Map of Degraded Areas and Areas of Increased Natural Hazard Risk — as an environmental database for spatial planning

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Currently, at the Polish Geological Institute the concept of the *Map of Degraded Areas and Areas of Increased Natural Hazard Risk,* in 1 : 10 ,000 scale is developed, and four pilot sheets are in preparations. The experience gathered (Bażyński et al., 1999, *Instrukcja*…, 2005) will help in producing cartographic guidelines for the map to be employed during compilation of next sheets for selected areas in various regions of Poland. As the title and detailed scale (1 : 10,000) imply, the map will present particular areas, where a detailed survey is necessary for further economic use, and thus proper spatial planning (Strzelecki & Sikorska-Maykowska, 2002).

A degraded area is defined as an area where the land surface and groundwaters are polluted, and/or whose natural landscape and water flow have been modified in a way hampering its useful functioning. The area of increased natural hazard risk, as understood by the authors, is the area where a negative influence on the environment or on humans occurs or is likely to occur.

These areas include:

❏ Postindustrial areas (including old industrial waste disposal sites);

❏ Post-mining areas (land destroyed by strip mining of lignite, sulphur or by rock quarries; areas of underground mining of hard coal, copper ores, etc.);

❏ Urbanized areas of areas of future developmnet of major Polish cities;

❏ Areas reserved for important large infrastructural or industrial investments;

❏ Areas with increased occurrence of natural geodynamic phenomena, such as landslides and other mass movements, karst, suffosion;

❏ Sections of river valleys — with increased flooding risk.

Maps of degraded areas and areas of increased natural hazard risk include four basic modules:

❏ Environmental information;

❏ Anthropopressure;

❏ Building conditions and infrastructure;

❏ Synthesis — valorization of the environment.

Each module contains several information layers/topical maps, selected in each case to fit the specific situation of particular study area. Producing the map requires fieldwork and laboratory research; their scope and quantitative range varies depending on region. The basic ones include:

❏ Analysis of archival materials, existing cartographic studies and data of the Environmental Protecion Inspectorate;

❏ Analysis of aerial and satellite photographs;

❏ Field charting (geological, engineering-geological, hydrogeological, geoenvironmental);

❏ Taking soil, grounds and water samples, including probing and shallow boreholes;

❏ Chemical analyses of the soil, grounds and water samples.

The last module of the map — the geoenvironmental valorization, presents a synthetical overview of the problems, as well as recommendations of preventive or remedy measures necessary to protect or restore the expected proper environmental conditions in the study area. The maps should serve, among others, in planning of recultivation or revitalization work in postindustrial or polluted areas or in designing protective actions in areas of elevated flooding or landslide risk. The valorization should include all major elements of the environment (such as grounds, soils, surface waters, groundwaters of the first aquifer, resources of animated and inanimated nature, air) and evaluate their quality with respect to current legal standards, and present the level of environmental risk posed by natural and anthropogenic factors typical for the study area.

In analysing selected stretches of river valleys, most prone to flooding (Odra River Valley), or Carpathian areas with high incidence of landslides, digital terrain model will be used. It will allow for detailed spatial analysis of natural processes of flooding and sliding of large masses of earth, both creating serious risks to humans.

The whole thematic scope of the map is analysed with reference to current and planned land use, and authors are expected to indicate conflict areas. Charting landslides in detail may show that existing land management plans of a community need changing, and such recommendations will be included into the synthetic map of a given sheet.

In contrast to the existing geoenvironmental maps, this project will include, as important parts of the analysis, such elements as the existing technical infrastructure and administrative divisions and property structure of the study area, because they will often influence the direction of recovery measures, i.e., recultivation and revitalization.

The table below presents the proposed basic information layers (categories of database information), that should be compiled for particular types of terrain within the proposed thematic modules. Obviously, during work on a particular sheet, the configuration of information layers may need adjusting, or introducing a new layer specific for the area. Such eventuality is expected, e.g., for landslide areas, where geodynamic processes will need characterization in a separate layer (Bąk & Radwanek-Bąk, 2005). The-

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Table 1. Basic information categories of the geoenvironmental map in 1 : 10,000 scale

Tematic module	Information categories in the geoenvironmental map database
ENVIRONMENTAL STATE AND RESOURCES	Geology of surface strata (lithogenesis with elements of stratigraphy)
	Soils (soil types and bonitation classes)
	Depth to first aquifer (hydroisobaths)
	Environmental geochemistry (soils, grounds, surface waters and groundwaters)
	Natural hazards: geodynamic processes (active landslides, stabilized landslides, areas prone to landslides and other mass movements, floods, submerged areas, filtrational deformations radon emanations
	Protected (inanimated and animated) nature objects and areas
	Cultural heritage monuments
ANTHROPOPRESSURE BUILDING CONDITIONS INFRASTUCTURE ADMINISTRATION	Anthropogenic risks: hazards to waste storage sites, illegal garbage dumps, sewage dumps, environmentally hazardous installations, noise, gas and dust emissions, electromagnetic radiations
	Mining damages: areas after old shallow exploitation, mining spoil heaps and sludge heaps, land subsidence, land sinking and drying
BUILDING CONDITIONS INFRASTUCTURE ADMINISTRATION	Ground carrying capacity
	Surface and underground technical infrastructure
	Spatial develepment
	Administration and ownership status

se and other detailed solutions will be decided upon by the authors of the pilot sheets.

As already mentioned, the contents of particular information layers (and thus database contents), as well as the way of presenting them in the maps will be specified in more detail during the pilot stage, and the collected experiences will serve for preparing adequate guidelines.

According to the authors, the information contents of the planned database and maps will be most suitable for the professionals interested in:

❑ planning linear and spot investments which according to current law cause or may cause negative environmental impact;

❑ preparing integrated permits, ecological overviews, reports and environmental impact forecasts;

❑ environmental management, spatial planning by public administration at the community, county and province level, with scope including:

— environmental protection,
— geodesy and cartography
— land property management,
— strategy of development and spatial planning,
— regional development,
— crisis management,
— river catchmnet management,
— investments and iinfrastructure,
— agriculture and forestry.

The interest in geoenvironmental information is largely stimulated by the formal requirements posed by current Polish legal norms (Environment Protection Law, Water Law, Geological and Mining Law, Law on Waste Disposal, Spatial Development Act, Construction Law, Nature Conservation Act) regulating preparation of several studies directly or indirectly pertaining to natural environment and procedures concerning environmental impact assessments. The database is intended to fulfill the needs of such groups.

References

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