



ENGINEERING GEOLOGY – A GLANCE IN THE FUTURE

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In its almost one century of official existence, engineering geology has been developed as an acknowledged important and necessary science with, in a number of cases, extreme significance for modern civilization. If K. Terzaghi could be able to see the progress of the science that he founded in the beginning of the past century he should have felt well-deserved satisfaction (Terzaghi, 1934). Due to its complexity, material culture becomes still more sensitive and vulnerable to the effect of various natural disasters. The emergence of megapolises, transcontinental communications, complex power generation structures, including nuclear power stations, large dams, etc., has brought greater challenges and requirements towards our science. The transformations in society, including changes at global level, have set forth new tasks and aims in front of science. The first heralds of the planetary scope of engineering geology have appeared (Dearman, Sergeev, Shibakova, 1989). The most important object at present is to transform the still growing conflict in the system "man-environment" into harmony. This general formulation implies a long series of distributed in time problems, delineating prospects for the development of engineering geology far in the future. This is also enhanced by the circumstance that human activities have reached the range and impact of a geological factor focused on increasing the instability of the environment. This fact provides the ground to assume that the Earth has entered a new geological epoch (Ter-Stepanian, 1985).

It is impending that engineering geology will broaden its subject and range in new areas and directions due to the necessity of trans-border project realization, solution of problems of expanding economic unions, for example the European Union, globalization of a number of activities, execution of programmes for settlement of bases on other spatial bodies, etc. The share of engineering geology in these undertakings is significant (Fig. 1).

Besides this, the exhausting possibilities of the Earth's surface of enduring further urbanization loading will provoke the utilization of territories with unfavourable engineering geological conditions, bigger depths of the underground space, shallow water along marine and oceanic coastlines. In suitable cases the protection of coasts could be even situated on artificial islands and peninsulas intended for versatile purposes. Low lands built of weak sediments with deficiency in their bearing capacity will need artificial improvement. It will be still more important to know, preserve and protect every square meter of the dry land and water surface. Hewing forests for example, leads to a long chain of mutually related dangerous and destructive processes with extremely negative consequences for nature and society (Fig. 2).

The historical and contemporary experience showed that the territory of Bulgaria is characterized by complex and difficult engineering geological conditions and this requires that

the modern development of the country should be consistent with them. The engineering geology itself is also subjected to trial since it needs ascending to a higher stage in its development in order to solve the problems it has faced.

These problems are:

- Ensuring information, assessments and substantiations for the engineering geological conditions (geotechnical resources) in the country and parts of it, where future urbanization process is going to occur;
- Decreasing the geological hazards, reducing the consequences and losses to acceptable levels, protecting the life and health of the population; Protection of the Danubian riparian area and the Black Sea coastline and risk regions in the interior of the country; the dangerous trend is outlined for the Black Sea zone to be overpopulated and covered with asphalt and concrete and as a final result – destroyed as a resort area;
- Scientific substantiation of the alignments of transport corridors, sites of power generation objects (nuclear, thermal, hydraulic, gas power plants) and their affiliated infrastructure;
- Participation in the preservation of environment and rehabilitating disturbed terrains and abandoned mining and industrial enterprises, refuse dumps, tailing ponds, landfills, burial grounds, etc.; The permanent disposal of radioactive waste is a special problem.

Necessary research and applied activities

- Compilation of an Atlas and maps at different scales – from review ones for the whole country to urban planning ones for settlement territories: engineering geological, hazard, risk, geoecological, geoarchaeological, etc.; This requires the construction, maintenance and amendment of a specialized information system;
- Construction of a monitoring network on a national, regional and local level, according to the requirements of the objects, for controlling geodynamic processes: slow tectonic movements, earthquakes, landslides, erosion, sea erosion, subsidence, collapse, groundwater; The combinations between different methods are effective and provide possibilities for comparison: distant, geodetic, geophysical, optical, inclinometric, tensiometric methods; Useful information can be obtained by applying geobotanical, archaeological, historical methods;
- Assessment of the engineering geological conditions with respect to the status of the historical heritage – cultural layers, Thracian tumuli, palaces, fortresses, churches, monasteries, bridges, water supply ducts and other facilities; The lessons from such analysis concerning longer time periods complement the results from contemporary studies, fixing the present moment situation; This resembles the inverse problem solutions and helps the elaboration of more motivated predictions;

• Improvement of the administrative status of engineering geology in the state hierarchy, development of the normative basis, its coordination with the respective Eurocodes and conformity to the world standards and achievements.

Whether the chosen by khan Asparouh land for permanent dwelling of his tribe will be a piece of paradise, bestowed by God, or a stony desert – this depends entirely on the hosts of this precious land.

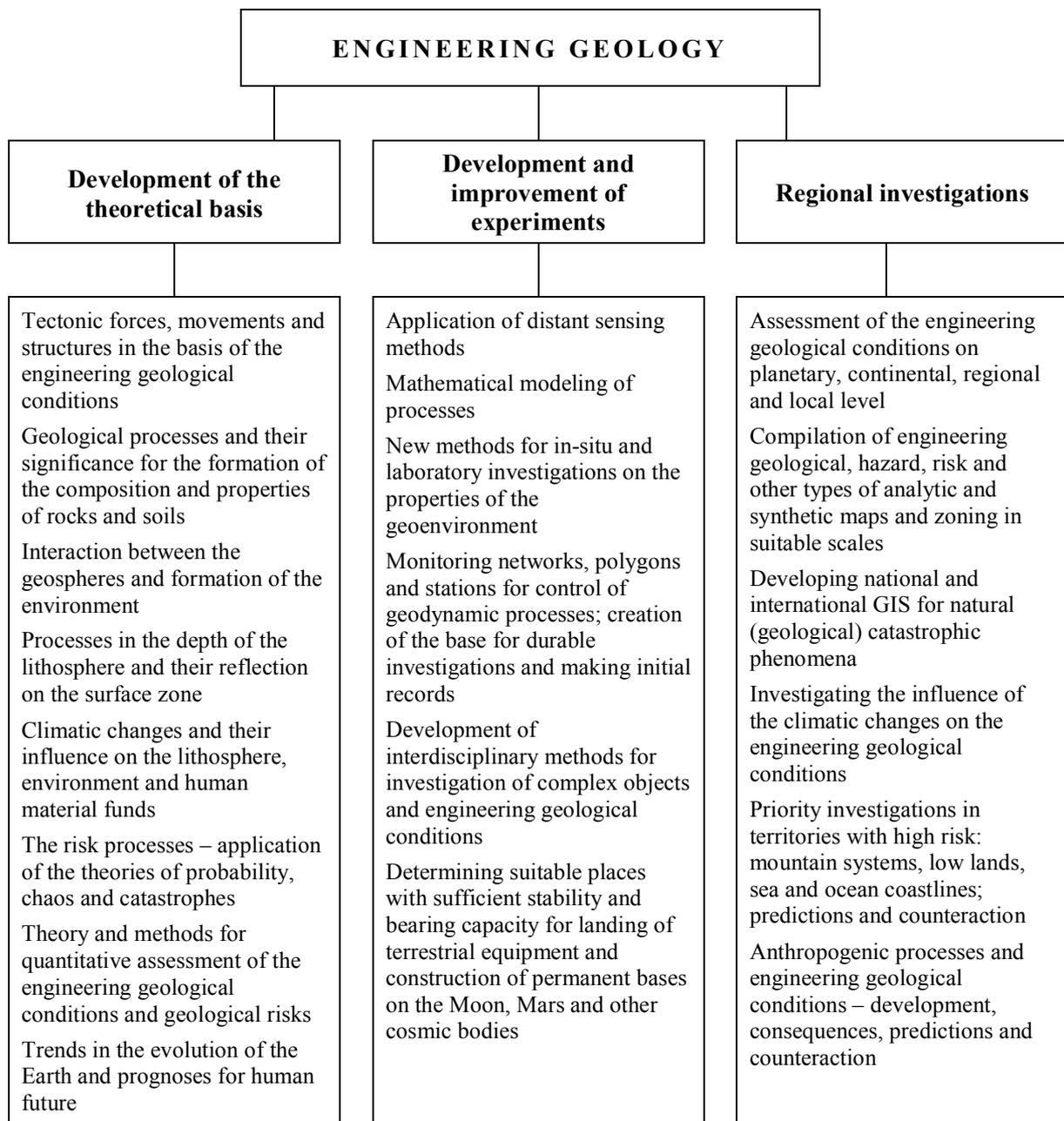


Fig. 1. Engineering geology and its development in the future

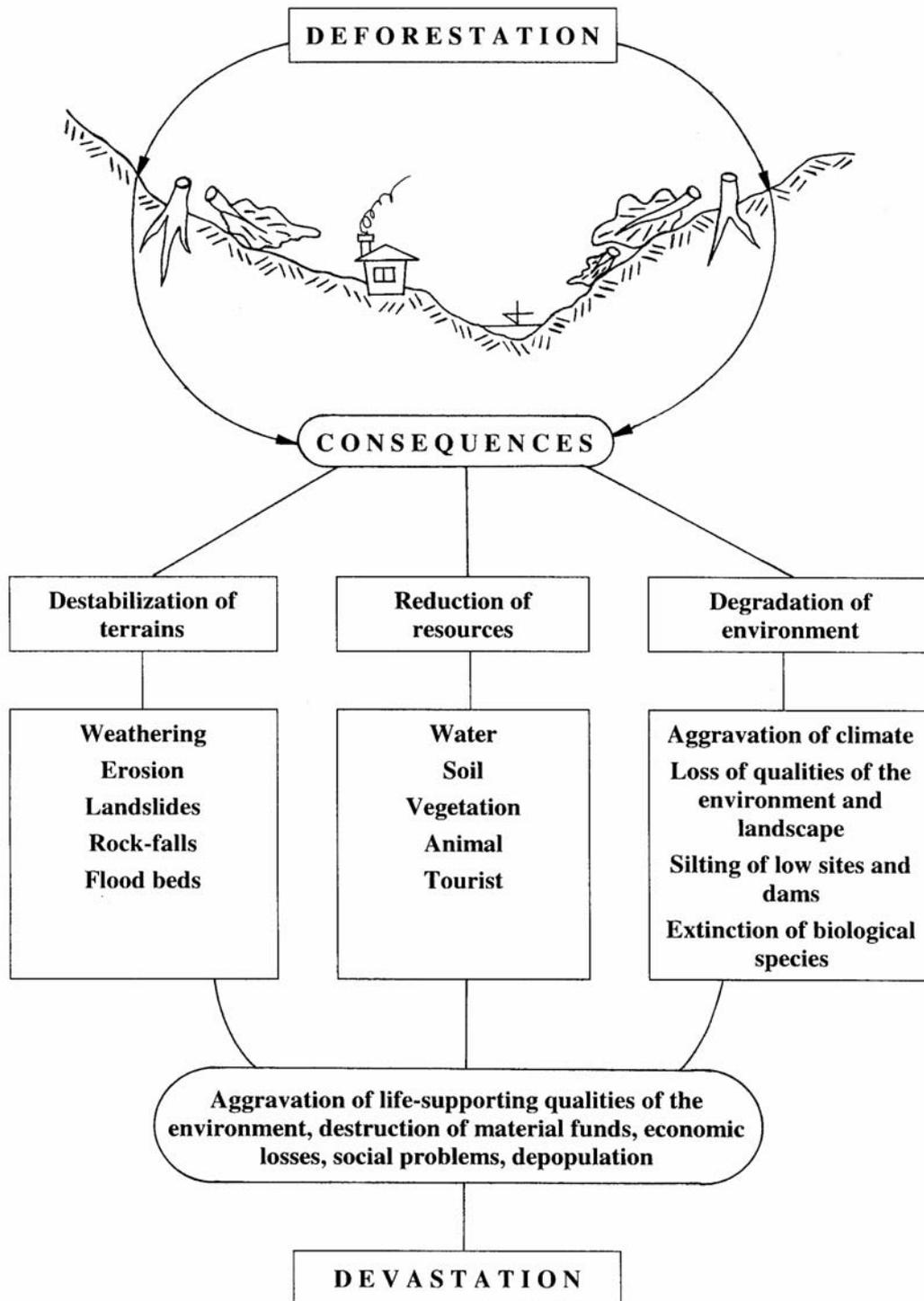


Fig. 2. Consequences from deforestation

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