# GEOLOGICAL ENVIRONMENT CAPACITY ASSESSMENT IN THE VICINITY OF NUCLEAR FUEL CYCLE FACILITIES

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One of the basic principles of the Earth sciences – the carrying capacity principle – enables to bring human activities into balance with the Earth's resource base. This principle is being reexamined for recent decades as humans' actions are depleting the Earth's natural capital, putting severe strain on the environment. By geological environment (geoenvironment) we consider the upper part of the lithosphere which directly influences the society conditions for development which human beings exploit and convert (Hrasna, 2002).

Theoretical limit to the capacity a natural ecosystem to support continued increase in consumption of its resources and in generation of pollution without being overwhelmed. It depends mainly on factors such as the territory anthropogenic load, population size and density, and rate of renewability of its resources.

Nuclear fuel cycle facilities (NFCF) including nuclear power plants (NPP) and uranium recovery facilities (URF) are those of the most anthropogenic threats to the environment and can cause irreversible landscape changes. The facilities are unevenly spread through the territory of Ukraine. They are mainly located in the forest-steppe landscape zone and their operation is accompanied by condemnation of considerable areas of fertile agricultural lands, predominantly chernozems. After temporal use, the last ones are often transferred to a category of an anthropogenic badland. The average uranium concentration of this waste material is less than 100 ppm. Next to each dumped fill of empty rocks, a risk zone is allotted that leads to the significant loss of the land resources. Within such zones, the atmospheric air is polluted and the soils are salinized and waterlogged that makes impossible to use them in agriculture. Considerable areas are occupied with the solid wastes from reclamation industry, namely with ash dumps, storage tales, sludge pits. They have a significant amount of toxic elements that contaminate the atmospheric air.

Given the increasing stress on the Earth's ecosystems it is essential that the research data and their interpretations are of the highest technical standard. Remote sensing techniques are those able to provide the required quality level and can be effectively used for studying land quality deterioration indicators as well as for change detecting the risk of degradation in anthropogenically loaded areas during a certain period of time. Furthermore, the use of satellite imagery allows covering hard-to-reach areas of research especially contaminated with radioactive materials.

For the purpose of geoecological environment capacity assessment the authors have produced a number of thematic landscape changes maps obtained as a result of multispectral imagery processing, allowed assessing the state and trends in land degradation processes within the territories of NPP and URF location [1-2]. To continue the research it is meant a deeper consideration of geology and geomorphology factors together with soil, vegetation, land cover and land use ones taking into account the radiation capacity factor for the territories of NFCF location. The results obtained are supposed to show the impact assessments of vulnerability of the human-environment system under such environmental changes.

1. Дудар Т.В., Станкевич С.А., Тимошенко Я.О., Бугера М.А. Дистанційне картування змін ландшафтів під впливом антропогенного навантаження в районах видобування урану // Збірник наукових праць "Техногенно-екологічна безпека та цивільний захист", 2014 - Вип. № 6.- Київ: Інститут геохімії навколишнього середовища НАН України.- Р.82-88.

2. Stankevich S., Lysychenko G., Dudar T. Remote assessment of chernozem soils degradation in the vicinity of nuclear industry facilities: South-Ukrainian Power-Generation Area Case Study. Chemical and radiation safety: problems and solutions/ Abstracts and Announcement. – K., 19-22.05.2015. – P. 44-45.