

# NATURAL RESOURCE MANAGEMENT USING GIS TECHNOLOGY IN ALBANIA

## UPRAVLJANJE PRIRODNIM RESURSIMA KORISTEĆI GIS TEHNOLOGIJU U ALBANIJI

dr. Edmond HOXHA<sup>231</sup>

dr. Skënder LIPO<sup>232</sup>

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**Abstract:** *This paper presents the Albanian experience on Natural Resource Management (NRM) using the GIS (Geographical information System). The natural resource management is a very high priority for the country. Because of that there is a high attention to improve this process including all the actors are using high technology in management and organization. In the Natural Resource Management process are working many institutions, depend on the field of interest. In this article we will speak mostly about the Geological and Mining resources management, but without forgetting other fields as: environment, agriculture, forestry, cultural heritage, etc.*

*As for the Geological and Mining resource there are some institutions participating in the process as: National Agency of Natural Resource (NANR); Albanian Geological Survey (SHGJSH); Institute of Geosciences, Energy, Water and Environment (IGJEUM); State Authority for Geospatial Information (ASIG), and other non government agencies acting in the field.*

*The paper present the way how the Natural Resources are managed using GIS technology. It explains the methodology and programs used in different institutions. The paper gives also the tendency of this process in the future. It also gives conclusions and recommendation for the future of Natural Resources Management process using high technology.*

**Keywords:** *Natural Resource Management; GIS, Mining*

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**Sadržaj:** *Ovaj rad predstavlja albansko iskustvo u upravljanju prirodnim resursima (NRM) koristeći GIS (geografski informacioni sistem). Upravljanje prirodnim resursima je veoma visok prioritet za zemlju. Zbog toga se velika pažnja posvećuje poboljšanju ovog procesa, obezbeđujući da svi akteri koriste visoku tehnologiju u upravljanju i organizaciji.*

*U NRM-u rade mnoge institucije, u zavisnosti od oblasti interesovanja. U ovom članku ćemo govoriti uglavnom o upravljanju geološkim i rudarskim resursima, ali ne zaboravljajući i druge oblasti: okruženje, poljoprivredu, šumarstvo, kulturno nasleđe, itd.*

*Što se tiče geoloških i rudarskih resursa postoje institucije koje učestvuju u ovom procesu kao što je: Nacionalna agencija za prirodne resurse (NANR); Albanski geološki institut (SHGJSH); Institut za Geosciences, energiju, vodu i zaštitu životne sredine (IGJEUM); Državna uprava za prostorne informacije (ASIG), i druge nevladine agencije koje deluju na terenu.*

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<sup>231</sup> Faculty of Geology and Mine, Polytechnic University of Tirana, Department of Mineral Resources,Rr. Elbasanit, Tiranë, ALBANIA

<sup>232</sup> Faculty of Geology and Mine, Polytechnic University of Tirana, Department of Mineral Resources,Rr. Elbasanit, Tiranë, ALBANIA

*U radu je predstavljen način upravljanja prirodnim resursima koristeći GIS tehnologiju. On objašnjava metodologiju i programe koji se koriste u različitim institucijama. U radu je data i predikcija ovog procesa u budućnosti. On takođe daje preporuke i zaključke za budućnost procesa upravljanja prirodnim resursima koristeći visoku tehnologiju.*

**Ključne reči:** *upravljanje prirodnim resursima; GIS, rudarstvo*

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## (1) INTRODUCTION

Modern society today requires high quality spatial information and Geoinformation represents a key element in decision making processes for optimal resource management, data exchange, communication, and sustainable development. Development of technology contributed in making geoinformation compulsory elements of this society. It is known that this technology will only reach its full potential when governments decide to maximize access to geographic information. The GIS technology (*Geographical information systems*) is being used in Albania in many aspects of society life. One of the very important fields when GIS application is used is Natural Resource Management. The main authority responsible for the natural resources in Albania is The National Agency of Natural Resources (AKBN).

In this paper we will concentrate in geological, mining, and energy resource. Together with AKBN there are some other Institutions working in this field, and using GIS technology to manage their works as: Albanian Geological Survey (AGS); Institute of Geosciences, Energy, Water and Environment (IGEW); State Authority for Geospatial Information (ASIG), and other non government agencies.



*Dr. Edmond HOXHA received the PhD degree on Geosciences and Environment on Polytechnic University of Tirana, Faculty of Geology and Mine. He studied also on leadership on Harvard University, USA. He has huge experience working with Government of Albania and International institutions like World Bank, European Union etc. During 2009-2013, he was Deputy Minister of European Integration of Albania. He is founder of Albanian Centre of Excellence, National Mining Surveyors association, and publisher of Scientific Journal "Albanian Excellence". He is member of Eurosciences, International Association of Sciences, technology and Development. He speaks English and German language. Actually he is a professor in Faculty of Geology and Mine teaching GIS technology and Mine Modeling.*

## (2) THE NATIONAL AGENCY OF NATURAL RESOURCES (AKBN)

*The National Agency of Natural Resources (AKBN) has as main object of its activity development, and supervising the rational utilization of natural resources, based on the government policy, and monitoring them after using in: mining, hydrocarbons, and energy.*

Mains tasks are: (1) Propose, consult, and cooperate for policy and strategy making; (2) Implementation of government policies; (3) Ensuring the technical review of the projects.

To ensure good results, public access, and transparency AKBN has implemented its Portal of information where every subject can find the necessary information in real time. The portal is built based on GIS. It has improved the information and transparency for the public. Everyone can find the information concerning the licensed zones, free mining zones, hydrocarbons, Hydroenergy and renewable energy.

The system gives information based on Main Menu which includes: (1) Renewable energies; (2) Hydrocarbon; (3) Mining activity; (4) Hydroenergy (**Fig.1**). *The Renewable energies include: (a) TEC (Thermo centrals); (b) CHP; (c) Wind; (d) Sun; (e) Biomass; (f) Self production TEC.*



The screenshot shows the AKBN (Agjencia Kombëtare e Burimeve Natyrore) National Agency of Natural Resources portal. The 'Renewable Energies' menu is on the left, with 'Wind' selected. The main content area displays a table of wind energy projects.

ID	Emri i Projektit	Adresa	Statusi i Licencës	Adresa e Kontaktimit	Adresa e Kontaktimit	Adresa e Kontaktimit	Adresa e Kontaktimit
15	2010 ENERJI E RENEWABLE GREEN ENERGY	SHKURTIM	...	...	...	...	...
16	2011 ENERJI E RENEWABLE GREEN ENERGY	SHKURTIM	...	...	...	...	...
17	2012 ENERJI E RENEWABLE GREEN ENERGY	SHKURTIM	...	...	...	...	...
18	2013 ENERJI E RENEWABLE GREEN ENERGY	SHKURTIM	...	...	...	...	...
19	2014 ENERJI E RENEWABLE GREEN ENERGY	SHKURTIM	...	...	...	...	...
20	2015 ENERJI E RENEWABLE GREEN ENERGY	SHKURTIM	...	...	...	...	...
21	2016 ENERJI E RENEWABLE GREEN ENERGY	SHKURTIM	...	...	...	...	...
22	2017 ENERJI E RENEWABLE GREEN ENERGY	SHKURTIM	...	...	...	...	...
23	2018 ENERJI E RENEWABLE GREEN ENERGY	SHKURTIM	...	...	...	...	...
24	2019 ENERJI E RENEWABLE GREEN ENERGY	SHKURTIM	...	...	...	...	...

**Figure 1:** View of GIS Portal of AKBN [Source: <http://akbn.gov.al/>]

*The hydrocarbons include: (a) Agreement; (b) Agreement license. In the subcategory (b) Agreement License, the public can find the list of Contractors, date of their license etc.*

*The mining activity category includes two blocks: (a) Mining License; (b) Mining monitoring. (a) The mining License includes: (1) Request; (2) Requests and Act Verification; (3) Licenses; (4) License Zones. (b) Mining monitoring includes: (1) Risk zones; (2) Mining: (3) Solid waste; (4) Pollution Source.*

*The Hydroenergy includes: (a) Contracted concessions; (b) Private Hydro centrals; (3) State Hydro centrals.*



*Prof.as.dr.Skënder LIPO received his PhD degree at the Faculty of Geology and Mine of Tirana, Albania. He has large teaching and researching experience in the field of Mine Surveying. He is trained in Polytechnic University of Bari, Italy; Faculty of Geology and Mine in Prague, Independent University of Barcelona. He is Executive Director of Albanian Centre of Excellence. He is founder of National Mining Surveyors association. He speaks English and Russian. He has been Deputy Dean of Faculty of Geology and Mine. Actually he is working as Chief of Mineral Source Department in Faculty of Geology and Mine in Tirana, Albania.*

(3) ALBANIAN GEOLOGICAL SURVEY (AGS)

The Albanian Geological Survey (AGS) activity consists on: documentation of geological activity; underground waters studying and monitoring; realizing civil geological studies; evidencing underground natural resources. All the information and data cumulated are in public disposal through the GIS technology. The Geoinformatisation directory produces maps for all fields which are in focus of AGS. This directory creates, details, and updates all the data. There are two GIS units, one for digitalization and one for data editing. All data are presented and registered in catalogues. Furthermore information is passed to the Interface, which ensures the relation of data with maps in ArcGIS program. Types of maps produced by the AGS are: geological, mineral resources, engineering geology, geological risks, metalogenesis, hydrogeology, tectonics, geoenvironment, etc. Finally all data are published in the website (<http://www.gsa.gov.al/>) (Fig.2).





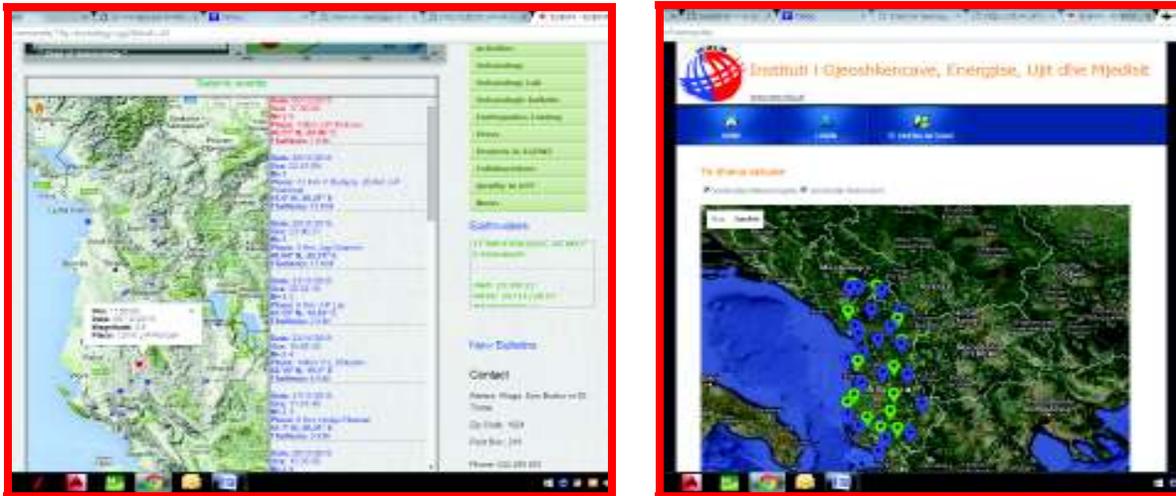
**Figure 2:** Portal of Albanian Geological Survey.  
 Source: <http://www.gsa.gov.al/indexen.html>]

#### (4) INSTITUTE OF GEOSCIENCES, ENERGY, WATER AND ENVIRONMENT

The Institute of GeoSciences is a national research unit that operates under the umbrella of the Polytechnic University of Tirana. The mission is to improve scientific research in the field of Geoinformation. The main tasks are: to study geological phenomena; to study and evaluate natural country resources; to carry out research on natural hazards; to adopt European standards in the field; to study and monitor continuously the seismic activity; to develop, based on geoinformation technology, geomodels that supports scientific research.

One of the very important purposes of GIS technology used in GeoSciences Institute is the earthquakes monitoring. This is very important not only for the country, but also for the region, Europe and more. All the data for earthquakes are received and distributed in real time (Fig.3).

The Data Portal uses GIS to give access, transparency, and real time information. There are many data on meteorology and hydrogeology. All this information is placed on Data Portal as original data ensured according of international standards, especially WMO (*World Meteorology Organisation*). This data can be used for business or scientific purpose. Main data published in website (<http://www.geo.edu.al>) are those of meteorology, and hydrogeology received in continuing way from 40 stations spread all over the country.



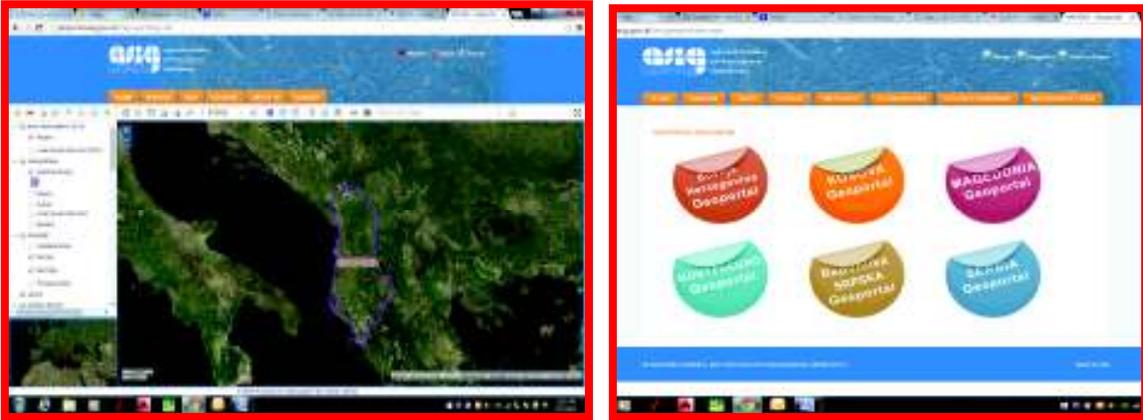
**Figure 3:** View of earthquakes monitoring from Institute of Geosciences  
 [Source: <http://www.geo.edu.al>]

(5) STATE AUTHORITY FOR GEOSPATIAL INFORMATION (ASIG)

State Authority for Geospatial Information (ASIG) is established in 2013. *The ASIG responsibilities* are: (1) Implementation of national policy for geospatial information infrastructure; (2) Design, construction, maintenance and updating of Geodetic Framework (3) Making decisions on collection, processing and updating geospatial information; (4) Sets uniform standards and rules for creating the National GIS in accordance with EU standards; (5) Prepare rules associated with creating, updating, sharing, access and use of geospatial information and related services; (6) Administer geospatial information collected, processed and updated; (7) Ensures coordination of work with public and private sectors; (8) Develops and administers the National Geoportal and guarantees public access and stakeholders.

**ASIG objectives** are: (1) Creation of Geodetic framework to EU standards; (2) Establishment of national infrastructure geospatial data through Geoportal; (3) Designing and development geo-information standards and their implementation in institutions.

**The National Geoportal** is a "door" that allows professional users, and interested public, to watch and access in a very simple way geospatial data and Web services. This Geoportal is a very important step in the framework of the Open Governance (OGP). This Geoportal serve as a "bridge" for interagency cooperation within the efficiency in the civil service. It is also a necessary step in the establishment of geospatial Data Infrastructure (NSDI), a priority under-Government that brings Albania closer to the European Digital Agenda (Fig.4).



**Figure 4:** View of GeoPortal ASIG  
 [Source: <http://asig.gov.al/>]

**National Spatial Data Infrastructure** (NSDI) represents an integrated geospatial data system, enabling users to identify and access spatial information acquired from different sources, from local via national to global level, in a comprehensive manner. Spatial information unified within a common infrastructure provides a multitude of possibilities for upgrading public services, while disabling data duplication and data inconsistency. The Albania system is based on the best practice in Norway. This strategy will lead to creation of NSDI in Albania through following strategic areas: (1) Cooperation Infrastructure; (2) Spatial data and services; (3) Standardization; (4) Legal framework; (5) Geodetic reference system; (6) Financing and pricing; (7) Research, development and education.

During our works, very often we look for geoinformation as reference or to use them for different purpose. This is possible through online service and GIS technology. There are many agencies which publish online data, which can be accessed through GIS programs. The most used standards to publish this data online are WMS (Web Map Service) and WMTS (Web Map Tile Service). The most used programs are QGIS and ESRI ArcGIS. The import of the data is made through WMS/WMTS in Quantum GIS (QGIS), which is an “Open Source” platform which gives the possibility to view, edit, and analyze the geospatial data. The ASIG portal is connected with neighbor countries (*Fig.4*).

## (6) CONCLUSIONS AND RECOMENDATION

- Modern society requires high quality spatial information, and Geoinformation represents a key element for optimal resource management in decision making processes, public access and transparency;
- The Albania is now at the stage of largely including GIS technology in the management and decision making processes;
- The standards used to implement GIS platforms are based on European standards;
- The Albanian GIS portals are in open for public and connected with other countries portal;
- There are evidenced in some cases parallel GIS projects for the same objectives, reducing efficiency of funds using;
- There are unused GIS infrastructure from Government Institutions;
- There is a lack of updated information in some of institutions portal's;

- The staff of Public Administration is largely still unqualified to use GIS technology;
- It is recommended increasing of efficiency using existing GIS platforms and infrastructures in better way;
- It is recommended to create special training programs for GIS using, especially in public administration;
- It is recommended an update of the information in daily base;
- It is recommended creating of common projects between government Institutions and Universities;

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