The European Environment Agency Spatial Data Infrastructure

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Abstract

The European Environment Agency (EEA), together with the Environmental Information and Observation Network (EIONET), is developing its spatial data infrastructure as a geo-node of an environmental shared information system. Network services mainly based on ESRI tools include, among others, geospatial data discovery, web map viewers, geospatial reference data sharing and free download services. These services are contributing to the initiative for building an infrastructure for spatial information in Europe (INSPIRE). Environmental priority areas for development of the EEA system components and network services are air pollution, water management, land use, biodiversity loss and climate change. Special attention is given to integration of the data, architecture and services related to Global Monitoring for Environment and Security (GMES) and the Global Earth Observation System of Systems (GEOSS)

Introduction

There is an increased demand from public and decision makers for geo-referenced environmental information. An increased number of environmental issues require spatial modeling and integrated assessments. As a result, there is an increased number of data and information providers in Europe at international, national, regional and local level.

One of the priorities within the European Environment Agency (EEA) EEA strategy 2004-2008 is to build an integrated spatial information system to support more effectively the development of EEA products and services (Ref. 1). An operational spatial platform for geo-referenced data flows, modeling and analysis, will gradually develop towards a shared European Environmental Information System in line with the development of an Infrastructure for Spatial Information in Europe - INSPIRE – INSPIRE (Ref. 2) and the initiative on Global Monitoring for Environment and Security – GMES (Ref. 3). initiatives.

The EEA strategy is aligned with the 6th Environment Action Programme of the European Community (Ref. 4), working across four major thematic areas: tackling climate change, tackling biodiversity loss/understanding spatial change, protecting human health and quality of life, use and management of natural resources and waste. Each of these is influenced by a range of societal and sectorial processes.

Architecture

EEA is developing together with its European Environmental Information and Observation Network (EIONET) its spatial data infrastructure as an important network node of a European spatial data infrastructure (ESDI) for environmental data exchange at European level. INSPIRE is the legal framework proposed by the European Commission to develop an ESDI. A network node as a part of the ESDI is referred to in

this paper as a "geo-node". The ESDI consists of several interlinked geo-nodes providing geospatial information. The EEA infrastructure will enable easy exchange of environmental spatial information at European level within the European community and beyond.
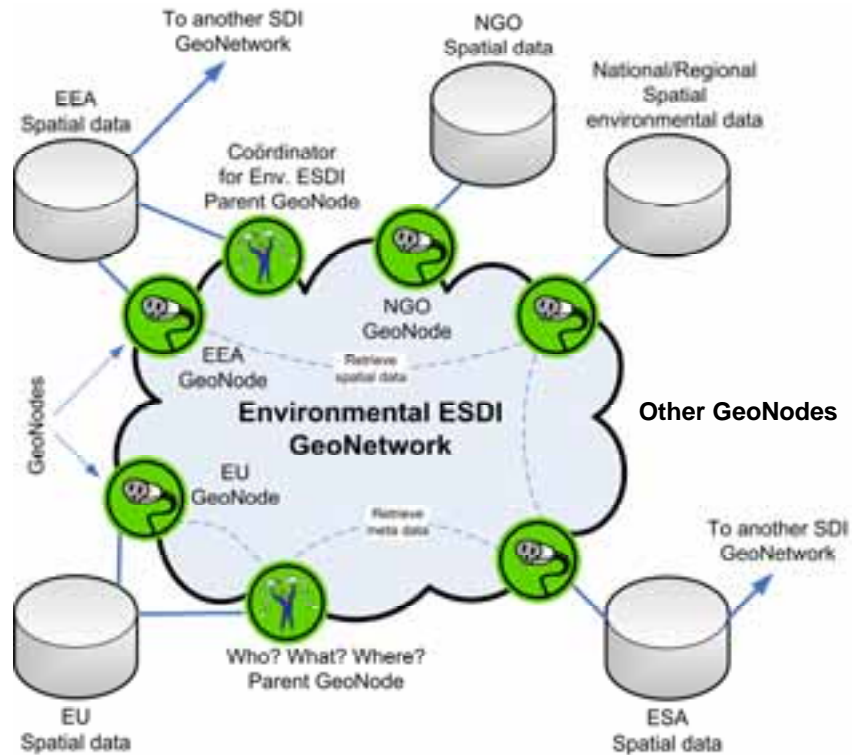

Figure 1. The GeoNetwork concept of a European Spatial Data Infrastructure for the environment

Building the spatial data infrastructure is taking into account the European Commission led review of reporting. There is as well the need to integrate the existing Eionet network and reporting tools, called ReportNet (Ref. 5) in the design of a shared environmental information system. The Reportnet tools have been developed to support EEA and Eionet activities related to the flows of data and information from countries and others to the EEA, through to the assessments and knowledge provided back to countries, the Community institutions and other clients. The system comprises the people and organisations in the network, their networking activities, as well as the supporting infrastructure and electronic tools.

Dataservice

For a number of years the EEA dataservice (Ref. 6) has been the place where all datasets compiled or used by EEA are stored, geospatial as well as tabular data. Analytical products like maps and graphs are also managed in the dataservice. Metadata are published for each dataset, map or graph and a download facility is available. A quality label based on ISO19113/4 reporting was recently introduced for European datasets produced by EEA. The EEA dataservice serves both as an archive internally and as a discovery and download service for its users, i.e. the European Information and Observation Network (EIONET), European Commission and

Parliament, the public, etc. The dataservice is widely used with at present on average 6000 downloads per month for geospatial datasets alone.

Web map services

The developments of the EEA GeoNode network services are grouped into six objectives. The objectives are:

- Development of web map viewers that provide web based mapping capabilities for websites;
- Technical system setup of web map system services, hardware and software, providing interactive maps to web map viewers and other GIS clients;
- Development of discovery system services, based on indexing metadata for geospatial data, maps and graphs. Indexed metadata will become available for search via webpage's and in-house GIS client applications;
- Implementation of a surveillance system to ensure that the EEA SDI provides high quality services. Ensuring secure, stable and updated, data warehouse and system services. The surveillance system ensure this by handling security, manage access, log stability of services, doing data management, and having ability to recover system failures;
- Development of incoming data connectors to access geospatial data sources outside the EEA SDI. They query on data on demand, do harvesting of data, and do scheduled collection of data;
- Development of outgoing data connectors to provide advanced access to geospatial data sources from the EEA SDI via GeoNode.

Since December 2004 prototype view services have been developed. The success of these web map viewers comes from a tool box concept developed by EEA that allows re-use of the same standard components in different map services. Thereby the user requirements have been separated from the technology which is a huge advantage for developing and maintaining the services. The toolbox includes customized layout and querying. In the longer perspective harmonized tools for analyses will be added. In 2003 EEA had five operational view services. In 2006 it will be more than 30 operational services. The view services are developed to facilitate access to environmental information related to nature, emissions, land cover, air quality, water, etc., and they rely on high quality, harmonised European data that are related to core geographic reference data.

Towards a shared European environmental information system

The Agency's priorities for the coming years will be to improve its information system towards a shared spatial information system to support more effectively the development of EEA products and services and to extend the network and the capacities needed by users. Quality assurance procedures will be strengthened to ensure standardisation, homogenisation and clearer data definitions for users. The electronic tools and infrastructure and review of business processes under the ReportNet umbrella will continue to be developed in order to make information flows, including geo-referenced data, more efficient, transparent and available for many purposes. The EEA data service will be populated with more and more geo-referenced data, also to underpin the core set of indicators and provide a setting for integrated

assessments. Interactive tools enabling users to analyse environmental data in its geographic context, produce spatial assessments for their own purposes and refer to best practice will be implemented.

Key EEA products and services such as the recent 'The European environment - State and outlook 2005' report (Ref. 7), the indicator management system, the reporting mechanisms on sectors and environment (i.e. agriculture, transport, energy) are more and more using SDI as the backbone for data and information management. These concrete products and services helped EEA to overcome most of today's technical challenges for implementation of a spatial data infrastructure and are paving the way towards an operational shared environmental information system in Europe.

During 2006-2008, special attention will be given to integration of the data, architecture and services related to Global Monitoring for Environment and Security (GMES) and the Global Earth Observation System of Systems (GEOSS) (Ref. 8).

References

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