

Mapping the Environmental Damage of “Erzeni” River using GIS Technology. The Impact of the High Way Construction. *Case study Bërzhitë-Vaqarr*

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Abstract— The environmental damages of the Erzeni River are too many. One of them is the construction of the highways in generally brings high impact in environment of the area where it passes. Some damages are unrecoverable and some other need rehabilitation measures. This paper describe the environmental damages caused by different actors and the construction of the Highway Tirana – Elbasan, Albania, in the “Erzeni” River.

The damages evidenced by the paper are in water pollution; deviation of the flow direction; landslide of the banks of the river; tourism impact; agricultural effect of the polluted water in vegetation; flora and fauna; etc. The damages on the “Erzeni” river area are mapped using GIS technology giving also an approximate estimated damages. The method used is comparative using satellite images before constructing the highway and after. Actual situation is mapped using control points, by GPS and comparing with old images.

The final maps produced by the study will help the local central and local authorities to make necessary decisions. The paper gives conclusions and recommendations for the rehabilitation of environmental damages, and other measure to be undertaken during highway construction.

Keywords— Environmental damages, GIS, Highway, River

I. GENERAL INFORMATION, ERZENI RIVER

The Erzeni is a river with its origin in the mountain called “Mali me Gropa” in the altitude 1200m. It has a length of 109 km and area catchment is 760 km². The river include Tirana and Durres region and it ends in Adriatic Sea. The river passes through the city of Tirana, only a few kilometers from its southern end. (Fig.1).The average discharge rate is 18.1 m³ / s . [1] . The high way Tirana – Elbasan started in 2011 and still continue in one part where the geological problems have been occur.



Fig.1 View of Erzeni River. [Source: <https://commons.wikimedia.org/w/index.php?curid=1600538>]

II. TYPES OF ENVIRONMENTAL DAMAGES TO ERZENI RIVER

Erzeni River is one of the most polluted river in Albania. The main reason of Erzeni river pollution is the fact that he passes many urban areas, there have been a new highway constructed, the environmental protection laws is not implemented well, etc. The environmental damages of the Erzeni river zone includes: water pollution; change on landscape; reducing the agriculture land; damages on flora and fauna; change of the flow direction, waste deposits, etc. The most important factor impacting the environmental in the Erzeni River are:

A. *Exploitation of River Inertia*

This happen because as a result of the need for the development of the construction industry. This type of exploitation is done without criteria and more than the capacity of this river. The consequences of this exploitation are the change of ecosystem and the increase of floods; lowering the river bed due to erosion of the bed; erosion of side edges and agricultural lands; the great pollution of the river bed; lowering the level of groundwater, which results in the failure of some wells; as well as the creation of small swamps along the riverbed. (Fig.2).



Fig.2 Environmental damages because of Exploitation of River inertias

B. Disembark of Hospital Waste

This phenomenon is the cause of irresponsible behavior of some companies that throw hospital waste on the banks of the Erzeni River. This phenomenon has been condemned by the community and the Government has taken measures condemning the perpetrators of this situation. (Fig.3)



Fig.3 Disembark of hospital waste.

[Source: <https://shendeti.com.al/wp-content/uploads/2017/07/mbetje-spitalore.jpg>]

C. Storage of Residual Waste on the River

Residual areas discharge sewage, household waste and businesses directly into the river without any prior filtration. Likewise, in most of the rivers where the river crosses, there are no bins for waste collection and therefore residents throw waste into the river, using river banks as landfills. On the other hand the lack of infrastructure, roads, etc., brings problems in landfill waste transport.

D. River Pollution from the Recycling Industry

Many recycling companies cause significant pollution and use the Erzeni River water without the Aqua Basin Control. The lack of legislation and the lack of tariffs for the discharge of liquids produced by the treatment of polluted waters has caused this phenomenon to spread.

E. Discharge of landfill wastewater into the river

The most flagrant case of this phenomenon is the spillage of wastewater from the largest Landfill of Sharra in the city of Tirana where the wastewater flows from the land surface and end up in Erzeni River. These polluted waters also lead to the death of river fish, and other damages. (Fig.3)



Fig.3 Discharge of Sharra's landfill wastewater into the river [Photo: Mariglen Kume]

F. Damages caused by Highway construction

The Tirana-Elbasan highway has begun to be built in 2011, currently it is in operation but some special parts are still under construction due to landslide problems. The construction of this highway besides the positive sides has also brought negative ones, especially in the field of environment. The main impacts on the environment of this highway concern mainly the deposition of soils along the banks of the Erzeni River and the damage to a part of the agricultural land along the River.



Fig.4 view of the highway Tirana-Elbasan works

G. The general impact of environmental damages of the River

Damage to the environment in the Erzeni River has brought negative impacts such as: on human health; do not use water for irrigation of land; blocking exhaust pipes causing flooding. Changing the river bed; not its use for fishing and the beach; blocking of irrigation channels and those of water flow from the highway; the increase of flooding on the banks of the river; damage to tourism, etc.

H. Removal of waste from restaurants, hotels, swimming pools.

The area along the Erzeni River is an area with great tourist potential. There are many restaurants, hotels, swimming pools, etc., which give very good contribution to the economic development but need to be careful on water discharges.



Fig 5. Swimming pool near to the river [Source: Google earth]

III. USING GIS FOR MAPPING THE DAMAGED ZONES

A. Methodology

The used methodology for identification of damaged zones have is this of working on the field; making photos; control points by GPS Garmin Oregon and after the data have been elaborated with Basecamp Program, Google Earth and a GIS map is built.

B. Results

As a result of field work and imagery processing there are identified 17 damaged zones, numbered 1-17. In most of them the pollution source is industry and machinery for construction materials, inert. The others pollution source are villages, resorts, swimming pools, parking, oil deposits, landfill, etc. Fig.6 shows the satellite image with zones of pollution.



Fig. 6 Satellite image with damaged zones [Source: Image Google earth]

IV. RECOMMENDATIONS

Analyzing the zones of potential risk for pollution are recommended the following measures:

- Stop any activity on the river bed
- Construction of retaining walls of soil deposits in order not to flow into the river;
- Do not allow garbage or landfills to be deposited in the river bed;
- Immediate prohibition of discharges of contaminated water into the stream without filters;
- Rehabilitation of damaged areas, planting trees etc.;
- Establishment of waste collection bins in residential areas;

- Cleaning of irrigation channels;
- Cleaning of highway water discharge channels;
- Removal of all old machinery and waste deposited along the Riverbank;
- Enforcement of environmental legislation.

V. LITERATURE

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