SYNERGETIC MODELS AND GEOLOGICAL RISK ANALYSIS

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At present, virtually all natural disasters appear to be a result of several natural and human-induced processes, which synergistically intensify each other. For example, the damage from the bulk of earthquakes could have been significantly less, if, first, their epicenters had not been unwarrantedly urbanized and, second, no rise in the ground-water level up to critical (3--4 m) values had occurred due to the leakage from supply lines. The latter phenomena intensify (by 1--2 points) the seismic shocks and result in a decrease in the strength of soils and rocks; their deliquescence; the development of landslides, rockfalls, mudflows, and collapses. The risk analysis itself can be represented as a cyclic synergetic process including the following steps: (1) the identification and the probabilistically determined prediction of type, place, intensity, time of occurrence, and exposure time of hazards; (2) the estimation of vulnerability of economic objects and population to these hazards; (3) the estimation of social, economic, and environmental risks of losses with the allowance for their undesirable synergetic effects; (4) the risk management. In these procedure, every new cycle of risk analysis starts after the measures on diminishing possible losses have been taken. Thus, the feedback control is performed; whereas, the risk analysis becomes a self-regulating (synergetic) process, which either intensifies or weakens depending on the results obtained on its previous stages.