

## Map Resources – ECO Farms in the Czech Republic

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### Abstract

The present paper deals with the creation of maps for the sake of a special map portal using the database of eco farms in the Czech Republic. The map output is being developed and implemented within the framework of the Research Program in mutual cooperation of the Department of Information Technologies, Information and Consulting Centre, other departments of the Faculty of Economics and Management CULS Prague with external partners, especially with the Ministry of Agriculture (Environment and Ecological Agriculture Section, Department of Ecological Agriculture) and the Institute of Agricultural Economics and Information (UZEI) - Division of Agro-environmental Policy in Brno. The maps are visualized by means of MPPR 1.0 system and have been processed – in the pilot stage - for the South Bohemian Region eco farms. The results represent initial data from 2009 (as at 31st December 2009) that have been processed, verified and complemented in the course of 2010.

### Key words

Map portal, web browser, Google Maps, eco farm, ecological agriculture, Act No. 242/2000 Coll.

### Anotace

Příspěvek prezentuje tvorbu mapových podkladů jako výstup speciálně vytvořeného mapového portálu s využitím datové základny ekologických farem v ČR. Mapový výstup je vyvíjen a implementován v rámci řešení výzkumného záměru ve spolupráci Katedry informačních technologií, Informačního a poradenského centra, Katedry ekonomiky a dalších pracovišť Provozně ekonomické fakulty ČZU v Praze, dále ve spolupráci s externími partnery, především s MZe ČR (Odbor environmentální a ekologického zemědělství, oddělení ekologického zemědělství) a ÚZEI - pracoviště Brno (Oddělení Agroenvi politika). Mapové podklady jsou zobrazovány prostřednictvím systému MPRR 1.0 a pilotně zpracovány pro ekofarmy na území Jihočeského kraje. Výsledky řešení představují výchozí data za rok 2009 (k 31. 12. 2009), průběžně zpracovávaná, dále ověřovaná a doplňovaná v průběhu roku 2010.

### Klíčová slova

Mapový portál, webový prohlížeč, Google Maps, ekofarma, ekologické zemědělství, zákon č. 242/2000 Sb.

### Introduction

Ecological agriculture is an activity that can – thanks to its multifunctional nature - enhance sustainable development in rural areas by means of quality food production, environmental protection and care, development of services that are vital for inhabitant stabilization, and by focusing on non-food agricultural products. It has been developing in the Czech Republic since the beginning of the 90's whereas the greatest dynamics can be observed in the past few years.

Ecological agriculture issues are therefore an obvious part of the "Economy of the Czech Agriculture Resources and their Efficient Use within the Framework of the Multifunctional Agri-food Systems" Research Program. Of course, the fore-mentioned research program includes as well chosen aspects of ICT development, in this case the "Information Technologies for a Better Information Availability in Regions" sub-period and then "Information Technologies for Regional Development".

The paper deals with map creation as an output of a purpose-developed map portal using the database of eco farms in the Czech Republic.

## Objectives and methods

In order to realize a map output, a universal software solution MPRR 1.0 (Regional Development Map Portal) has been created. The final output was verified by implementation over the eco farms database – in the pilot stage, the region of South Bohemia has been chosen because of its dominance from the viewpoint of agricultural enterprises number and area of ecologically farmed land.

### Technical Solution – MPRR 1.0 Map Portal

MPRR 1.0 was created by the Department of Information Technologies in cooperation with the Information and Consulting Centre and runs within the Apache Web Server. All objects visualized in the map portal have been saved under the form of UTF-8 character set in MySQL 5 database. To visualize geographical position of the individual elements, Google Maps API version 3 [3] [4] by Google Inc. company was implemented in order to provide constant map updating and to make other related Google Inc. functions available. The SW solution itself was developed in JavaScript (in which the Google Maps [5] application is accessible) using the JQuery framework [6] while jQuery plugin bMap 1.3 [6] and MarketCluster Library for Google Maps API v3 [7] were used for further SW functions. The former has been modified to meet map portal requirements.

Map data loading was realized by means of JSON [10] technology using PHP Nette Framework [9] and Dibi database layer [11]. The Nette Framework was chosen for the sake of required application quality and elimination of safety threats. Google Maps Icons [12], modified to the required form, have been used as graphical elements to visualize the individual objects in maps.

Whole SW solution on the World Wide Web platform has been created as a modern robust application enabling further enhancement and development. It is available not only on conventional end-use devices (PC or portable computers with a concrete web browser) but as well on mobile and dedicated devices. In the final testing phase, the application was tried out on different

versions of five most used web browsers<sup>1</sup> and many minor web clients.

In consideration of a potentially high number of visualized objects in the first map preview (eventually in any further previews too), these objects have been aggregated into the so-called clusters. The aggregation is automated upon map scale and number of objects on a certain area. Changing the map scale leads on one hand to an automated deaggregation of bigger clusters into smaller ones, or eventually to the individual objects (zoom in), or on the other hand, to the aggregation into bigger clusters (zoom out). Aggregate objects (object clusters) are indicated by the zoom icon with a numeric indication of the exact number of objects included (see fig. 1, 2, 3).

For clarity and user comfort sake, the objects are classified according to the defined criteria into individual clusters. Application users then dispose of a very simple and effective tool that enables filtering certain object clusters (groups) and view only the objects required (choose data objects preview).

### Map Output – Eco Farms in the Czech Republic (South Bohemian Region)

As at 31st December 2009, 344 South Bohemian farms were registered in the database of the Czech Ministry of Agriculture [8]. This number accounts for almost 13% of all eco farms in the Czech Republic whereas these farms cultivate approximately 15% of the ecological agriculture total area in the Czech Republic. The map depicts 334 farms while 10 were taken off during data verification process (due to incorrect enlistment in the South Bohemian Region). The farms are subdivided into specialized eco farms and those combining conventional and eco-agriculture.

After clicking on the farm icon in the map, basic farm identification data are displayed (company trade name, eco farm name, address and legal form) – see fig. 4. Moreover, map users can then view

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<sup>1</sup> MS Internet Explorer, Mozilla Firefox, Google Chrome, Safari, Opera



Figure 1: Implicit preview of the map portal – South Bohemian Region (eco farms clusters).



Figure 2: Overall view of the pilot solution – South Bohemian Region (334 objects – eco farms).

detailed information such as land area of the individual cultures both in transition period within the framework of eco-agriculture (abbreviated PO in Czech) and eco-agriculture system (abbreviated EZ in Czech), animal production focus area, control bodies and authorities etc. – using the "More information on the farm" link (see fig. 5).

While working with the maps, precise location of an eco farm can be viewed using all Google Maps functionalities, including Map, Satellite, Hybrid and Terrain views (see fig. 6, 7).

Primary mapping data were exploited from the database of the Ministry of Agriculture that is compiled by control authorities and organizations

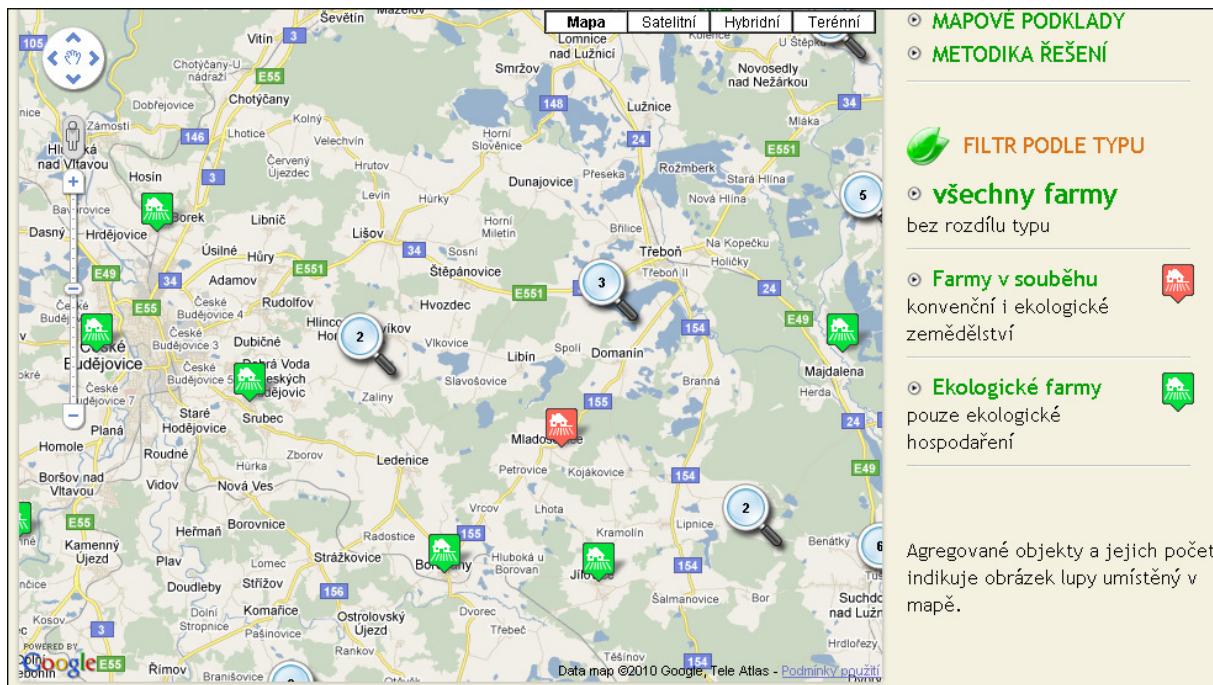


Figure 3: Zoomed area - preview of the individual eco farms or eco farms groups.

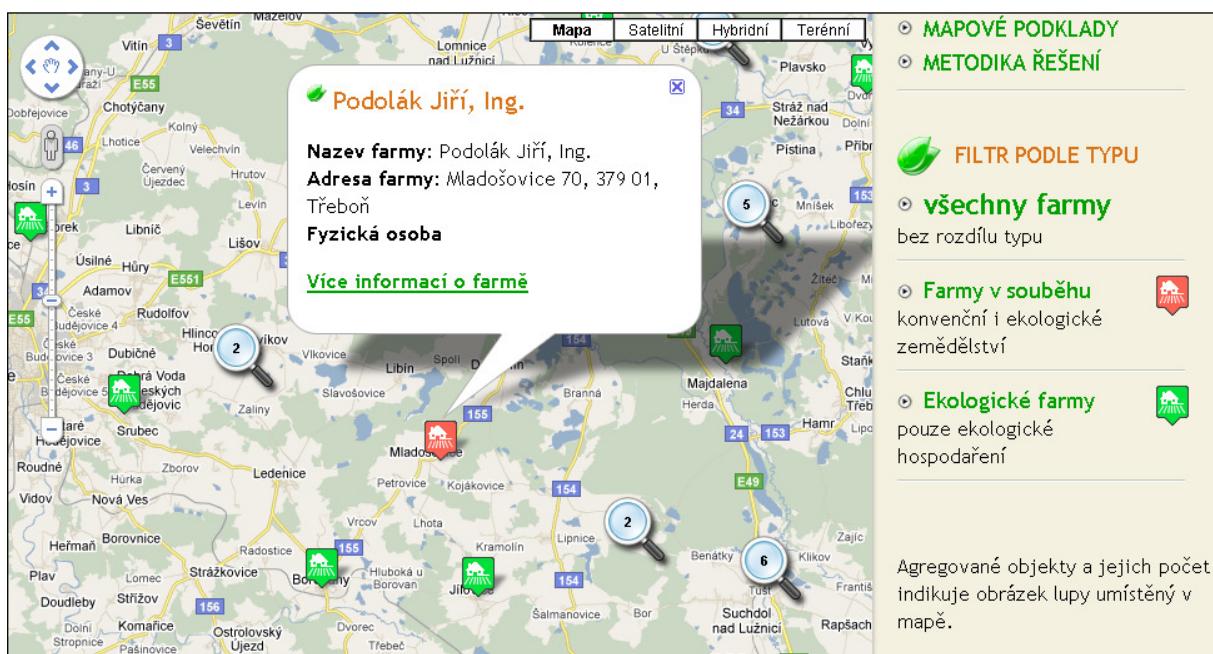


Figure 4: Basic information on the object (eco farm).

while registering and controlling eco farms in the course of the year in question [8]. The data were then elaborated and processed using the LPIS evidence (Land Parcel Identification System) and verified in close cooperation with the Institute of Agricultural Economics and Information (UZEI) - Division of Agro-environmental Policy in Brno. The data were also confronted and compared with public databases and information sources (e.g. the

Companies Register) and sometimes complemented by own survey (telephone survey, local inquiry). Together with high validity of the database, the most accurate eco farm map positioning (registered place of business) was the uttermost aim.

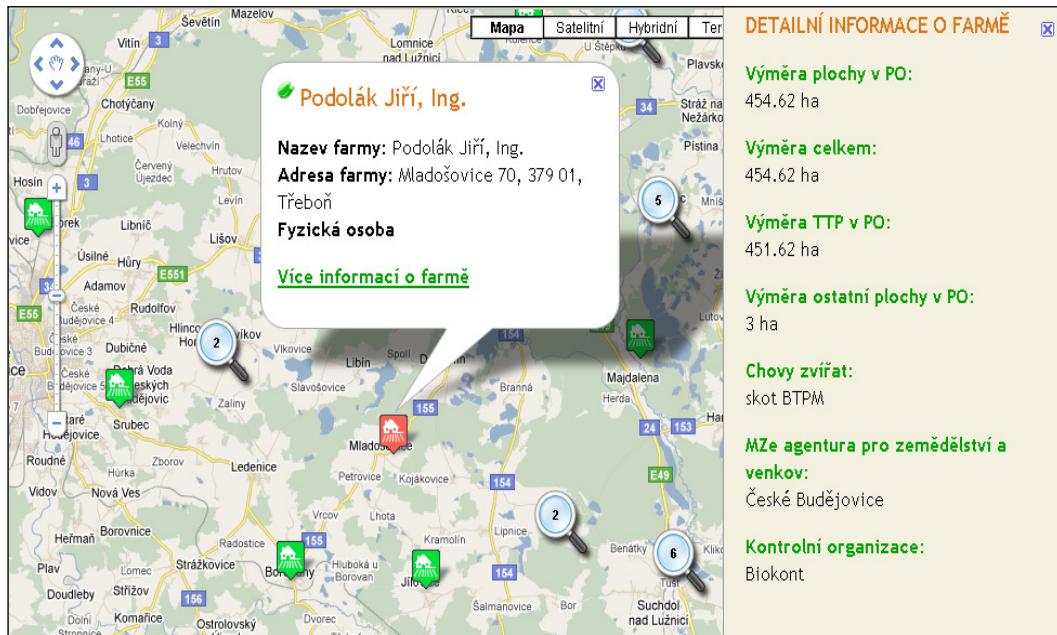


Figure 5: Basic and detailed information on the object (eco farm).  
(land area in the transition period, total area, animal production focus, Regional Agency for Agriculture and Rural Areas, control body)

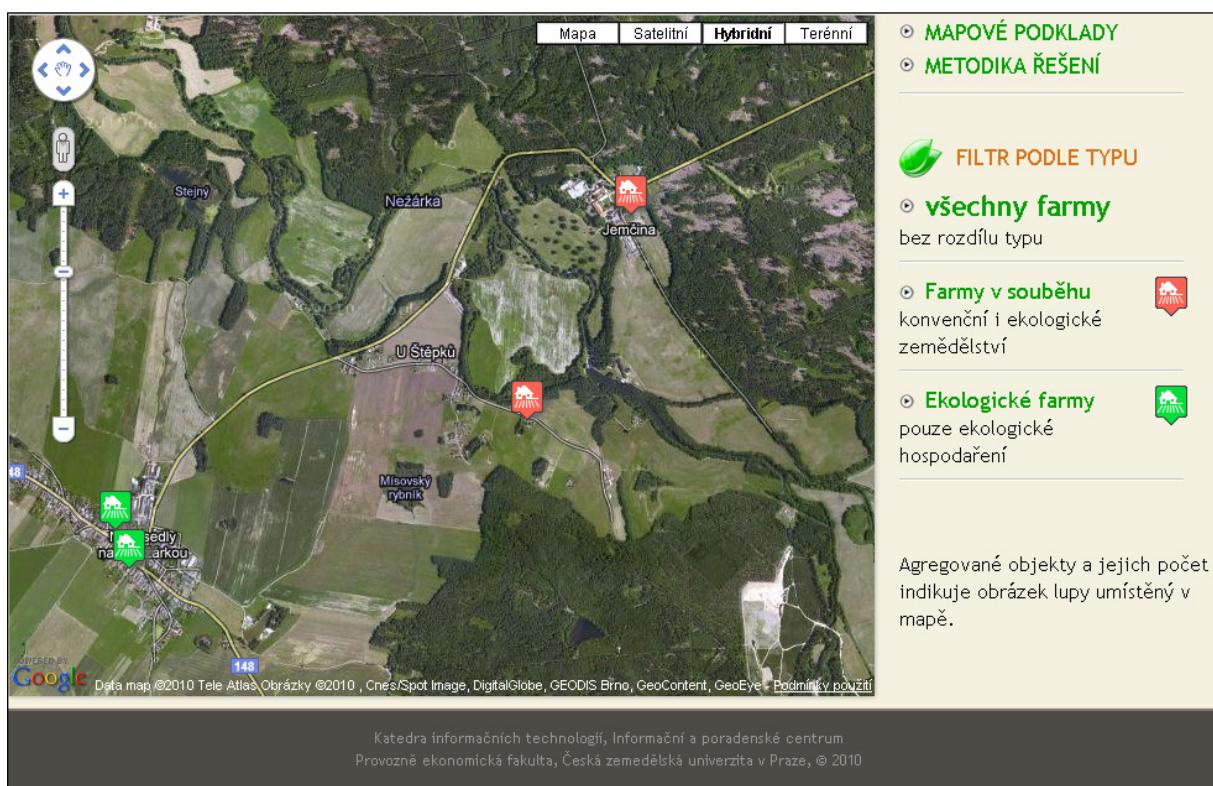


Figure 6: Hybrid map with zoomed objects.

## Results and discussion

MPRR 1.0 [13] is a complex SW solution of geographical object presentation within the World Wide Web platform.

Basic application functions are as follows:

- visualizing an object;
- visualizing basic information on the object marked;
- "More information on the farm" option;

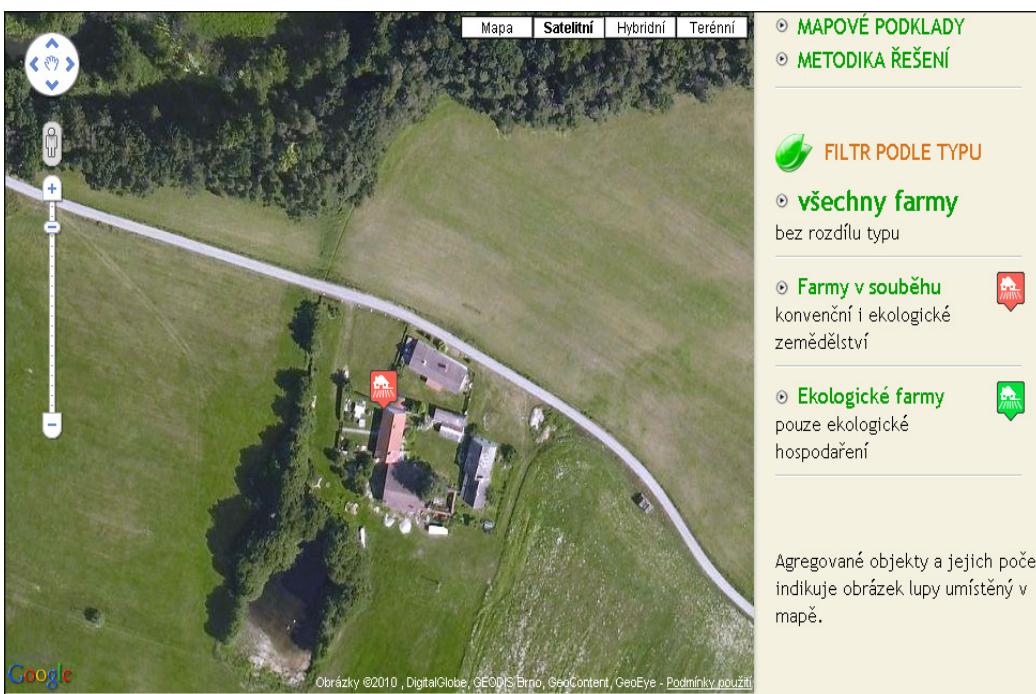


Figure 7: Detailed zoom (detailed visualization of exact object/premises location).

- map scale change (zoom in, zoom out);
- aggregation of objects into clusters;
- clusters disintegration into individual objects;
- customized object filtering and classification by specific criteria;
- dynamic change of the number of visualized objects.

Basic features of MPRR 1.0 application:

- high safety;
- general applicability;
- intuitive navigation;
- accessibility on most end-use devices;
- high speed (fast response time and data loading);
- relatively easy modification of displayed object information;
- modification options concerning graphic object interpretation;
- map type options (standard, satellite, hybrid, terrain).

The MPRR 1.0 solution represents qualitatively a brand new perspective of map data creation and, in comparison with the existing solutions, entails many original elements (optimized original icons, cluster analysis, object aggregation and deaggregation, viewing basic information and optional detailed information, customized preview

etc.). Map data related to organic farming (eco farms) have not been created yet, as far as the authors are aware.

The final solution displayed in the map portal (data validity and map location accuracy) stems from the best effort to validate and complete all data, including efforts to find out an accurate and relevant eco farm location and its subsequent map positioning. The map output includes as well a detailed methodology.

The data presented in the paper account for the solution as at 30th November 2010 – data correctness will not cease to be verified.

The map portal is intended to be widely used especially by the state administration, professionals in the field and students. However, it can be used by general public too as it is freely available on the specialist AGRIS web portal: <http://mapy.agris.cz/ekologicke-farmy/mapove-podklady/>.

## Conclusions

A substantial system extension is planned for the subsequent period, including first other regions (in relation to the number of eco farms in the region) and later on covering the whole area of the Czech

Republic together with providing relevant, up-to-date data on organic farming on-line.

Based on the discussions with the Ministry of Agriculture and other partners, the present solution has a high potential for further development. For instance, by means of a secured access (login, password) the system could not only provide a detailed inventory of the individual enterprises but as well – in the extended version – controls/certification evidence, results etc.

The MPRR 1.0 solution can be respectively utilized by eco farms (owners) to promote their products, services etc.

Having in mind the development dynamics, the database has to be updated yearly (continuously) owing to both newly registered subjects (it is again vital to verify, complete and chart the data) and subjects that stopped their operation in the eco-agriculture field or lost relevant certification.

*The knowledge and data presented in the paper were obtained as a result of the Research Program titled “Economy of the Czech Agriculture Resources and Their Efficient Use within the Framework of the Multifunctional Agri-food Systems” of the Czech Ministry of Education, Youth and Sports number VZ MSM 6046070906.*

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