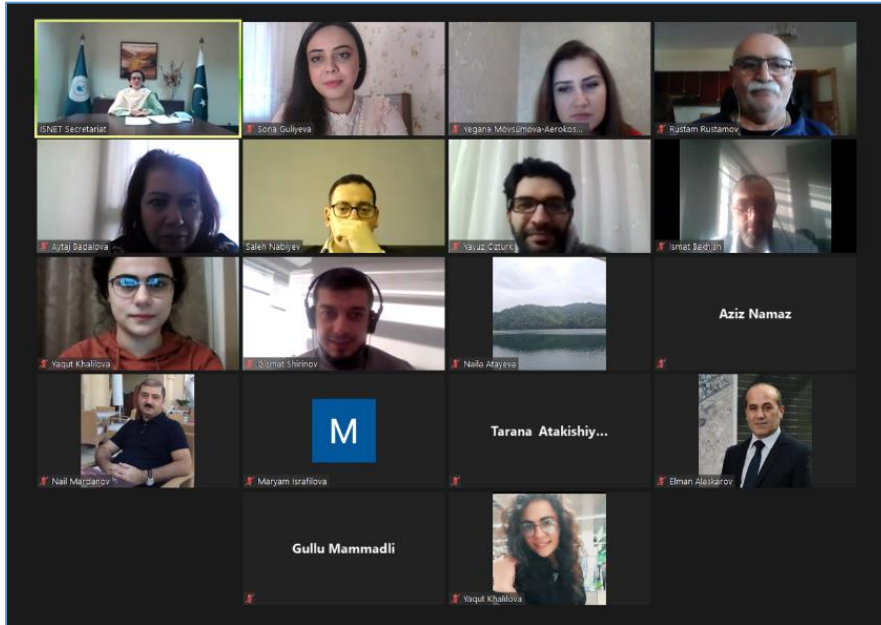


Through the online **WebGIS** platform users can acquire Azersky satellite data as well as create, store, filter and analyze information layers in the platform.



Aerospace and Robotics team develops a device and mechanism that with no explosive and flammable components provides a stable flight and ejection of a payload.

Training and internship programs



Azercosmos participate as a stakeholder



**“New Courses in Geospatial Engineering for Climate Change Adaptation of Coastal Ecosystems ”
GEOCLIC**



- **The main goal of the project** is to modernize and internationalize training in the field of monitoring and environmental protection of coastal ecosystems using new geospatial technologies, big data and remote sensing, at the undergraduate / graduate / doctoral levels in **Azerbaijan, Kazakhstan and Turkmenistan** through innovative three-level curricula that meet market requirements and best practices.



International Collaboration

Officially representing the Republic of Azerbaijan at:

- United Nations Committee on the Peaceful Uses of Outer Space
- International Telecommunications Satellite Organization
- European Telecommunications Satellite Organization
- INTERSPUTNIK International Organization of Space Communications

Memberships:

- International Astronautical Federation
- ESOA - EMEA Satellite Operators Association
- World Teleport Association
- International Society for Photogrammetry and Remote Sensing

Partnerships and initiatives:

- Framework Agreement with the National Center for Space Research (CNES)
- Memorandum of Understanding with the Italian Space Agency (ASI)
- Signatory of the Joint Declaration of interest for the international Space Climate Observatory (SCO)



International Astronautical Congress – Baku 2023

Azercosmos is a proud host of one of the world's most prestigious and unique events – the **International Astronautical Congress (IAC)**.

Azercosmos will welcome the global space community in Baku in 2023 and deliver the IAC participants an exceptional congress experience.

During the IAC, Azerbaijan will bring together **more than six thousand representatives of the space industry**.

Baku Convention Center, the largest congress center in the Caucasus, and Heydar Aliyev Center, a symbol of modern Azerbaijan and Baku, which was designed by Zaha Hadid, are **iconic facilities with a smart design and cosmic ambiance** that will make the participants feel inspired and excited throughout the IAC.





Thank You!

Questions?