

Roman Rybicki

Summary of the doctoral dissertation

**Evaluation of the effects of land consolidation in the aspect of soil protection against erosion**

The aim of the doctoral thesis was to assess the effects of land consolidation works in terms of protecting the soil against erosive degradation, in the natural, technical and socio-economic conditions of the eroded (carved) areas of the Lublin region. The research covered two objects: Wola Idzikowska, located in the center of the Lublin Upland (land consolidation was completed in 2006) and Latyczyn, located on the West Roztocze (land consolidation was completed in 2014). It was analyzed correctness and compliance of the economic and spatial assumptions of the completed land consolidation projects, against the background of the concept of comprehensive consolidations for the carved areas. The effects of their implementation in the field was analyzed too. The social conditions for the implementation of comprehensive consolidations in eroded areas were assessed on the basis of conducted questionnaire.

The field tests carried out as part of the work included:

- analysis of spatial distribution of land, layout of plots in relation to land relief, location and quality of agricultural road network, effects of shaping the terrain,
- observation of erosive damage,
- measurement of tillage erosion,
- conducting a questionnaire among participants of the land consolidation about the possibilities and scope of protection of land against erosion and satisfaction with the consolidation.

The chamber tests carried out as part of the work included:

- additional, detailed analyzes of the spatial distribution of land, layout of plots and location of agricultural roads in relation to the relief
- assessment of the potential soil erosion risk before and after the consolidation,
- analyzes of the results of a questionnaire.

It was found that the economic and spatial assumptions for the analyzed consolidation projects, mostly took into account the recommendations of the concept of comprehensive consolidation for sculptured areas developed at IUNG Puławy and contributed to reducing the risk of land damage by water, wind and tillage erosion. The implementation of project assumptions in the field, especially regarding antierosion activities, was largely dependent on social acceptance. This acceptance depended on the existing awareness of the risks and economic losses associated with the degradation of soil by erosion as well as possessed positive experiences in this area. For example, due to the lack of consent of land owners in the Wola Idzikowska was not excluded from use and not intended for afforestation 22.61 hectares of steep slopes and has not been introduced 1.25 km of roadside windbreak shelterbelt. Due to the provisions in the local zoning plan, the faulty, along slope layout of plots was also not changed. The results of carried out analyzes such as: identification of potential and current water erosion, modeling of soil erosion losses using the WEPP model and determination of soil losses caused by plow

cultivation prove that apart from excluding plots from plowing use and intending for afforestation, one of the important recommendations for of rural management works in eroded areas is the change of the layout of plots from along slope to across slope and the introduction of sods at the borders of newly-divided plots. Elimination of along slope redundant borders as a source of linear erosion is also important. Simulated by the WEPP model, annual soil loss on the steep slopes in Wola Idzikowska, for along slope cultivation of winter wheat amounted to 25,70 Mg·ha<sup>-1</sup>, for across slope cultivation - 19.18 Mg·ha<sup>-1</sup>, with additional shaft clamping and slush embankment - 17,912 Mg·ha<sup>-1</sup>, for afforested slope - 0,19 Mg·ha<sup>-1</sup>. In the case of tillage erosion, the soil loss for along slope cultivation amounted to 9.18 Mg·ha<sup>-1</sup> per tillage operation. For across slope cultivation - 4.88 Mg·ha<sup>-1</sup>. In the aspect of protection against water erosion, it is also important to proper locating agricultural transport roads. In addition, it is important to strengthening and drainage their surface in places with a large decrease and in road gullies.

The work positively verified assumed thesis: *correctly performed comprehensive land consolidation in carved areas is an effective way to reduce the risk of soil erosion.*

Keywords: land consolidation, eroded areas, protection of land against erosion

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