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SUSTAINABLE DEVELOPMENT GOALS FOR ALL

Green cadastre – source data for farmers

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Source: own elaboration.

Abstract

The decrease in the area of agricultural land resulting from global population growth, flood risk and climate change, can all be viewed as potential threats to food safety. According to forecasts and trends, the future of both agricultural policy and agricultural innovation will be based on big data, data analytics and machine learning. Therefore, it is and will be important to develop information systems dedicated to agricultural innovation and the management of food security challenges. This study, took on the challenge of presentation of the data group in the green cadastre supported by data from farmers. Data that are derived from farmers play a key role in the process of planning and implementing agricultural policy in Poland, but also may be an inspiration for comparable activities in EU member states.


Source: own elaboration.

The concept of Green Cadastre (GC) for Poland (Zysk et al. 2020) was created on the basis of the land administration system (LAS) called Integrated Real Estate Information System, currently under development in Poland. This system is to be the backbone of a national infrastructure for the implementation of sustainable land policies and land management strategies. It creates comprehensive access to information about spatial objects and land tenure rights, restrictions and responsibilities. Under the GC concept assumptions, it would be a uniform system for the whole country, thanks to the reference LAS. As defined, the LAS as part of national spatial data infrastructure includes institutional arrangements, a legal framework, processes, standards, land information, management and dissemination systems, as well as the technologies that support allocation, land markets, valuation, control of land use, and the creation of equitable interests in land. It enables the implementation of land policies to fulfil political and social objectives and to achieve sustainable development (UN-GGIM, 2015).

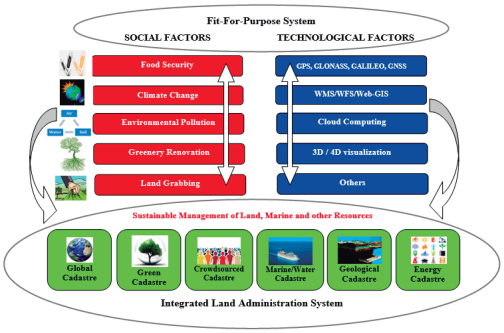
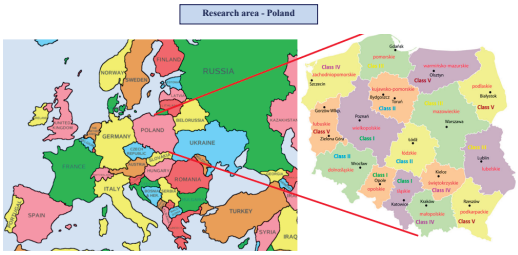


Figure 1. New role for cadastres. Source: own study based on FIG (2014).



- class I (very high potential of agriculture) - opolskie, śląskie i wielkopolskie,
- class II (high potential of agriculture) - dolnośląskie, kujawsko-pomorskie i łódzkie,,
- class III (average agricultural potential) - lubelskie, mazowieckie i pomorskie,
- class IV (low agricultural potential) - małopolskie, świętokrzyskie i zachodniopomorskie
- class V (very low agricultural potential) – lubuskie, podkarpackie, podlaskie i warmińsko-mazurskie.

Figure 2. Research area with agricultural potential map of Poland. Source: own elaboration.

General political and socio-economic data for Poland.

General location and area	Europe / 31.3 million ha
Division into sub-units (federal state)	Voivodships – (16); District level – counties (380); Local level – municipalities (2478)
Population (2018) IN THOUS.	38 411
/ including in rural areas IN THOUS.HA	15 344
Land (2018)	31269,6
Of which	
agricultural land	18776,5
forest land as well as woody and bushy land	9534,2
lands under waters	652,0
minerals areas	29,1
transport	938,7
residential	747,5
wasteland	465,0
Farms by areas groups of agricultural land (Poland) (in percent) (2017)	
up to 1 ha	1,5
1,01—1,99	18,7
2,00—4,99	32,0
5,00—9,99	22,5
10,00—14,99	10,1
15,00—19,99	5,0
20,00—49,99	7,7
50,00 ha and more	2,5

Source: own elaboration (CSO, 2020).

References
Zysk 2020, ORGANIZATIONAL ASPECTS OF THE CONCEPT OF A GREEN CADASTRE FOR RURAL AREAS, Land Use Policy Volume 91 February 2020 Article 104373.
UN-GGIM, United Nations Committee of Experts on Global Geospatial Information Management, 2015. The Application of Geospatial Information – Land Administration and Management UN-GGIM Version 3.1, 13 July 2015
FIG, 2014. Fédération Internationale des Géomètres, 2014. Steudler D. (ed.). Cadastre 2014 and Beyond. FIG 61, p. 84. http://www.fig.net/pub/figpub/pub61/figpub61.pdf. Accessed 16.06.2014.
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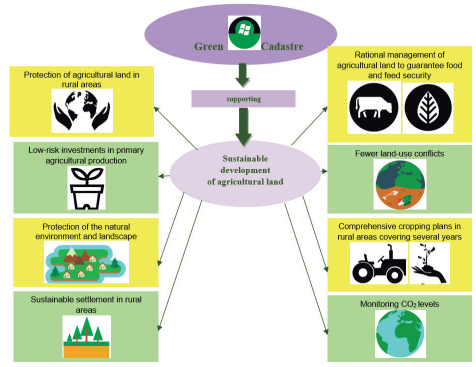

Figure 3. The aim of the Green Cadastre. Source: own elaboration.

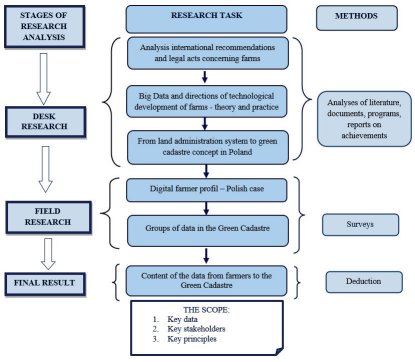

Figure 4. Diagram of the organization of the study. Source: Own study

FINAL RESULT

Content of the data from farmers

TYPE OF DATA	TOOLS	PLANNING	CONTROL
financial	excel	Monitoring	Precision farming
metrological	word, excel	Monitoring	Precision control
environmental	Robotics and sensors (temperature, humidity, CO_2, etc.), greenhouse computers	Monitoring	Climate control, Precision control
machine	GPS tracking	Monitoring	Precision farming
staff	excel	Monitoring	Precision control
types of fertilizers and pesticides being used	robotics and sensors	Monitoring	Precision farming
the types of crops being grown	robotics and sensors smartphone mapping	Seeding, Planting, Soil typing, Crop health, yield modelling	Precision farming
crop yields	robotics and sensors smartphone mapping	Lighting, energy management	Precision farming
livestock numbers and locations	biometric sensing, GPS tracking	Breeding, monitoring	Milk robots
weather	weather stations, observations	Monitoring	Climate control, Precision control

Source: own elaboration.


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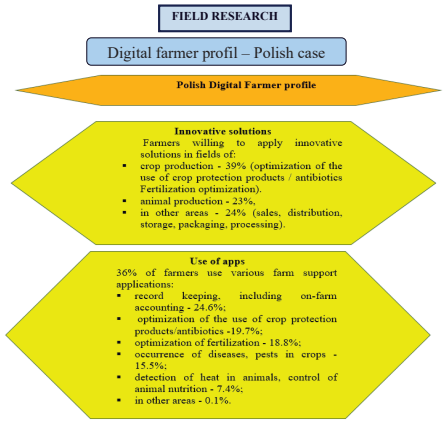

Figure 5. Digital farmer profil – Polish case Source: own elaboration.

Groups of data in the Green Cadastre

No.	Data group	Scope of data	Main source
1	Address data	Street and number, district, number of cadastral plot, number of cadastral district, number of municipality, type of municipality	Cadastre, Register of Places, Streets and Addresses
2	Physical properties of land plot	Area, boundaries, slope	Cadastre, Land Use Plans, Basic map
3	Ownership	Owner, tenant/administrator, documents granting legal title, distribution of plots	Cadastre, Land Register, National Register of Agricultural Producers, Farms and Applications for Payment Entitlements, IACS
4	Land-use types	Agricultural land, forests, developed and urbanized land, protected ecosystems, water bodies, miscellaneous	Cadastre
5	Local policy	Permissible types of land use and management, development plans	Land Use Plans, Local Land Use Plan
6	Infrastructure data	Existing infrastructure and public utilities, location of infrastructure networks	Geodetic Register of Utilities Networks, Land Use Plans
7	Soil and water conditions	Soil type, water table, watercourses and water bodies, hydrographic classification of Poland, indirect protected zones, protected water intake zones, geology	Soil and agricultural maps, water cadastre, geological maps
8	Nature protection types	Nature reserve, protected ecosystem, Nature 2000 area, nature and landscape conservation site	Central Register of Nature Conservation Sites
9	Climate	Average annual temperature, average annual precipitation, humidity, insolation (agricultural climate model – application)	Climate maps, Solar atlas
10	Environmental pollution and threats	Air pollution (e.g. CO_2); soil pollution (e.g. nitrates and Nitrate Vulnerable Zones, NVZ); radioactive and microbiological threats; artificial water deficit; landscape degradation; air, underground water, surface water and sea water pollution; water cycle disruptions; changes in land relief; soil erosion; degradation of flora; industrial and municipal waste; noise pollution; pests	Pollution maps
11	Agricultural production	Area, crop, crop and livestock production system, and farmed fish	National Register of Agricultural Producers, Farms and Applications for Payment Entitlements in the Integrated Administration Control System (IACS)
12	Roads	Location of motorways and national roads, traffic intensity, condition of roads, road traffic accidents	Road Register, Cadastre, Land Use Plans

Data from farmers to Green Cadastre

Source: own elaboration.

Conclusions

Measures supporting sustainable development of agricultural land require massive amounts of data, including data derived from farmers.
Farmers collect data and set up their own information systems to improve their knowledge. One key conclusion of this paper would be that farmers are an important part of the economy, not only as food producers, but also as data producers.
The future lies in big data as a basic element of machine learning. Processing such an amount of data requires that it be collected, systematized, and made available to the relevant actors. The green cadastre complies with this framework.
The proposed green cadastre include a universal framework with an identification of data, so it can be a model infrastructure for other EU member states.