

Editorial: Disturbance and Development of Landscapes

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Past and future environmental changes and disturbances at the landscape scale are the topic of this issue on Physical Geography. The papers cover the time span from the Pleistocene to the last decades of the 20th century. In addition, future aspects of landscape changes are mentioned.

External impacts – be they of natural or anthropogenic origin – affect the composition, structure and functions of ecological systems. Since the beginning of the industrialisation anthropogenic influences have caused extensive modifications, i.e. disturbances, of the former natural ecosystems which at places are nowadays prevailing even at the landscape scale. The term “disturbance” has been used by geographers and ecologists for a long time to describe more or less severe changes of ecological systems due to external influences. Mining activities may serve as an example for anthropogenic disturbance of great severity and of worldwide substantial significance. The effects of opencast mining operations are often comparable to disturbance phenomena caused by volcanism or glaciers. Opencast mines “produce” completely new sites, where soil, ecosystem and even landscape genesis starts at “point zero”. The re-establishment of important landscape functions can be channelled and accelerated by rehabilitation measures. Thus, results from research projects into

the development of soils, ecosystems and even entire landscapes are basic requirements for the establishment of sustainable rehabilitation concepts for the generation of landscapes and their ecological functions.

The contributions presented in this issue are integrating eco-functional and soil geographical aspects on the landscape level. Most of the papers are focussing on environmental changes in Germany, with the main emphasis on highly disturbed mining areas. Environmental changes have not only very often been induced by human activities but have also affected humans in many ways. The articles consider these aspects of man-environment context to a greater or lesser extent, too.

The first article by *Brigitta Schütt* focuses on environmental changes in the Western Mediterranean since the Late Glacial Maximum. Natural climate change from a tundra climate to a Mediterranean climate has extensively influenced the landscapes of the Iberian Peninsula. During the last centuries, anthropogenic impact had additional effects on the environment resulting in land degradation and desertification. The author tries to reconstruct the changes during the Holocene, with special regard to altitudinal effects on the Iberian Peninsula.

Topic of the second contribution by *Achim Brauer, Klaus Tempelhoff* and *Andrew Murray* is the reconstruction of the landscape change during the Pleistocene in Northeastern Germany. The optically stimulated luminescence (OSL) turns out to be a very helpful tool for the interpretation of glacial sediments, and the results of the investigation provide new insights into landscape evolution in NE Germany during the Quaternary.

Thomas Raab, Sabine Beckmann, Nadine Richard and *Jörg Völkel* investigated environmental changes caused by mining since the Middle Ages. They selected the floodplain of the Vils River in Northern Bavaria as a case study. The massive impact of the iron industry on floodplain formation could be reconstructed using a wide range of methods. The authors stress the importance of grain size analyses to discover differences between alluvial and colluvial sediments. In a number of cases, changes on the floodplains due to mining activities during (pre)historic times are still causing environmental problems in many other areas.

The article by *Jörg Völkel, Nicole Beckers* and *Thomas Raab* also deals with mining and re-

lated environmental problems. However, contrary to the papers already mentioned, only the very recent decades are considered. In Eastern Germany, especially in Thuringia, uranium mining has had severe and long-lasting impacts on the landscape – along with negative effects on human health. Especially the pedosphere of these highly disturbed areas is affected by contaminants translocated vertically and horizontally in many ways. In addition, technogenic soils with unique properties are formed.

Mining and especially lignite mining is an extreme example of large-scale human-induced disturbance. *Oliver Bens* and *Reinhard F. Hüttl* present results of investigations of their working group of the Brandenburg University of Technology at Cottbus on opencast lignite mining in Lower Lusatia. They also give a review on the effects of surface mining on soil consumption and devastation in Germany. Moreover, the man-made post-mining landscapes are examined in order to assess the ecological potential of these new landscapes. Needless to say, sustainable recultivation should also restore essential soil functions.

Oliver Bens, Reinhard F. Hüttl
and *Gabriele Broll*