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AGRICULTURAL LAND USE CHANGES MONITORING

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> "With satellite imagery, we have the ability to monitor different environments and thus make more informed decisions
>
> **Władysław Ortyl**
> *Marshall of the Podkarpackie Region*

Agricultural landscape of the Podkarpackie Region | cc Podkarpackie Bureau of Geodesy and Agricultural Areas [2023].

The Copernicus Land Monitoring Service (CLMS) provides a comprehensive set of land cover data, which is essential for tracking the changes in land use. This made it possible to develop an efficient method for assessing the state of agriculture in the Podkarpackie Region.

THE CHALLENGE

The Podkarpackie Region has a total area of 17,846 km2, of which more than 30% is agricultural land. In some sub-regions, there are areas particularly affected by land abandonment. It is estimated that one of the causes of this problem is the unfavourable spatial structure of the agricultural regions. This factor can significantly hamper the management of farm land and often leads to the unprofitability of agricultural activities. The unfavorable phenomenon of defective spatial structure can be reduced or eliminated, inter alia, by land consolidation measures carried out within the framework of the Common Agricultural Policy Strategic Plan for 2023-2027. However, the proper location of activities requires a precise analysis of the needs and legitimacy of carrying out potential consolidation work for individual localities in the region.
In addition to studying cadastral data, satellite data can be used to identify areas of land abandonment that are problematic to manage efficiently.

THE SPACE SOLUTIONS

The CORINE Land Cover and Global Dynamical Land Cover studies were used to carry out the task. The data were provided by the Copernicus Land Monitoring Service (CLMS).

The extracted data were implemented into a GIS environmenT. An innovative, self-designed tool for automatic extraction, reclassification, and comparison of raster data was used to identify areas affected by arable land decline and crop overgrowth. The calculation process was based on the analysis of the automatically detected land cover classes and their annual changes. A detailed study then made it possible to identify areas of intensive abandonment, providing helpful information for local authorities. In view of the results of the survey, some former arable land can be converted into future development areas, while others can be revitalised to restore agricultural suitability or used for environmental protection. The new methodology has now been implemented in a pilot analysis carried out in 2024. In the near future, it may be used regularly.

The project was developed by the Podkarpackie Office of Geodesy and Agricultural Areas in Rzeszów on behalf of the Marshal of the Podkarpackie Region. Monitoring changes in agricultural structure and land use is a mandatory activity of the regional administration.

∨ **Statistical comparison of changes in the area of arable land for a selected district of Podkarpackie Region** | Own study based on Copernicus Land Monitoring Service data [2024].

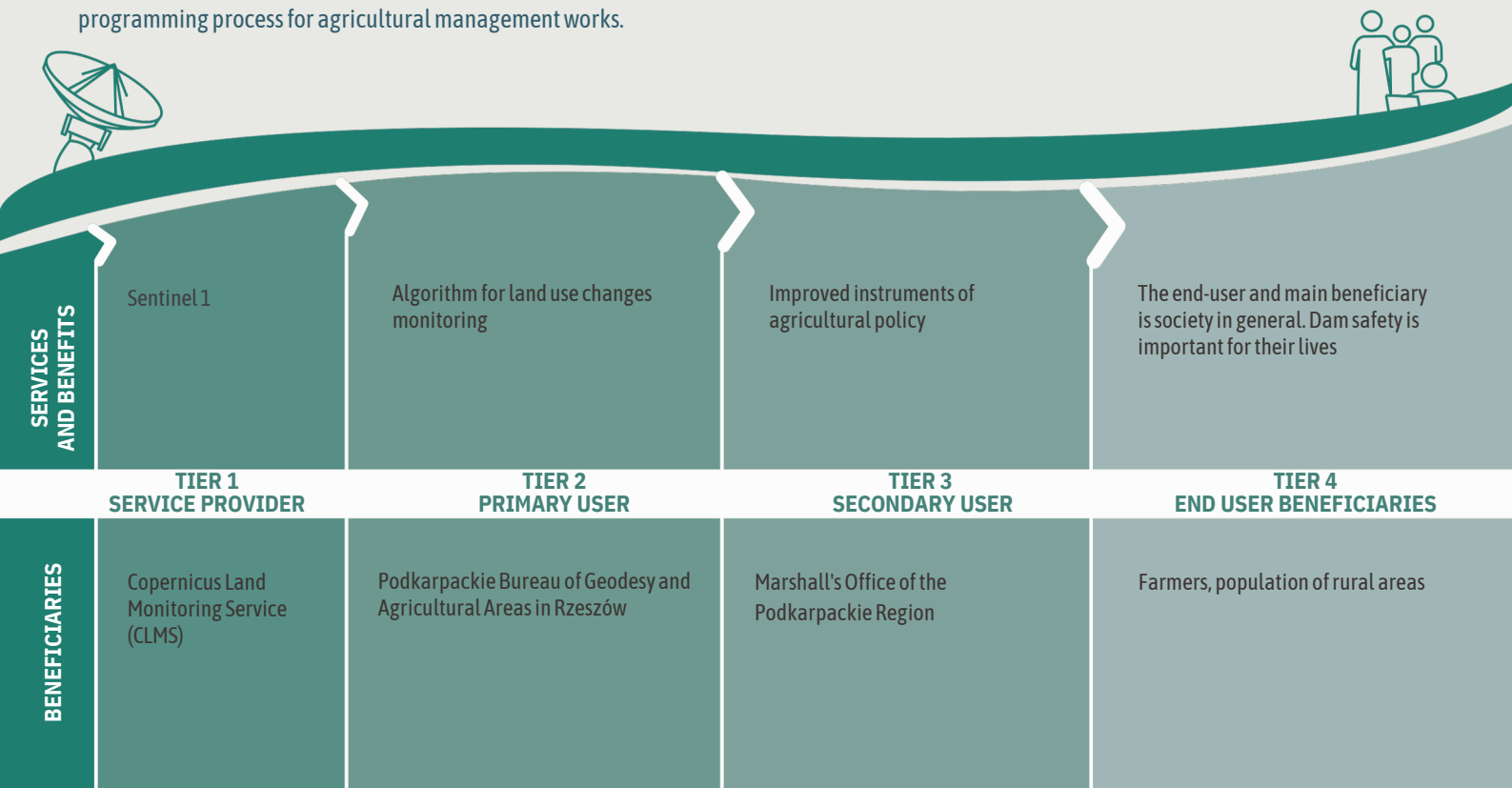| THEMATIC AREA	REGION OF APPLICATION	SENTINEL MISSION USED	COPERNICUS SERVICE USED
Agriculture, Food, Forestry and Fisheries	Podkarpackie	-	CLMS

THE BENEFITS AND THE BENEFICIARIES

The research findings enabled an understanding of the current problems and enhanced the potential efficiency of regional administration activities, with a focus on supporting local agriculture and pursuing a long-term, sustainable spatial policy.

The cartographic and statistical studies created during the project have been used for programming and coordination of management and agricultural work. These studies are one of the key sources of information on the needs for intervention to protect and develop regional agriculture.

The developed research methodology, based on publicly available and highly valuable satellite data, has enabled the streamlining of the programming process for agricultural management works.

This has resulted in an improvement in the quality of the consolidation works carried out, providing noticeable benefits for both local farmers and the regional economy as a whole. For instance, the preliminary analysis conducted for the district of Kolbuszowa identified two villages where the intervention appears to be of the utmost urgency. Furthermore, the Copernicus data may provide initial information that could be useful in planning and updating cadastral databases.

The provision of detailed and reliable spatial information on the peculiarities of local agriculture and its potential problems enables local authorities to take effective action for stable and sustainable rural development at the local, regional, national, and EU levels.

	TIER 1 SERVICE PROVIDER	TIER 2 PRIMARY USER	TIER 3 SECONDARY USER	TIER 4 END USER BENEFICIARIES
SERVICES AND BENEFITS	Sentinel 1	Algorithm for land use changes monitoring	Improved instruments of agricultural policy	The end-user and main beneficiary is society in general. Dam safety is important for their lives
BENEFICIARIES	Copernicus Land Monitoring Service (CLMS)	Podkarpackie Bureau of Geodesy and Agricultural Areas in Rzeszów	Marshall's Office of the Podkarpackie Region	Farmers, population of rural areas

EU POLICY / DIRECTIVE

Common Agricultural Policy (CAP)

TYPE OF SERVICE PROVIDER

Public Service

TYPE OF FUNDING SOURCE

Other

USAGE MATURITY LEVEL

4

A FUTURE WITH COPERNICUS

The success of the developed method for processing satellite data indicates the need for continued research into utilizing the resources of the Copernicus service to support regional agricultural policy. The activity may inspire more regions experiencing agrarian decline.

The widespread availability of satellite imagery, offered through the CLMS platform's spatial information services, might be applied in further aspects of local government operations. Efficient data-driven management is an important factor in the development of the local economy

DID YOU KNOW?

The implemented satellite data proved to be much more reliable than the conventionally used cadastral data. A detailed comparison of both sources revealed that the cadastral databases were locally outdated.

Acknowledgements

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