CALCULATION MODEL OF THE ALTITUDE MODIFICATION AS A RESPONSE OF THE GEOMORPHOLOGIC SYSTEM FOLLOWING ANTHROPOGENIC ACTIVITIES OF MINERAL RESOURCES EXPLOITATION

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ABSTRACT: *Geomorphologic system response is primarily dependent on the intensity and frequency of anthropogenic exploitation activities held on a geomorphologic resources, and secondly, by the geological, meteorological and soil variables. The most important environmental variables are: quantity of precipitation, wind intensity, type of rock, soil erosion etc.*

Using the proposed calculation method, we want to quantify the result of the exploitation of mineral resources on the relief. The end result, expressed in value, being in fact the geomorphological system response to these human-induced disturbance.

KEYWORDS:*geomorphological system, human activity, calculation model*

1. INTRODUCTION

The need to address the problem of extreme phenomena in systemic perspective is appropriate for itself if we consider the fact that in the genesis and manifestation of the risks, a determining role it holds on condition of "causal interface". This condition involves extreme phenomena within the potenţializarea of a set of factors and alike, through diversification of their considerable upgrade, in terms of "target" effects. As a result, the attributes as well as systemic complexity, completeness, unity, functionality are deeply involved in the expression of the non-linear evolutionary systems.

Human modeling differs from the natural one, by the degree of intensity, the manifestation, the complexity and design of the products, by printing an irreversible trend to the territory. Thus, areas with positive forms of relief, subject to anthropogenic modeling, were transformed from its original form to a flat form, and flat surfaces have been uplifted with tens of meters. As a result of the feedback it generates a new spatial size and territorial planning, resulting in the occurrence of inversions final relief and critical environments.

Critical environments, seen as a product of the ambient system malfunction caused by human intervention, in the form of threshold, characterized by phenomena of information and energy disruption which detracts from or do disappear entirely the internal capacity of the system to be autoregla and to ensure a dynamic equilibrium [5].

Unpredictability, uncertainty, the apparent indeterminacy and surprising character building and the succession of status, representing all of the traits of a system at risk. They are undecided character paths for energy imbalances that occur on the evolutionary trajectory of the system.

Natural geomorphological modeling processes are represented by fluvial modelling system, glacial, marine, wind or oceanic, as well as the tectonic. Anthropogenic processes that have a modeling effect on relief by printing a certain touch to the landscape are: agricultural techniques and processes, construction (buildings, roads), the processes of extraction and processing of minerals, military actions, and others [1].

We can affirm that human activity is like the weather, is manifested every day is widespread and is found in an ever-changing, affecting both the natural and the human society through its manifestations.

The evolution of the socio-economic causes of acceleration-induced environmental components, and the answer it is apparent by highlighting the conflicting relations on the ground. As technological development and spatial extent of anthropic compound was an amplification of the conflicting relationships with the natural environment.

Through the activities of minerals extraction and processing, spaces which are at a relatively steady, changes the dynamics in a backward acceleration, generating other landscapes which function in an advanced degree of entropy. Geomorphological elements are changed, it creates new superficial formations and accelerates their physical-chemical processes of hipergen.

2. PRESENTATION OF THE CALCULATION MODEL

In designing this model of calculation has started from the premise that any anthropogenic change of the landscape will ultimately result in a contrasting image within the natural landscape, even though it will be subsequently rehabilitated.

It has been taken into acount the relative elevation of the anthropic surface, the original elevation, the newly created form of relief, the tendency of subsidence (sinking rate), the erosion feature of the material that forms the new form of relief and the average quantity of precipitation.

So we have proposed the following formula for calculation:

$$\mathbf{H_f = (H_i - R_s) \cdot C_e \cdot P} \qquad [1]$$

Where:

H_f – relative elevation of the anthropic surface;
H_i – the original elevation;
R_s – the tendency of subsidence (sinking rate);
C_e – the erosion feature of the material;
P – the average quantity of precipitation;
S – surface (1 km^2);

Taking into account that we determine the changing rate of altitude per year respectively per surface area is considered to be constant i.e. does not affect the result. We put a set of parameters, however, because this is right. The Formula is applied per year (by admitting that the given values are the respective constants). Of course it is possible each year to be different values. It is Important to demonstrate how to apply in an year. After that it may change depending on the new values.

Using problem-solving as a way of expressing those exposed earlier, then we could make by way of example the following problem or situation:

- If in 2004, the initial relief had an altitude of 650 m, and in 2014 the relief has an altitude of 675 m, bearing in mind that the rate of sinking basin is 4 mm/year and erosion coefficient of the constituent material is 0.03, a quantity of 120 mm precipitation/year, can you calculate which was the average rate of change of the relief on the surface (1 km^2), over a year.

Solution:

Definition of parameters set:

H_i = the original elevation (650 m)
H_f = relative elevation of the anthropic surface (675 m)
S = surface (1 km^2)
R_s = the tendency of subsidence (sinking rate 4 mm/an)
Ce = the erosion feature of the material (0,03 - 0,04)
$P|_{an}$ = the average quantity of precipitation (120 mm/an)

For a start it has to be made all transformations in meters (we work with meters and as a result the final outcome will represent a quantity in m/year, Figure 1).

H_i = 650 m

R_s = 4 mm/year = 0.004 m/year

C_e = 0.03

$P|_{an}$ = 120 mm/year = 0.12 m/year

Then $\mathbf{H_f = (H_i - R_s) \cdot C_e \cdot P}$

= (650-0.004)*0.03*0.12

= 649.996*0.03*0.12 =

= (649 996 *3*12)/10 000 000 =

= 2,339 ~ 2,34

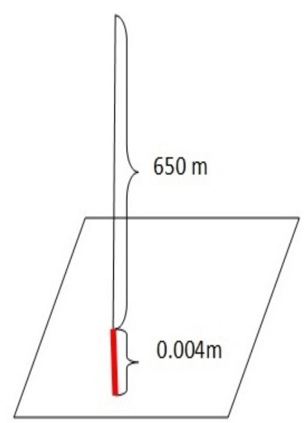

Figure 1. Graphic elevation

Observation:

The rate of altitude change in one year depends on the variables and that is Hf (Figure 1). If we are talking about an area that has a negative erosion coefficient, then we have a decrease of its initial data.

3. CONCLUSIONS

One component of the concept of "sustainable development" is the impacts management of socio-economic activities on the environment. Keeping the control assumes knowledge of the impact of the phenomenon, which presumes the stages of identification, estimation, evaluation, etc.

It should be mentioned that generally distinguishes a dynamism and a trend of improvement in the rules on the identification of the relationship between a particular activity or product, with the environment and minimize eventual negative environmental impact.

It is well known that any human activity has a wide range of implications that can be felt in the most diverse fields. In general, you should take into account the whole spectrum of implications of indirect effects, in some cases exceeding, the importance of direct ones.

In a brief definition, anthropic impact assessment seeks the scientific investigation of geomorphological complex effects resulting from the impact of anthropogenic activities on the structure and original morphology land.

By estimating the induced effects of human impact on the morphology of the terrain means the quantitative assessment and/or quality of geomorphological processes or phenomena. Often, given the novelty of the issues, lack of previous or similar data, extremely diverse nature of the effects, the uncertainty and the multitude of interactions with other environmental factors, predicting in qualitative terms may be the only solution, and may require the use of quantitative estimation of mathematical and physical models, to provide a basis for the interpretation of the obtained results [2, 4].

On the base of effects estimation is the size, being determined by the level of indicators characterising the effects. The size of the effects, as assessed through indicators always relate to the reference level, to certain standards, at intervals of admissibility.

The main advantage of quantification is the precision more akin to phenomenon, especially where comparisons over time and space. Numerical estimation can be used where the terms are ambiguous [3].

The aim of creation and subsequent use of this model is to be able to monitor in time and otherwise to present graphics in a soft the dynamic geomorphological system's evolution from a territory, depending on the type of human impact. In this way, having set the parameters on the basis of statistical data, one can have a clear picture of the "evolution" of the new created landforms.

4. REFERENCES

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