





modern management of difficult situations based on the European model "Response Service"<sup>i</sup>.

### 3. Natural Disasters Management in Albania

Currently the responsible institution for natural disasters in Albania is General Directory of Civil Emergencies. This Directory has as its mission to strengthen the ability to prevent, protect, response and rehabilitation from the consequences of natural disasters or those caused by the human activity. The main tasks of civil protection are: Prediction of potentially dangerous phenomena or incidents; Monitoring and implementation of measures to be taken for disasters prevention and emergencies; Preparation, programming, planning, estimation, emergency intervention, and organised assistance to cope with different disasters.

Disaster management in Albania is still in its first steps of modernization, and new technologies are not fully implemented. AdriaRADNET is the most important project at the moment (partner countries in this project are Italy, Croatia and Albania), which integrates Radar system based on an information system "NETwork" to support hydro-meteorological monitoring and decision makers for civil protection. This project is financed from European Union through IPA instrument in budget of 3 million Euros.

AdriaRADNET project has as objective to create and integrate an IT infrastructure, which is flexible, interactive and based on low cost radars' network for weather monitoring. Together with satellite data and GIS models it will be a good support for the decision makers for civil protection for the Adriatic region.

### 4. Regional Cooperation for Natural Disaster Management

Natural disasters are national and regional concerns therefore regional cooperation is very important for the natural disasters management. After the fall of communism, almost all countries in the region embarked on a rapid transition from centralized systems to democracy. Immediate development of a free market economy gave rise to uncontrolled population movements, hasty construction of housing and facilities and disproportionate concentration of people in and around big cities. These developments combined with the natural factors impact caused several disasters and much more are expected to happen in the future. For all these reasons regional cooperation for natural disaster management is of special importance.

Balkan Peninsula has the most complicated tectonic in Europe and seismic activity has given a series of devastating earthquakes in the region, destroying entire villages and taking many lives. So far each country has managed these risks almost individually, through various institutions, organizations and agencies, often using different methods. But natural disasters have no national boundaries and problems such as overpopulation, construction without planning, etc., are found in many neighbor countries therefore regional cooperation for natural disasters management is much needed.

So far there is little collaborative effort in the region such as the mapping of geological risks in the Balkans using GIS technology. Through the integration of many different data layers is intended to give a broad view of how geological risks can affect a community, a country or a region. This cooperation is very important but yet insufficient. Currently regional cooperation is considered as an exchange of experiences, but still not at the level of organized actions and common management systems.

In general, the main objective of Regional cooperation is the provision of a sustainable and long term system to the citizens, businesses and countries of the region (including Albania) against natural disasters. The main goal is to assist citizens, businesses and every country to their long term financial stability and property security as well as to protect the future of the businesses to real challenges caused by natural disasters, which can occur anywhere, anytime and can affect any segment of the society.

"New Europe" is another project, which operates in the region in order to offer a unique and functional model of cooperation between public and private sector, between the governments of the Member States, recognized global institutions and the private sector, etc. The goal of this project is to provide regional cooperation and to develop mechanisms for disaster risk mitigation.

### 5. Use of GIS Technology for Natural Disasters Management in Albania

Natural disasters management in Albania is still in the early stages of modernization. Advanced technology is not yet fully involved in this process. However in academic level has begun the study of new technological application such as the examples of GIS application for disaster management. Examples below outline briefly some cases (for university purposes) of GIS application for analyses of soil erosion by rivers and the sea.

#### 5.1. Soil Erosion by Rivers

One of the examples chosen to illustrate the erosion of rivers is the case of Shkumbin River. This river (181 km long) which originates from Valamara Mountain (Albania) is one of the rivers with highest erosion level of agricultural land. Besides other factors, a very important factor that affects the continuous movement of water flow is the extraction of the inert materials (gravel) in the riverbed by some private companies (Figure 3). The riverbed deepening is 2-3 meters in a length of more than 2km. Soil loss is estimated at up to 50,000 tons per year, or 0.5 ha per year<sup>ii</sup>.

The purpose of using GIS technology in the case of Shkumbin River has to do with the study of erosion factors and their cartographic presentation. The program that is used for this purpose is ArcGIS 3.2. The data were provided by various international projects such as CORINE (land cover), Watershade (hydrographic network), etc.

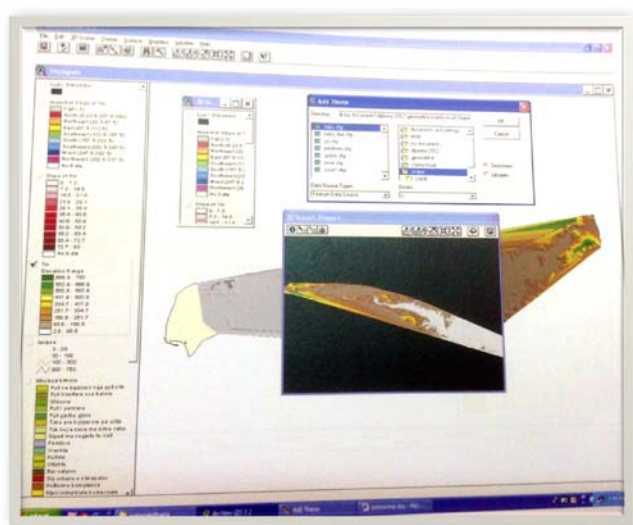


**Figure 3:** Inerts (gravel) extraction in Shkumbin river  
 [Source: <http://ekolevizja.wordpress.com/2014/04/25/librazhd>]

Based on GIS analyses it is concluded that: (1) Shkumbin River is extremely vulnerable to water erosion; (2) Protective measures against the erosion are not sufficient; (3) Legislation to protect the environment from water erosion does not implement enough; (4) There is no monitoring of damages. **Fig.4** shows GIS based map for Shkumbin River.

**5.2. Soil Erosion from the Sea Activity**

Another case of GIS technology use, for modeling and management, of natural disasters in Albania is the case of soil erosion from the sea activity. An example of this is the use of GIS to determine the coastline change. The case study is Lezha coast, which represents one of the most popular areas of the Albanian coast, with some protected areas in terms of biodiversity. Coastal erosion in this area has caused the introduction of salt water inland and introduction of invasive species, as well as the damage of the natural ecosystem and vegetation.

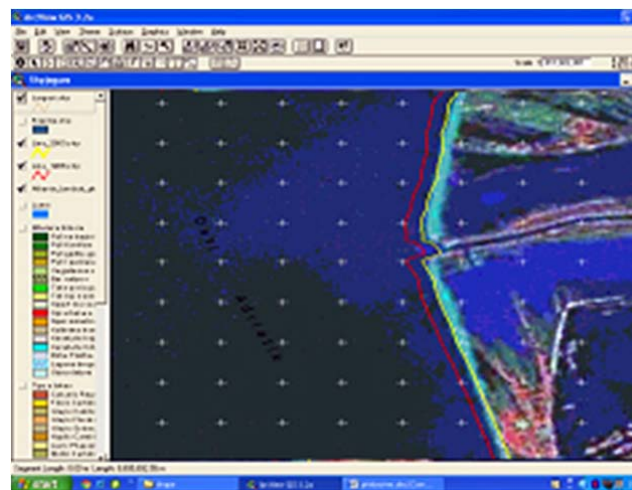


**Figure 4:** Using GIS for Shkumbin River  
 [Source: Resulaj K, 2013]

The purpose of using GIS technology in this case has been the determination of the Coastline change in Lezha bay. The

data are taken from different projects and are analyzed in ArcGIS 3.2 program. Steps taken have been: (1) Collection of information and data from various sources; (2) Digitalization of coastline over the years using topographic maps compiled in 1986 and satellite images for subsequent years; (3) Georeference of the topographic maps in AutoCAD program and determination of the coastline change; (4) Cartographic presentation of the coastline change in different periods.

The final product is the creation of the Map showing the coastline evolution in different periods. Red color line indicates the coastline in 1986 and yellow one the current coastline. It is obvious the sea advancement inland. GIS analyses showed that the coastline of Lezha has been moved 8m inland<sup>iii</sup>, (**Fig.5**). The beaches of Tale, Kuna, Vaini and Shëngjin (Lezha bay) are subject to erosion. After 1980, these beaches are facing continuous erosion of 3-13 m/year<sup>iv</sup>. At Tale beach the coastline withdraws some 2-3 m/year over a length of 2 km<sup>v</sup>.



**Figure 5:** Coastline change of Lezha bay  
 [Source: Nazarko Xh. 2013]

**6. Conclusions**

1. Albania presents a high risk to natural disasters. High risk comes as a combination of natural and human factors.
2. Main natural hazards in Albania are earthquakes, floods and erosion.
3. Management of natural disasters in Albania, and their modeling methods, is still traditional. Disaster Risk Modeling is an emerging discipline still in development.
4. The public does not have the necessary information about the risks from natural disasters, and how to be protected from them.
5. The risk from disasters is increased due to non-compliance with technical requirements in construction.
6. The approach used to estimate risks in Albania is that of probability.
7. The main problems of risk modeling in Albania are: determination of the exact natural risk, the absence of a precise Database of the endangered objects, and especially the assessment of the vulnerability to natural main risks that threaten the country: earthquakes and floods.





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