

# MAN-MADE INFLUENCE ON GEOLOGICAL ENVIRONMENT OF THE UKRAINIAN CARPATHIANS

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**Abstract:** Influences of economic activity on a condition and processes in geological environment of Ukrainian Carpathians are considered. Characteristic influences of an agriculture, forestry, building, mining, transport, power economic are marked. The changes of a condition and character of processes in geological environment of the mountain countries occur owing to man-made breaches of a vegetative cover, conditions of a underground and superficial drain, static and dynamic overloading of the slopes.

**Key words:** mountain, economic activity, geological environment, geodynamic processes.

The geological environment of the Ukrainian Carpathians as a part of the earth's crust of this region, that undergo influences of economic activity, is constantly increased in volume owing to last expansion and intensification. All kinds of economic activity in Carpathians as in the mountain country are much complicated.

Sharp dismemberment of the relief, high its dynamic, large steepness of slopes, the high-altitude changing of a climate define in the basic life and activity of the human society in Carpathians, constrain and complicate their economic development. However, and under these circumstances the economic activity at the moment has appreciably affected a condition of geological environment and processes proceeding in it.

All main kinds of economic activity directly use geological environment and influence on its condition and on dynamic processes developing in it. The influences of economic activity on an environment are subdivided on direct and indirect, long and short-term. The direct influences are displayed directly during economic activity at changes of a vegetative cover, lay-out and built - up of territory, changes of superficial and underground drains. The indirect influences have an effect in influences, which will render reduction of a wood, pastures, sowing areas. The direct influences cause primary consequences - development of erosion, landslides, rock falls, mud-flows; the indirect influences cause

secondary consequences - changes of a microclimate, deterioration of conditions of residing.

The consequences of man-made disturbances of the natural state and conditions of geological environment are marked as well as convertible and irreversible, eliminated by realisation of certain measures and unavoidable. To convertible it is possible to relate breaches of a vegetative cover, to irreversible of a various reorganisation relief, changes of a hydrographic network.

Breaches of a water regulative role of a wood, and also direct violation of conditions of a drain and drainage, expressing in damming constant and temporary streams though themselves are restorable, result in non-recoverable consequences – to destruction of slopes, development of a rock falls, mud -flows, landslides, floods, that became of the natural calamity in Carpathians area in the autumn 1998 and in the spring 2001.

On influence on geological environment, on intensity of changes caused by these influence it is necessary to put on the first place in Ukrainian Carpathians transport construction[1], then hydraulic engineering and civil construction, and also development connected to them of raw material for building and forestry [2].

The rather serious direct and long influence on geological environment render development of raw material for building, output in the basic open way. The basic group of deposits of raw materials for building is made with diverse building stones, used as ashler, facing and decorative, for manufacturing of the rubble, crushed stone, additives to road coverings. In these purposes are widely used volcanic rock. Large mechanised quarry on production of a building stone are available in Zakarpatye area. As the building materials are developed deposits of volcanic tuff. Valuable qualities as raw material for building have sandstones, aleurolites and argillites of the age Cretaceous and Paleogene.

Are widely developed as raw material for building calcareous rocks. From them the most valuable are the deposits of the marbleised limestone. The deposits of the marbleised limestone are concentrated in an axial part of a Carpathians Internal anticlinal zone. Age of the limestone – Cretaceous and Jurassic. Their outcrops are observed in Zakarpatye area as two narrow faltering strips of width up to 1 km northern and southern, taking place on distance of 5-10 km one from other.

In a Rahiv zone marbleised limestone compose the core of the synclinal structures or represent the separate klippes. Marbleised limestone is folded in complicated manner,

dislocated and broken by cracks on separate blocks and sites over thrust the younger sediments.

The majority developed quarries of raw material for building in Carpathians are incorporated on their natural outcrops on a day time surface as separate rock mass, abrupt break-over, outcrops. In accordance with development of deposits, opening of new horizons occurs breaches of natural conditions on the large areas.

Rather adverse consequences of development of deposits of raw material for building materials are established in many cases. So, for example, development of a deposit of a marble near Rahiv (Zakarpatskye area), has resulted in creation a mud-flows dangerous situation on slopes of a mountain Bevcool, repeatedly realised during downpours, that brought in destruction of separate structures, destruction of crops and arable land, breach of a channel stream Bilaiv.

The further development of this deposits has required ordering of a spoil area on a mountain Bevcool, stream clearing and realisation of mud-flows protection measures. The serious complications on a railway line pass Uzok - Uzgorod repeatedly arose because of located are close to open pit on production of building stones from effusive rock near Uzgorod. Landslide of the spoil bank in the winter 1988 has blocked railway, than breaks in a movement of trains were caused.

In significant volumes at road and hydraulic engineering construction are used alluvial deposits. The output of gravel and pebbles in channels and on river-plat is conducted in many places. In a number of cases this caused breaches of the rivers hydrologic modes and activity of erosion and slopes gravitational processes.

The development of raw material for building in large scales can involve also appreciable changes of ecological conditions of region.

Besides production of raw material for building in Carpathians are conducted in small volumes output of petroleum. Influence of these development to change engineering geological and ecological conditions in Ukrainian Carpathians are investigated not enough.

In connection with rich reserves of water resources in mountain regions Ukrainian Carpathians the large importance for this territory has hydraulic engineering construction, directed on regulations and use of these resources.

Non-uniformity of a drain of the mountain rivers, the presence in its mode several floods, especially in multiwater years (1911, 1927, 1941, 1955, 1964, 1969, 1980 1993,

1998, 2001), makes a problem of regulation and management of a mode of a drain rather urgent.

One of the basic control facility water resources for its uses in different purposes is creation of reservoirs. The reservoirs on the mountain rivers in Carpathians form for a long time and in the various purposes – for improvement of conditions of the timber floating, power purposes, for prevention of the floods. The reservoirs on the rivers for the timber floating were under construction in XIX – beginning XX a century for increase of depth and reduction the speeds of current of the rivers. In 1930-60th years along mountain parts of Dniestr and Tyssa tributaries for taking out of a timber are constructed of the narrow-gauge railway. After this small dams have begun to be destroyed. The timber floating until recently was performed only on the rivers of Cheremosh pool, where there are 26 small reservoirs.

In the latter of a decade in Ukrainian Carpathians are projected a reservoirs of multitarget purpose for regulation of a floods drain, water supply, production of the electric power are built.

One of the largest hydrostructures of region is Rovine reservoir on the Stryj river. The dam plugs the river in the narrowest place near village Sopot. Common capacity of reservoir will make 175 millions cub. m. On period of the dam building the basic current of the river was allocated on two 450-meter underground channels, in which hereinafter will be used as a gutter. The basic purpose of a hydrocomplex was the protection of the lower located territories from floods and water supply.

Designing reservoirs will be performed at the rate of their existence and preservation of useful volume in period no less than 50 years. A major factor, determining service life of mountain reservoirs, is filling them by silt.

The granular structure of the silt, acting in reservoirs, is determined by many factors, among which major are a geological structure and steepness of a channel on a site of reservoir, the climatic conditions, economic activity in pool. The quantity of the involved and weighed drift, for example, sharply grows on sites of cutting down a wood.

Directly to a mode of a drain are connected also activity an ancient and occurrence new landslides on coastal slopes of the mountain rivers.

The creation of reservoirs reduces adverse influence on slopes below dams. In limits of the upper pool the rise of a level of water will on different influence stability of slopes. On the one hand, are excluded the frequent and sharp rises and abatement of a level during the floods, disturbing of the slopes, with other the filling of reservoirs

causes backwater and increase of levels of underground waters, especially in slopes sediment, that reduces stability last [3].

The problem of regulation of a superficial drain in Carpathians is rather important and urgent and requires further all-round geological and engineering geological researches, including detailed study of a condition of slopes with the forecast of their possible reactions to change of hydrometeorological conditions and influence of a man-made factors [4].

Rather appreciable influence on geological environment of the Ukrainian Carpathians, on character of geological processes render forestry with wood cutting and taking out of timber leading to activity of landslides, mud-flows, directly communicates.

Estimating a condition of geological environment in Ukrainian Carpathians, we come to a conclusion, that ecological load on separate sites at the moment reach limiting. Are especially loaded valleys of the rivers, where place on a little bit transport highways, settlements and industrial objects. Taking into account rather high sanitation value of territory, the presence of many monuments of a nature, perspective is hereinafter expansion in Ukrainian Carpathians of a network of reserves, reserved territories and reservations.

The basic ways of optimisation of a condition of geological environment in Ukrainian Carpathians are:

- Limiting restriction of further breaches of a vegetative and soil cover. Prohibitions of a wood cutting on slopes more than 20°. To carry out forest plantation abrupt slopes, places of development landslides and mud flows.
- Perfection of general plans of cities and a resort zones on the basis of the all-round and complete account of the natural factor, the planing and building of linear objects; system of construction and operation of water objects, systems of clearing of waste waters, methods of slopes strengthening, protection of the banks, systems of protection from landslides and mud-flows. The development in an industry of waste-free and slightly waste technologies.
- Complex use of deposits of useful mineral. Recovery of exhausted territories. Development of a network of state reserves, reservations, security territories and monuments of a nature.
- Scientific substantiation of rational use of natural resources Ukrainian Carpathians, perfection of methods of engineering-geological researches with the purpose of duly revealing, estimation and forecast of the exogenic geological processes.

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