

Jan Evangelista Purkyně University in Ústí nad Labem

Faculty of Environment

Study material

RECLAMATION, RESTORATION, REMEDIATION AND
ADAPTATION OF LANDSCAPE

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Objectives

This principal course is focused on the gain of deep understanding of natural and antropogenic processes that can be used for reclamation or restoration of changed or damaged land, remediation of polluted land and adaptation of the cultural land to climatic changes. This course presumes fundamental knowledge in landscape ecology, pedology and biogeochemical cycles from prequel grades. Students will gain deep knowledge in antropogenic interventions in the landscape. They will understand the theoretical foundations of scientific disciplines, from which reclamation and revitalization of the landscape is based on various spatial scales. Positive examples of revitalization in practice will be presented and evaluated. Also the soil remediation technologies will be overviewed. The aim of the applied part is to acquire the knowledge needed to assess the degree of disturbance of the landscape, decide on the need for revitalization, develop a proposal for revitalization measures and determine the success of the intervention by monitoring the further development of revitalized areas. The student will gain knowledge of reclamation of various orms – forestry, agricultural, hydrological and others. They will get acquainted with the issue of evaluating the effects of human activity on the soil in a positive and negative sense, gain knowledge in the manifestations of antropization in the soil profile and in the landscape, regional and global, including the specifics of urban areas.

Study topics

1. Antropogenic interventions and their impact on soil - influence of human activities on landscape and soil quality, historical periods, population explosions, agriculture, mining, positive and negative impacts on soil quality, characteristics of main antropogenic influences on landscape and soil, global and regional soil degradation.
2. Landscape reclamation - basic principles of landscape revitalization in terms of biological principles of revitalization measures. Creation of reclamation soils and dumps - antropogenic forms of relief. Influence of antropogenic activity in north-west Czechia, and development of reclamation soils. Complex issues of reclamation in north-west Czechia - forestry, agricultural, hydrological and other reclamation. Examples of reclamation and revitalization of the area after mining abroad (Leipzig region, Lusatian lakes in Germany).
3. Landscape revitalization - approaches and basic principles for landscape revitalization, theoretical foundations of landscape revitalization and landscape ecology, procedures for landscape revitalization: determination of the degree of disturbance, decision on the need for revitalization, proposal of revitalization measures, determination of success rate, legal aspects. Revitalization of ecosystems in protected areas and ecosystem management. Revitalization of the water regime of the landscape. Revitalization of ecological stability of the cultural landscape (degree of ecological stability, evaluation of landscape character, monitoring of changes in the landscape). Revitalization of antropogenically formed segments of the landscape (revitalization procedures - leaving to spontaneous development, controlled succession, reclamation, monitoring the consequences of interventions in the landscape). Different concepts of sustainable development and its indicators.

4. Soil remediation techniques - methods applicable for remediation of contaminated soil, *in-situ* vers. *ex-situ* technologies, biotechnology vers. abiotic technologies, overview of bioremediation and phytoremediation technologies leading to pollution elimination, stabilization, modification, and detoxification, innovative approaches, linkage of bioremediation technologies with production.

Study literature

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GARDNER, Robert H., Robert V. O'NEILL a Monica Goigel TURNER. Landscape ecology in theory and practice: pattern and process. New York: Springer, c2001. ISBN 0-387-95123-7.

ANDEL, J. van a James ARONSON. Restoration Ecology: the New Frontier. 2nd ed. Hoboken: John Wiley, 2012. ISBN 9781118223147.

SCHOR, Horst J. a Donald H. GRAY. Landforming: an environmental approach to hillside development, mine reclamation and watershed restoration. Hoboken, NJ: John Wiley, 2007. ISBN 0471721794.1118223147.

ŘEHOŘ M., JAROLIMOVÁ M., ŽIŽKA L., VRÁBLÍK P., VRÁBLÍKOVÁ J. The Results of the Long-Term Research on the Development of Anthropomorphic Soil in the Reclaimed and Successive Areas of the Most Basin in Czech Republic. Journal of Mining Science, 53(4), 778-788, 2018

VRÁBLÍK, P., VRÁBLÍKOVÁ, J., WILDOVÁ, E. Other types of reclamation as a part of tourism development in an anthropogenically affected landscape. Str. 278-283. In: Fialová, J. [Eds.]: Conference proceeding „Public recreation and landscape protection – with nature hand in hand!“ 2.-4.5.2018, Czech Society of Landscape Engineers, Mendel University in Brno. ISBN 978-80-7509-550-3. ISSN 2336-6311. Křtiny, 2018.

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