

IMPACT OF ARTIFICIAL ACCUMULATION ON CLIMATE CHANGE

Petrovic Marija

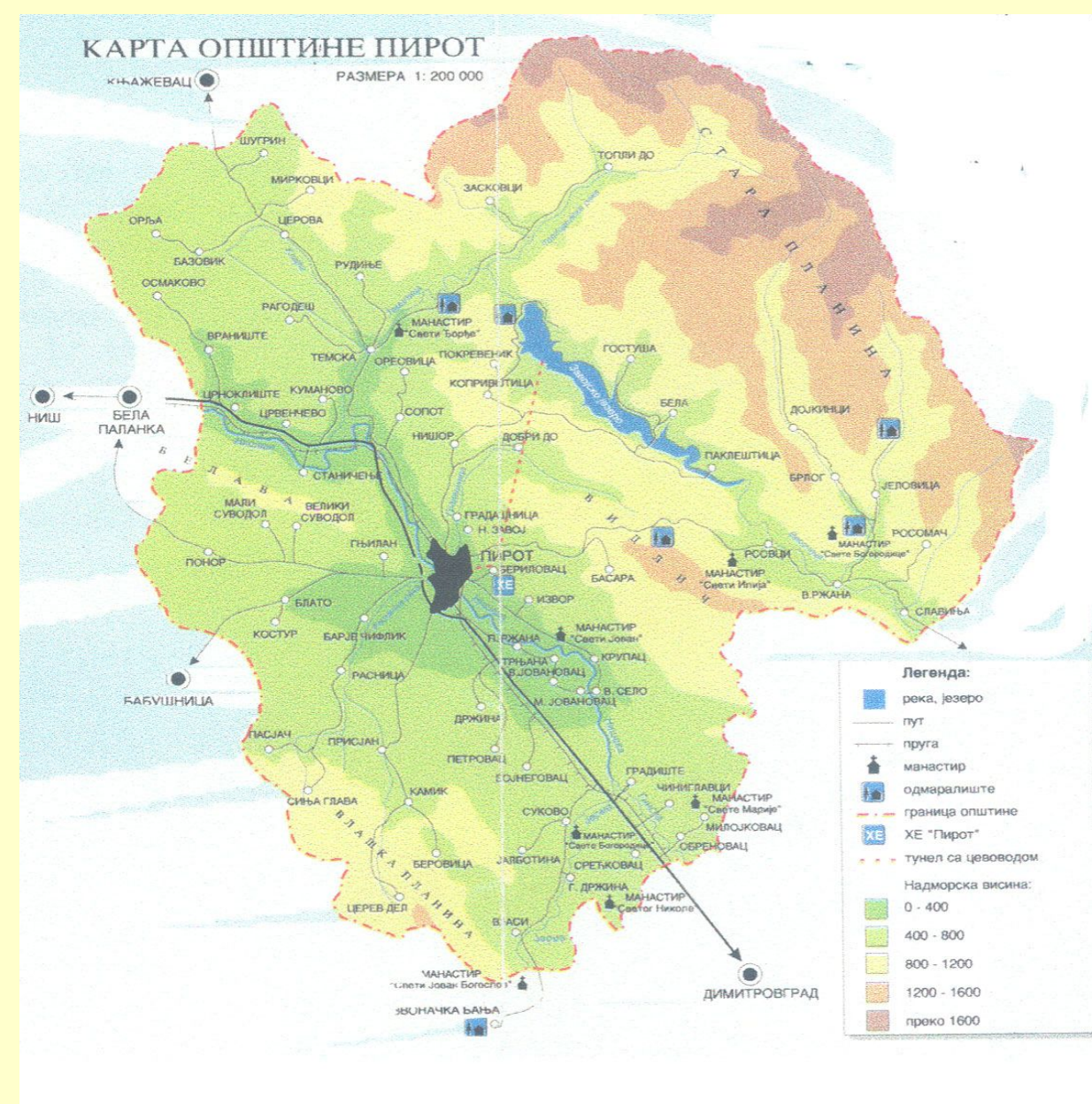
Although, hydroelectric power as a renewable energy sources are supposed to be environmental friendly, hydro plant may have a significant influence on climate change, which is a case in tropical countries where they produce CO2 and methane. In this paper it is explained how hydroelectric power plants may change local climate in region and, may become bad influence on environment. The aim of my work is to explain disadvantages of this kind of energies and to point out efficiency of GIS technology as a solution in this specific area. Also, the use of GIS in landslide management will be explained in this paper.

HYDRO PLANT "PIROT"

On February 25, year 1963, between two hills of the village Zavoј land was sliding into the defile, trough which the river Visocica flows. A five hundred meters long landmass was sliding with estimated speed of 5 km/h. In 3 days half of village Zavoј, where about 1300 people lived, was already under the water. Nature dam appeared only after a few days and it was 550 m long and 50m high. Little river Visocica become a lake with 20 mil m3 of water. After this event, the idea for building a hydroelectric power station was born.



THE LANDSLIDE



PIROT MAP

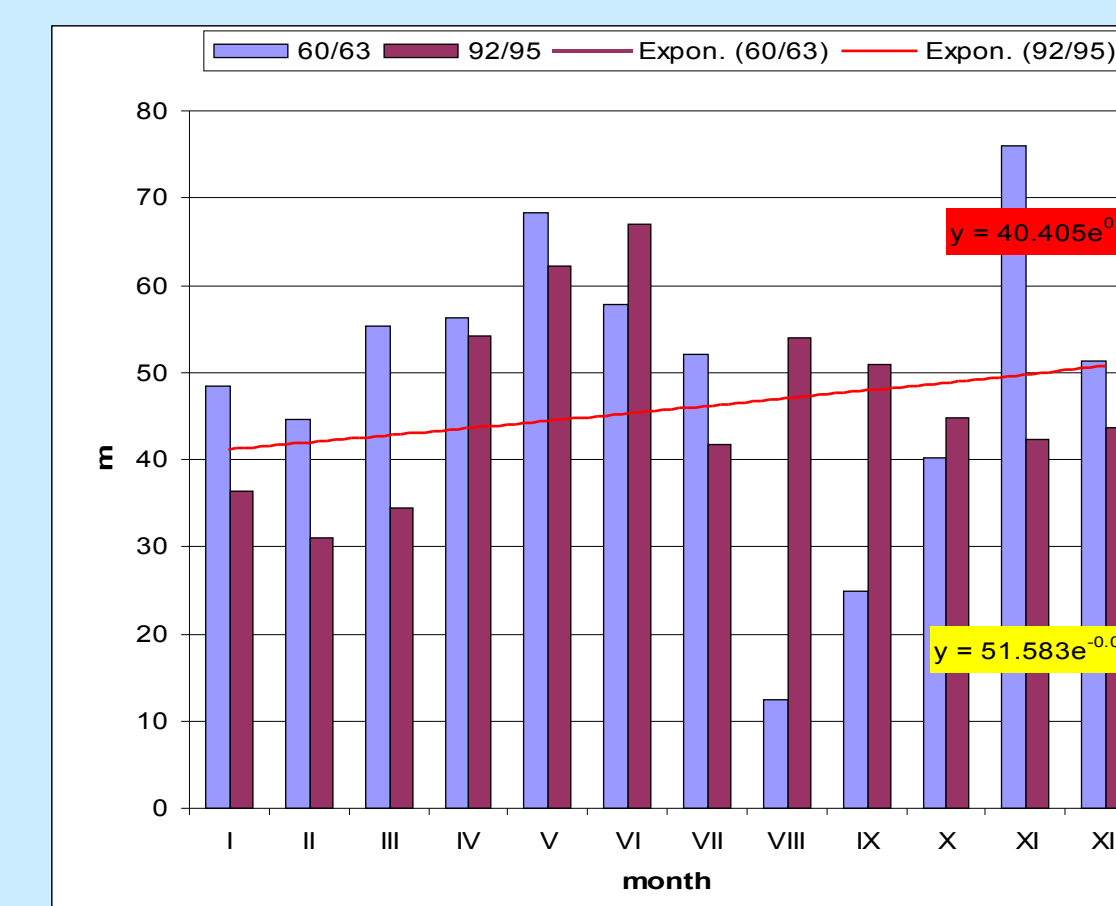
The natural lake was dried, the dam was consolidated and a hydroelectrical power plant was constructed (HE Pirot) with the artificial Lake Zavoј (area 5,53 km²; altitude 612 m; depth 60 m) instead of the dried one. Twenty years had to pass before first construction work started and finally in 1990, the hydro plant was finished.



PIROT DAM

IMPACTS OF "PIROT" HYDRO PLANT ON ENVIRONMENT

- Precipitation amount in these days is drastically changed compared to the one measured before the construction of hydroelectric station. Alteration of precipitation regimes is shown on graphic.



- Disruptive effect on surrounding aquatic ecosystem. Studies have shown that the number of fishes was reduced when hydro plant was built and that some species even became extinct. Dam was a reason for extinction of some species like brown trout (*Salmo trutta fario*), dace (*Leuciscus leuciscus*), gudgeon (*Gobio Gobio*) and bitterling (*Rhodeus sericeus amarus*) not only in lake but also in river Nisava.

- With increasing river flow due to a large amount of water that is exiting a turbine, river Nisava is now in some areas diverted, and made a new riverbed. Water flow from turbines is manifold larger than used to be, increasing the height of the water level, causing mud sedimentation and taking away all nutrient for aquatic populations.

- This hydro plant is significant due to intermittent turbines opening. The water from turbines is much more colder than in river Nisava and causing thermal shock for aquatic faunal populations.

THE OTHER DISADVANTAGES OF HYDROELECTRIC POWER PLANT

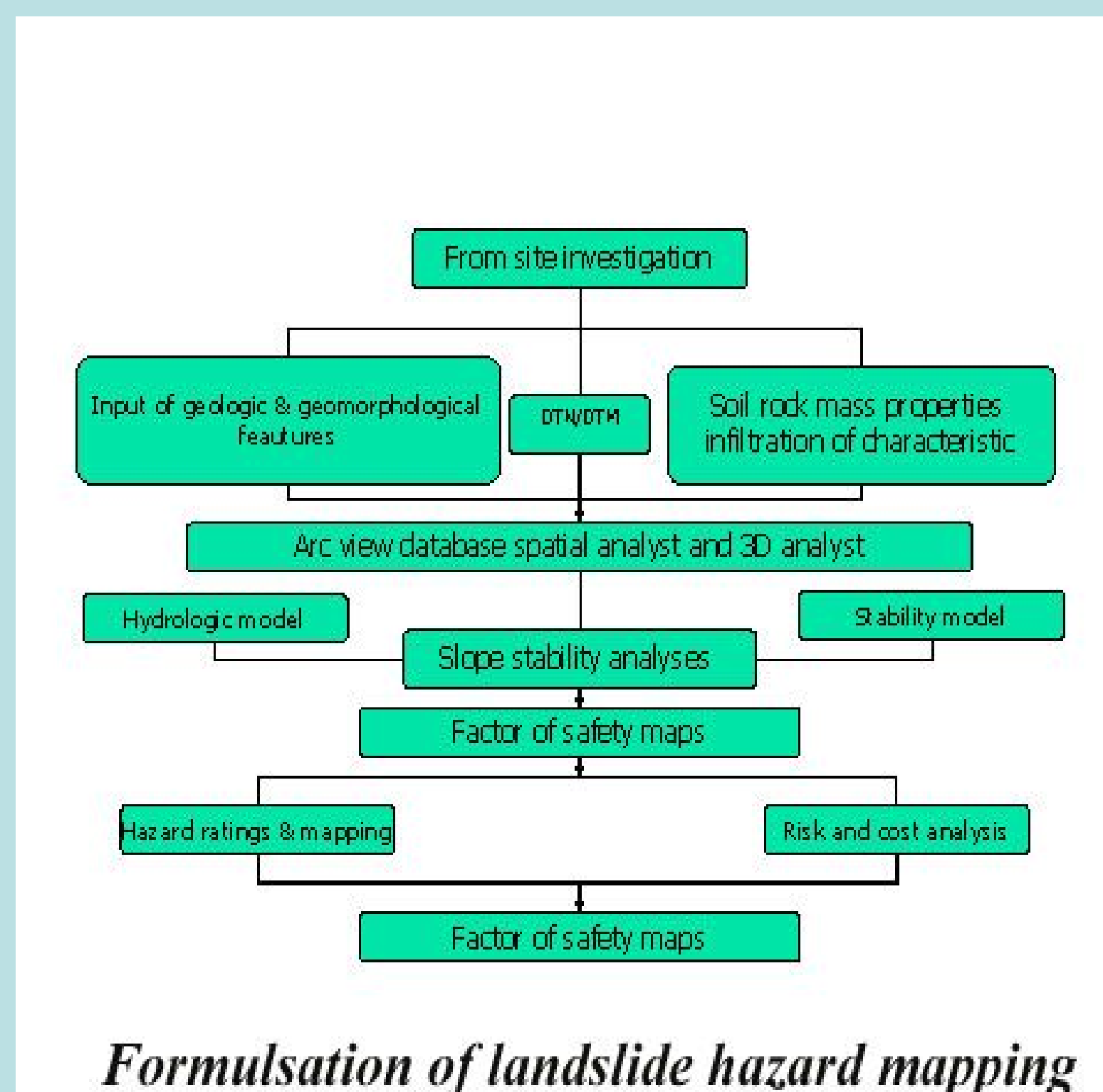
- Dams produce significant amounts of carbon dioxide and methane. Methane has a much higher impact on global warming, he is 21 times stronger then carbon dioxide's. This is typically for tropical countries then in colder regions because cold conditions will be less favorable for producing greenhouse gases.

- Hydroelectric dams implies the need for relocation of the people living where the reservoirs are planned.

- The creation of a dam in a geologically inappropriate location may cause disasters like the one of the Vajont Dam in Italy, where almost 2000 people died, in 1963. Failures of large dams, while rare, are potentially serious — the Banqiao Dam failure in China resulted in the deaths of 171,000 people and left millions homeless, more than some estimates of the death toll from the Chernobyl disaster.

GEOGRAPHIC INFORMATION SISTEM (GIS)

Geographic Information Systems (GIS) is an information system intended to work with spatially referenced data. Economic and Social Research Institute (ESRI) defining GIS as a technology who integrates common database operations such as query and statistical analyses with the unique visualization and geographic analyses benefits offered by maps. These abilities distinguish GIS from other information systems and make it valuable to a wide range of public and private enterprises for explaining events, predicting outcomes, and planning strategies. (ESRI)



HAZARD MAPPING OF LANDSLIDES

Landslide hazard maps have been constructed by different methods, but all the methods proposed are founded upon a single conceptual model. This requires:

- the mapping of the landslides over a (target) region or a subset of it (training area),

- the identification and mapping of a set of geological-morphological factors (such as rock composition and structure, bedding attitude, slope steepness and morphology, stream evolution, vegetation cover, etc.) which are directly or indirectly correlated with slope instability,

- an estimate of the relative contribution of these factors in generating slope-failures, and

- the classification of the land surface into domains of different hazard degree.

CONCLUSION

Hydroelectric power may have bad influence of environment. Before the building of the "Pirot" hydro plant, there were different kind of opinions is there was any need for its construction. People felt very suspicious in how this work would effect the environment. If the elaborate about environmental impact of hydro plant was developed, the hydro plant wouldn't have been build there.

Using GIS is necessary in understanding of complex issues such is a climate change and the impacts of this change. GIS technology brings scenarios of global climate change to researches, scientists, educators and planers. GIS can provide an active program of simulations and evaluations of climate change that can be very relevant in a decision-making.

References:

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- [3] Z, Vukusic, Geografski informacioni sistemi u funkciji upravljanja udesnim dogadjajima, seminarski rad iz predmeta "Osnovi elektrotehnike", odbranjen 2005.godine na fakultetu Zastite na radu, 2005.