HUMBOLDT SCENARIO FOREST

Otakar Čerba[1], Josef Fryml[2], Karel Charvát[3], Martin Pospíšil[4]

[1] Katedra matematiky, Fakulta aplikovaných věd, Západočeská univerzita v Plzni, Univerzitní 22, 306 14, Plzeň, Česká republika
ota.cerba@seznam.cz

[2,4] Ústav pro hospodářskou úpravu lesů Brandýs nad Labem, Nábřežní 1326, 250 01, Brandýs nad Labem, Česká republika
fryml.josef@uhul.cz,pospisil.martin@uhul.cz

[3] Help service – remote sensing s.r.o., Černoleská 1600, 256 01, Benešov u Prahy, Česká republika
kch@bnhhelp.cz

Abstract

The Humboldt project was finalized in September 2010. Objectives were demonstrated by nine scenarios, which covered most of relevant themes connected with data harmonization process in most of European countries. Data harmonization in forestry is common theme on national level and as cross border theme too. The Humboldt Scenario Forest (HS Forest) is focused mainly on land cover and vegetation integration with data for water resources, risk management and protection. This application case deals with the harmonisation of conceptual schemas. Mapping rules between schemas of the source data Regional Plans of Forest Development (RPFD) and the target data model of Corine Land Cover (CLC) 2006 are defined using Humboldt Alignment Editor (HALE). The HALE functionality is illustrated using examples of mapping functions on features and attributes. RPFD are the defining principles of forest management according to the natural forest areas in the Czech Republic. As a methodical tool of state forest policy, it serves as an aid for state administrative decision-making. It forms the background for forest management plans and forest management guidelines elaboration. Legal force of RPFD is twenty years. In present RPFD are in mid time of validity. GIS part of RPFD is accessible on the MapServer of the UHUL and tenth of dataset is updated yearly. It is possible to connect it via WMS. This contribution describes real processes during data harmonization. Our aim is to increase involvement of RPFD into decision processes not only in field of forestry but also in theme of environment.

Abstrakt

Projekt Humboldt byl dokončen září 2010. Naplnění záměrů projektu bylo demonstrováno v devíti scénářích, které pokrývají převládající témata spojená s harmonizací dat v Evropských zemích. Harmonizace lesnických dat je společné téma jak na národní tak na přeshraniční úrovni. Humboldt scénář Les (HS Forest) je zaměřený hlavně na spojení dat pokryvu území a vegetace s daty vodních zdrojů, managementu rizik a ochrany. Tento příklad je uveden harmonizací pojmových schémat. Pravidla mapování mezi schématy, zdrojového datového modelu Oblastních plánů rozvoje lesů (OPRL) a cílového datového modelu Corine Land Cover (CLC)2006, jsou definována pomocí Humboldt Alignment Editor (HALE). Fungování HALE je předvedeno použitím příkladů mapovacích funkcí pro prvky a atributy. OPRL definují principy hospodářské úpravy lesů podle přírodních lesních oblastí České republiky. OPRL jsou metodickým nástrojem státní lesnické politiky a složí pro rozhodovací procesy státní správy lesů. OPRL jsou podkladem pro zpracování lesních hospodářských plánů a osnov. Platnost schválených OPRL je dvacet let. V současné době jsou OPRL uprostřed doby platnosti. Vrstvy GIS OPRL jsou přístupné na MapServeru UHUL a desetina této datové sady je každoročně aktualizována. Datovou sadu OPRL je možné připojit přes síťovou službu WMS. Příspěvek popisuje proces harmonizace. Naším cílem je zvýšit zapojení dat OPRL do rozhodovacích procesů nejen v lesnictví, ale i do oblasti životního prostředí.

Klíčová slova: Humboldt, RPFD, CLC, lesnictví.

Keywords: Humboldt, RPFD, CLC, forestry.

1. INTRODUCTION

Forestry policy as well as forest management have been the crucial factors in many policy areas. These are documented by numerous global, community, national and local actions and initiatives which have shown the significance and responsibility of the forestry sector to economics, environment and social affairs. The strategic goal of FMI is to develop rational and most effective methods of monitoring and evaluation of forest ecosystems, information and indicators for the reliable warnings of citizens and authorities to support the effective protective actions. Monitoring is mainly based on terrestrial data collection at sample plots, as well as classification of high resolution satellite imagery. The analysis of the Earth Observation (EO) data comprises an effective and objective way to create operational forestry maps and analytic geodata. Therefore the ongoing and future projects on the field of Earth Observation implemented by the FMI.

Data harmonisation in forestry is very important for several reasons:

- Forestry represents the combination of economical subject, subject of landscape management and subject of nature preservation. Forest management is also essential in term of risk management (e.g. floods or fire protection). Therefore the forestry data have the huge utilization.

- In forestry there are a large number of different data sets originated from many sources (e.g. internal data, data of state administration, data of private and state owners etc.). On that ground the data harmonisation is necessary, too.

- Risk management needs the very quick access to the updated forestry data (e.g. forest borders or forest roads). Just the harmonised data sets lead to better accessibility.

2. OVERVIEW

The Humboldt Scenario Forest (HS Forest) is created in cooperation of Help service – remote sensing (HSRS) and Forest Management Institute (FMI). HS Forest focused mainly on land cover and vegetation integration with data for water resources, risk management and security. The Czech Republic, in terms of area, is one of the smaller states in Europe but it can be proud of its highly diverse natural wealth. Forests are undoubtedly one of the most valuable of its assets - their value can be expressed by purely economic indicators, but the true significance of forests far exceeds their economic importance.

This application case deals with the harmonisation of conceptual schemas. Mapping rules between schemas of the source data Regional Plans of Forest Development (RPFD) and the target data model of Corine Land Cover (CLC) 2006 are defined using HALE. The HALE functionality is illustrated using examples of mapping functions on features and attributes.

HALE Open Source Software, available from:

http://community.esdi-humboldt.eu/projects/list_files/hale

HALE Manual, available from:

http://community.esdi-humboldt.eu/attachments/72/alignment_editor_manual_2010-03-31-M2.pdf

Schema of the source data in this case: RPFD and CLC 2006 as target data. The schema can be loaded:

- from a shapefile

- by loading a GML application schema .xsd file (GML versions 2.1, 3.1, 3.2)

- from a Web Feature Service by specifying the GetCapabilities request URL and selecting a feature type or by directly inserting the DescribeFeatureType request URL for a feature type.

Target schema, in this case the CLC 2006 data model GML application schema.

After you have finished all your mapping tasks, you can save the whole HALE project by choosing the Save Alignment Project as command from the File menu. The result of your mapping could be saved into a file in two different xml-based formats: the RDF OML (Ontology Mapping Language) as adapted and extended in the HUMBOLDT project ("gOML") or to an Extensible Stylesheet Transformation file (XSLT).

3. THE CONCEPT OF HS FOREST

- support data source harmonization in field of natural resource monitoring and land cover
- support decisions of regional and local authorities
- enhance future direction and development of GMES
- deliver up-to-date data to other information systems to support timely warnings

3.1. RPFD

Regional Plans of Forest Development (RPFD) contain data summaries on the state of the forest and the service needs of the forest as a public interest. They stem from the principle of sustainable forest management and form conditions for minimization of collision between society interests and interests of individual forest owners.

- Standards: Data are standardized by Forest Management Institute (FMI)I
- Geometry types: All types of geometry primitives (point, line, polygon)
- Storage format(s): Database
- Coordinate reference system: S-JTSK (Czech national system)
- Scale / resolution: from: 1:10 000 to 1:50 000
- Language: Czech
- Metadata: Defined by FMI (support of INSPIRE standard)
- Visualisation: Raster maps

3.2. CLC 2006

Land cover data set CORINE Land Cover (CLC) covers most of European states. There are some other benefits of the using of CLC: standardization, high number of users, support of legislation. The higher level of detail of CLC was emphasized in many studies and projects. Above all densely populated and dynamically changing areas needs the updated and detailed land cover information for their further development

- Geometry types: Data contains Polygons.
- Storage format(s): Shapefile, rasters.
- Physical model: Prepared W3C XML Schema, XSD schema based on example of CLC data
- Conceptual model UML Class diagram): the CLC data are composed of features with three parameters:
- GEOMETRY: Geometry
- CODE_00 (enumeration of values in Appendix 1)
- AREA : double
- Coordinate reference system: ETRS 1989

- Scale / resolution: 1:100 000 or 1:250 000
- Language: English (translated to other languages)
- Visualisation: Raster maps

4. FORESTRY AND INSPIRE DIRECTIVE

The expected role of Forest Management Institute in supporting GMES programme is to ensure data knowledge bases for the forestry sector, which will be utilised in evaluation the EU policy and their partial directives. The actual goals and potential practical applications are as follows:

- FMI will ensure the results will contribute to fulfil the strategic goals of GMES by supporting the data source harmonization in field of natural resource monitoring, and the outputs will be applicable in e.g. urban planning, monitoring of disturbed and industrial areas in regional development, control of agricultural filed extent, crop management and production, assessment of forest state for timely warnings (forest fires, thread zones, erosion, etc.)
- The results delivered to end-users such as regional and local authorities, Ministries of Agriculture and Environment, will support their decisions and help to evaluate the entire regional management
- The geospatial data will act as the basis of the future direction and development of GMES, as the whole concept of forestry remote sensing is oriented to the adaptation of the end-user demands
- The FMI's strategic goals are also to deliver up-to-date data to other information systems to support timely warnings. The services will contribute to GMES system in order to provide analytical data for early identification of threads and the rapid response. Our datasets gathers thematic forest maps and spatial environmental information from the threaded areas of Czech Republic.

Why does FMI as the main forestry data manager need geospatial data harmonisation? There are three main general reasons:

1. Economical objectives: Support of a competitive strength of the forestry management, increasing of usage of forest products and services.
2. Ecological objectives: Support of a biological diversity and its improvement as well as a forest resistance from local and global point of view.
3. Social objectives: Increasing of life quality due to the improvement of social and cultural features of the forests.

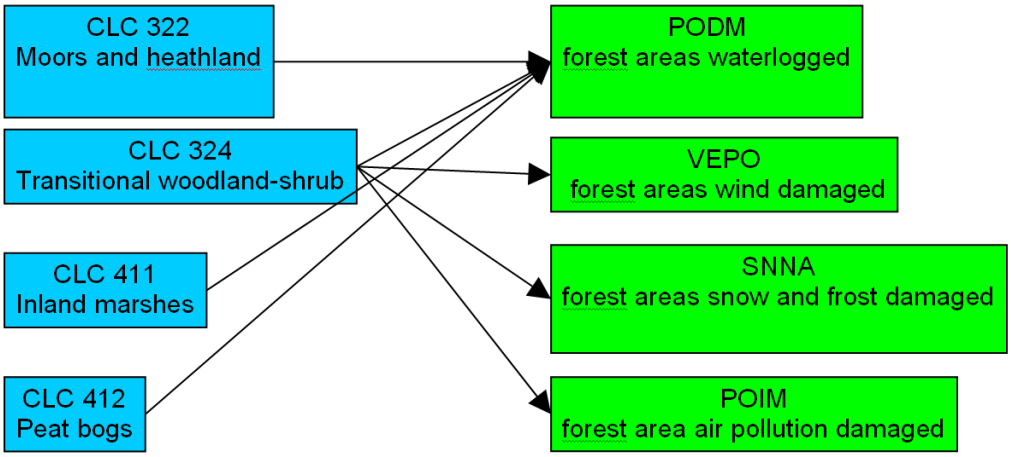
The claim on harmonisation results from INSPIRE directive. In this case the harmonisation is concerned with metadata records. Metadata in accordance with INSPIRE must be created by two (data of Annex I. and Annex II.) or five (data of Annex III.) years from the acceptance of implementing rules.

5. COVERED GEOGRAPHIC AREA

Whole area of the Czech Republic – RPFD.

CLC 2006 - most of the European countries.

6. USE CASES



Picture 1: Harmonization of the source dataset RPFD to the target dataset CLC 2006

Use Case A

- Target dataset CLC 2006 – object 324 - Transitional woodland-shrub
- Source data layer – from dataset RPFD (Regional Plans of Forest Development)
- Object - polygon, layer name VEPO - forest areas wind damaged
- Object - polygon, layer name SNNA - forest areas snow and frost damaged
- Object - polygon, layer name POIM - forest area air pollution damaged
- The attributes:
- UDRZBA – maintenance transfer from all above object (VEPO, SNNA, POIM)
- UDRZBA – N 4 0 - year of last maintenance
- Process:

To perform integration of RPFD layers in order according to value of attribute

Use Case B

- Target dataset CLC 2006 – object CLC 411 ,412- Inland marshes
- Source data layer – from dataset RPFD (Regional Plans of Forest Development):
- Object - polygon, layer name PODM - forest areas waterlogged
- Object – polygon, layer name MELI – water potential of forest areas
- The attributes:
- UDRZBA – maintenance transfer from all above object (PODM, MELI)
- DRUH_ZAM – type of waterlogging
- Value of DRUH_ZAM:
- P – cyclic waterlogging
- G – stagnant water waterlogging
- V - flowing water waterlogging
- R - peats
- L - floodplain soil with underground water
- Process:

To perform integration of RPFD layers in order according to value of attribute. Object with attribute value of G and L will be selected, other deleted.

7. APPLICATION CASES

Processes of workflow in the Forest scenario Demonstrator is described in text connected with EPC (Event Driven Process Chain). Below is text only the EPC scheme is accessible on training web site: http://www.gisig.it/humboldt/training

1. EVENT:

Request for preparation of RPFD data set, data layers selection and update from fieldwork.

1. PROCESS:

Data set selection from central DW_RPFD, data collection in field, in according with methodologies and Forestry Information Standard (see use case of WP2)

2. EVENT:

Selection of updated data layers (VEPO, POIM, PODM, SNNA) from central DW_RPFD – update of HS Forest

2. PROCESS:

Data layers was selected for a new HS Forest from DW_RPFD

3. EVENT:

Creation of updated metadata, preparation of WMS and WFS (gml) for harmonization of CLC 2006 with RPFD according to new HS Forest

3. PROCESS:

Creation of metadata, WMS and WFS

4. EVENT:

Preparatory of source data set RPFD and target data set CLC 2006 for harmonization.

4. PROCESS:

Loading of source and target data set in HALE.

5. EVENT:

A new target data model is visualized. Model is saved as an OML file.

5. PROCESS:

A new target model was saved.

6. EVENT:

Creation of a new content of CLC 2006 data sets in GIS. Description of harmonization sevice for CLC 2006 was saved in metadata.

6. PROCESS:

Harmonized data of CLC 2006 was created, a new WPS was created and saved in metadata.

7. EVENT :

Setting –up of a new service into Humboldt tools for harmonization of CLC 2006.

7. PROCESS:

WPS was created for harmonization of CLC 2006.

8. EVENT:

Visualization of harmonized dataset of CLC 2006 on portal esdi-humboldt.cz

8. PROCESS:

Harmonized data set was created on portal esdi-humboldt.cz.

8. CONCLUSION

Input analyses of user requirements and description of processes was based on practical experience from current operations in data provision, own internal analyses of data sources in data warehouse of the FMI. The Humboldt tools, source data sets, definition of mapping rules and testing steps in process of adaptation and implementation, it was a new experience in European project community with research of technical ability and realization of required processes. The final training web page becomes the main presentation tool of the Humboldt project results and gives possibility how to share result of the project with other users in many interest groups (forestry, environment protection). We expect new requirements from forestry administrations, forest owners and forestry research in field of data sharing and data analyses in new economic conditions. It means that most of forestry data users need to have a possibility to process and evaluate all available data before field-work monitoring. The Humboldt tools gives operational instrument for these tasks.