PRESENT SITUATION OF (ENVIRONMENTAL) SPATIAL DATA EXCHANGE AND COMMON USE IN ESTONIA

Estonian Environment Information Centre

Tallinn 3/2005
Introduction

The aim of the present document is to give a short overview of the present situation about the production, exchange and common use of spatial data in Estonia. This document is an introduction to proposals for writing a strategy on spatial data in Estonia.

Even the ENVIFACILITATE project focuses on environmental spatial data, the present document describes also spatial data for other areas. This is because the environment is influenced by very many factors and, therefore, there is a need for very different data in order to assess the state of environment etc.

A lot of spatial data are created in Estonian public sector. At the same time a lot of this data is not available outside an institution managing this data. This background document explains some of the reasons.

Current situation in data exchange and in common networking (lack of information, price, legislation)

One of the biggest problems is lack of information. Estonia has no meta-database from where to receive information on existing spatial data, including satellite photos. At the moment this information is transmitted via unofficial networks. In addition to meta-database there is also a need for cross-reference of data.

In many cases, even there is information on existing data, the real availability of data is difficult or missing. There are different reasons for that. One of the reasons is the need to earn money, therefore, data producers work out different schemes. For example, it can be small changes ("cosmetic" changes) in a database that was ordered by the state and this "new product" is sold under a different name. Often data exchange can be as "claw me, and I will claw thee", where data are given out in exchange of other data or services.

Price for companies, especially for non-state-owned business companies, can be very high. This creates a situation where it would be more useful for the company to produce the necessary spatial data themselves. But this situation causes duplication of databases and decreases data reliability.

Legal bases:

- International legal acts, conventions. Arhus Convention (a right to participate in environmental decision-making, right for an access to environmental data, right to dispute environmental decisions).
- Environmental Register Act.
- Public Information Act.
- Databases Act.

The problems are especially serious in case of basic data. Without this data it would be impossible for a user or producer to fulfil legal or statutory obligations.
**Reasons for the current situation**

One of the main reasons for present situation is a missing clear strategy. In addition to that there is lack of money and influences from soviet methods (time-row persistence, personal habits etc.).

**Estonian steps that influence the generation of spatial data and data exchange**

The following information has been taken from the State Information Systems’ (RISO), MoE Information and Technology Centre’s and X-road homepages in February 2005. Authors of this document have not included any comments of their own. Therefore, some contradictions with other parts of the document might arise.

**Basis for information policy in years 2004 – 2006**

4.5. Environment and spatial data

Responsible body: The Ministry of Environment

Compilation of environmental data into a general national register (the Environmental Register) that links all environmental data in time and space. Environmental monitoring data and respective databases (the Fisheries Information System, the Register of Environmental Permits, the Forestry Information System).

Development of information infrastructure related to land and geographic location (national spatial data); further development of the Land Information System (including the improvement of data quality) in order to provide state agencies and local governments with e-services related to the publication and administration of spatial data.

Guidance, organisation and coordination of geo-information activities for state institutions is carried out by the Land Board, who reads and gives an opinion on state institutions’ geological information action plans.

**Information policy action plan 2005**

The aim of the action plan is to present projects in areas of activities that are related to the main aims of the basis for information policy. In order to implement the action plan it is necessary for respective government institutions to foresee the necessary activities in their action plans.

1. Geological information systems

Geological information systems are easy-to-use and maps are available to all authorised users and other information systems.

**Anticipated outcomes and influence:**

1. Guaranteed interoperability between all geological information systems based on open standards of the public sector.

There are preconditions that digital maps and geological information can be used either locally important or institutionally important data layers (e.g. municipal schools, tourism attractions, fireplugs etc).

All authorities, enterprises and citizens can use digital maps based on GIS standards that have been created by the public sector.
Without remarkable costs it would be possible to take new data sources into use, to offer new e-services via open interfaces and add links for geological information to existing e-services; Guaranteed authorised use of data (e.g. data with legally restricted use are available only to authorised persons).

2. There is a possibility to find information on existing spatial data and maps, their availability, possibility to use, acquire or conditions for use easily – there is a directory service for the existence of spatial data and different map applications.

**Responsible body:**
The Ministry of Environment

**Executors:**
The Ministry of Environment, the Ministry of Internal Affairs (county governments, Rescue Board, Police Board), the Ministry of Agriculture, the Ministry of Economic Affairs and Communications, the Ministry of Justice, the Ministry of Culture

**Description:**
1. By application of geological information standards a map interface will be created to X-road;
2. By using open standards basic maps generated by the Land Office will be made available;
3. Tools will be created to start using new spatial data layers and in cooperation with the executors the respective services will be started;
4. The possibilities to use e-services that are available to all will be expanded;
5. In order to guarantee the availability of spatial data and services based on that, the performance and reliability of supporting systems will be increased.

**Source:** www.riso.ee

**Environmental Register Act**

Elaboration of basic principles of the draft Environmental Register Act started in 1998 after adoption of the Databases Act in the Riigikogu and receipt of materials of the convention “Public Access to Environmental Information, Participation in the Decision Making Process and Access to Administration of Justice in the Field of Environment” (Aarhus Convention) for the preparation of ratification.

Drafting principles of the draft of Environmental Register Act were following:
to consolidate all environmental data into one national main register, relating through it environmental data in time and space;
to quit use of data not entered into national main register in international information exchange, upon granting of national resources exploitation permits and permits for emission of pollutants, waste and biological ecological factors into the environment, compilation of development plans and programmes and assessment of the state of the environment;
to quit disclosure of data not entered into the main register or currently in the stage of processing, in order to avoid misinterpretations, except data necessary for operative management;
to harmonise, relate and process data collected with various methods with one solution of information technology and on one cartographic base; to use the system of official classification, Estonian map system and the system of address data and names of register objects as systems supporting the main register.

The objective of establishment of the Environmental Register is to consolidate the entire environmental database into one national main register, relating through it all environmental data in time and space, and to give to the database a form, enabling to use data according to internationally approved principles. Different from other national databases, basic nature of the Environmental Register is its public availability practically in full extent. Through the establishment of the Environmental Register environmental database will be provided with legal meaning and reliability of environmental database will be ensured on international as well as national level. After the Environmental Register Act has entered into force it will be prohibited to use data not entered into the Environmental Register, e.g. upon compilation of development programmes and plans, exchange of international information and granting of environmental permits, as these data are uncontrolled and not complying with the requirements of legal acts. The mentioned restriction is not valid during the application period of the Environmental Register and in case when data are needed for decision-making for the purposes of operative management.

According to the principles of economy of public sector the Environmental Register is a non-profit organisation providing public service. Upon compilation of the draft Act, the chosen workload of the Environmental Register will be actual current volume of environmental data and the authorised processing unit proposed by the Minister of the Environment will be state authority appointed by the Government of the Republic, which has relevant technical possibilities and experience, for following reasons: replacement of current volume of environmental data with actually needed volume was not possible during the period of compilation of the draft Act, because of lack of knowledge about demand for such public service, and not depending on demand certain data should still be produced, stored and disclosed in the interest of security of the society; determination of actually needed volume of environmental data in the initial running phase of the Environmental Register is possible in more objective way and that volume should be less than current actual volume; as such public service is lacking price, because the service is offered on the basis of the principles of sale of public goods, it would be practical to choose for service provider the state authority appointed by the Government of the Republic for at least the initial running phase of the Environmental Register;

The Environmental Register has already first data and the register shall operate at its full capacity in 2007.

Source: www.keskkonnainfo.ee

**X-road**

X-road is a data exchange layer connecting main Estonian state databases. X-road enables a person as well as an official and entrepreneur to use a majority of databases registered in the State Databases Register over the Internet securely. X-road has a software and hardware to perform data exchange, as well as a respective management
centre. The X-road management centre organises the management, training for users and technical maintenance of the system. X-road identifies all users and allocates them user licences.

The Government approved the application of the data exchange layer (X-road) for information systems. The aim of the application of this data exchange layer is to establish the basis for data exchange layer’s activities. This aim is necessary in order to unify the use of Estonian databases and their intercommunication on the Internet. Implementation of this regulation allows the databases and information systems to use common, already existing, data exchange environment and one common set of user interfaces and authentication system. Authorities that manage important core and state databases for execution of public power, who have not joined X-road until now, will, pursuant to the regulation, join the X-road by March 1st 2004 as the latest. All government, as well as local government authorities will notify the Ministry of Economic Affairs and Communications about the deadline for joining the X-road by March 1st 2004 as the latest. Government authorities shall join in by January 1, 2005. Source: http://x-tee.riik.ee

State’s XML strategy
XML has changed understanding about data exchange since its development. This is both human as well as machine legible information processing. XML is used in document creation software applications, in inter-database data exchange, it is considered suitable for long-term data (information, archivals) filing. Several network services are based on that. The use of XML is giving a new content to the Internet and to data exchange between people and systems. A semantic Internet is developing where an information resource is much better described and, therefore, also understood. The problem that there is a huge amount of data that are understood only by a person creating the data, could find a solution. There is hope that XML can cumulate information in such a way that through easier understanding knowledge could be increased. In that, a wide use of XML is part of transition to knowledge-based economy. Once expressed knowledge (XML labels) are semantically described and cumulative and re-usable. This will form a memory for information society. Countries need a strategy to implement XML. Countries, like Denmark, where such a strategy exists and operates, are in the forefront of information societies. Services that are offered to citizens are cheap and fast, the systems (incl. databases) are able to exchange data by knowing data semantics, authorities are able to write and exchange documents quickly and with good quality. As a result this gives a good quality decision with a shorter period and, thus makes administration cheaper.

The aim of the core document XML strategy done by Veiko Berendsen is to make semantic interoperability more efficient. Semantic interoperability means that services related to life events and business episodes are made understandable from the semantic aspect and often at the data definition level. Source: www.riso.ee

In order to facilitate achievement of these aims a draft Information System and Data Service Act has been worked out, most likely it will be adopted even this year. If the Databases Act was aimed at data collection, then the new act will emphasise on the need to offer data services.
Main producers and users of spatial data, their interrelations

The structure of environmental administration and its relations to universities and other scientific institutions

The Ministry of Environment’s area of administration:

- Estonian Land Board
- Environmental Services
- Environmental Inspectorate
- Centre of Forest Protection and Silviculture
- Estonian Environment Information Centre
- Estonian Meteorological and Hydrological Institute
- Estonian Radiation Centre
- State Forest Management Centre
- Estonian Geology Centre
- Estonian Map Centre
- Estonian Environmental Research Centre
- Tartu Environmental Research
- Protected areas with administration
- Other smaller organisation, e.g. Põlula Fish-farm, Nature Museum

A very intensive data exchange takes place between organisations under the administration of the MoE that either collect or produce data according to their specialisation. The data are needed by other organisations in the area of administration in order to fulfil their everyday responsibilities. Usually raw data are not exchanged, they will be processed beforehand, i.e. an additional value is given to data. Physical data exchange takes often place via e-mails. Still, other solutions are also used, e.g. URL queries etc.

Largest universities:
- Tartu University
- Tallinn Technical University
- Estonian Agricultural University

Several different institutions in the area of administration of the above-mentioned universities deal with spatial data and geo-information.

Tartu Observatory, NGO Research Centre Archipelago, Scientific Association IM Saare should be mentioned from independent research institutions.

One of the cooperation areas related to environmental spatial data is the National Environmental Monitoring Programme. This is organised by the MoE. At the moment there are about 15 institutions in Estonia that coordinate accordingly one or several sub-programmes.
In addition to the above-mentioned organisations, spatial data are also used by several free associations like Estonian Nature Foundation, Heritage Community Protection Association, Estonian Ornithology Association.

Universities and other research institutions use environmental spatial data in research and studies. At the moment they receive the data via information claims and public web-pages.

**Production of environmental data in Estonia, areas of responsibility**

Pursuant to the Environmental Register Act the issuers of data are:
- Government institution that prepared a legal act;
- Issuer of an environmental permit;
- Maker of a registration decision;
- Receiver of the work done based on a programme, study or and inventory;
- Establisher of a plan.

At the moment, before the full implementation of the register, the main issuers or producers of environmental data are:
- State institutions due to their responsibilities.
- Local governments;
- Scientific and Research institutions that in relation to the National Environmental Monitoring Programme.
- Companies that give out data pursuant to several legal acts. For example when applying for an environmental permit.

A lot of environment-related spatial data are produced in the frames of very different projects (incl. LIFE, Phare, GEF etc).

Annex 1 gives a more detailed overview of biggest producers of environmental data.

**Users and their needs**

Users can be divided into 5 groups:

1. State institutions and local governments
   E.g. Statistics Board, county governments.

2. Business associations
   E.g. notaries, forest owners, assessors of environmental impacts.

3. Scientific and research establishments

4. The public is until now a small group of users of spatial data. One of the reasons is certainly a small amount of services aiming at a wider public.

5. International organisations. A lot of them receive data via state institutions based on international agreements (accountability).
The needs in the first three groups depend on their main activity and direct needs based on that.

In general, an interest to use spatial data is big. Lack of knowledge and training are reasons for a limited use, people are not aware of the suitable software and necessary data to use for achieving a specific aim. Users have no information about freeware GIS and they have no skills to use it. Another reason is a small amount of web-based services.

At the same time there are situations where spatial data are used as much as it is necessary and as little as possible in decision-making. Only in recent years “what happens if...” analysis have been carried out and sustainability has been considered. For example, local governments have understood that a thorough analysis of a plan helps to maintain a balance between nature protection, human-friendly life environment and economic success.

This situation is supported by existing legislation. For example, legislation does not oblige assessors of environmental impacts to produce additional data in a situation where based on existing data thorough analysis will not be possible.

**Main databases in an environmental sector**

1. Environmental register
   Several existing databases have been included in the environmental register. For example, National Water Cadaster (list of water bodies), list of drillholes and artesian wells, list of ground and surface water intake. Since July 1st the list of mineral deposits instead of the present Mineral resources register.
2. EELIS (Estonian Nature Information System). Several lists are available via EELIS, that, for example, has a list of nature reserves, protected parks and nature monuments; list of Estonian species (incl. protected species); list of valuable habitats.
3. Forest register
4. Sea coast register
5. Information system of air pollution sources, air pollution sources register
6. Waste reports information system
7. Environmental permits information system
8. Fisheries information system

In 2007 all environmental data shall be entered in the environmental register. The register is Internet-based and public, excl. data subject to limited access as provided by legal acts.

Existing information systems are working tools for environmental specialists and will be connected systems for the environmental register.

There are other, incl. unofficial registers in the environmental sector. One example could be a landfill register that has information about existing as well as closed landfills in Estonia.
In addition to the above-mentioned data, a lot of other spatial data directly or indirectly influencing the environment are used in the environmental sector. For example, satellite photos and aerophotos, Estonian Basic Map (infrastructure etc), soil map.

**How an EU membership has influenced the situation and needs**

The EU membership has brought along an obligation to fulfil directive requirements. Several directives oblige to transmit also spatial data.

Estonia has been a member of the European Environmental Agency (EEA) already before joining EU and therefore Estonia has an obligation to transmit data to EEA. More and more EEA requirements will be harmonised with the directive requirements. Therefore Estonia should have taken the majority of directive requirements into account anyway, it means the collection and/or production of respective spatial data.

Specific topics in connection with EU have more or less influenced Estonian public. For example Natura 2000 has created a lot of discussions and deepened an interest towards the location of Natura 2000 areas, restrictions and other information about the areas.

**Activities related to data exchange and networking**

**Existing or planned legal acts about the productions of environmental data and data exchange**

The Environmental Register Act, X-road regulation, draft National Information System and Data Service Act are the acts that have influenced the production of environmental data and data exchange the most.

**Existing or planned network to improve data exchange**

At the moment there is no considerable network for spatial data exchange. X-road will perform that task in the future. For example, at the moment the Ministries of Justice and Environment have initiated e-notaries application. State authorities have created some applications that make data exchange easier. For example the Information and Technology Centre and Land Board use URL queries for data exchange. Other state authorities and local governments have similar initiatives. Unfortunately there are no considerate solutions among them where data exchange would take place via map servers.
Activities related to INSPIRE

There is an INSPIRE round-table in Estonia that meets in the Ministry of Environment. The following organisations have their representatives in the round-table:

- The Ministry of Environment;
- MoE Information and Technology Centre;
- Estonian Land Board;
- The Ministry of Finance;
- The Department of State Information Systems (RISO);
- The Ministry of Internal Affairs;
- The Ministry of Agriculture;
- Statistics Board;
- State Information Systems’ Development Centre (RIA).

The round-table shall put together the state’s evaluation of the draft act and later support the work of Estonian experts in an INSPIRE expert group i.e. implementation provisions’ working group.

Activities related to NSDI (National Spatial Data Infrastructure). Attitudes towards data exchange at the national level.

At the moment there is no official NSDI in Estonia.

In 1998 the Land Board ordered a development work „Models of Estonian spatial data“. The first stage stated the present situation in spatial data production and use and this was the first step in creating models of spatial data. The contractor was the Institute of Geography in Tartu University was. In the second stage initial spatial models were created, their public discussion was held and a working programme and budget were done for the final version.

The Institute of Geography in Tartu University has dealt with the development of spatial data standards and infrastructure.

Users/demanders of spatial data about the availability

Data availability and issues related with that are different for different user groups. But there can be differences also inside one user group. The lack of meta-database can be mentioned as a common problem.

Relatively limited web-based services are a problem for the public, but also for other user groups. There are interactive atlases, applications allowing address search, land information and nature protection applications etc. But connected and/or adapted services would be more important for the public.
Producers of spatial data about data availability and data exchange. Key problems and benefits.

One of the main problems for producers is the lack of meta-database. Information about data that could be useful in a decision-making process or would give additional values to produced databases is transmitted via unofficial channels and is therefore occasional.

A dialogue between users and producers would be necessary and help to clarify the needs of stakeholders.

General attitudes towards issues related to data exchange and opportunities to improve the situation.

Cross-reference of data and facilitation of general data exchange is considered very necessary. Steps made by the state of Estonia have been approved, e.g. data exchange layer in X-road.
One possibility to improve the situation would be an INSPIRE directive. At the same time issues related to the directive have not yet been publicly discussed.

International topics, initiatives (INSPIRE)

The biggest benefit form the INSPIRE directive will be that Estonia shall not develop or adapt infrastructural legal acts, implementation provision etc. on its own, these will be empowered top-down and so the process will be shorter and there will be less various interests between different interest groups. A visible benefit will be a simplified data exchange in Estonia, within the European Union and with international institutions.

Estonia has supported the adoption of the directive. The reason is that unified standards raise the efficiency of spatial data use and access and decrease costs for data exchange inside the country as well as internationally. There will be no need to unify data produced by different institutions. An overview of spatial data in different institutions or registers will be available from one certain place.

Pursuant to different EU directives Estonia is obliged to transmit spatial data to EU institutions. When the draft will enter into force the requirements for data will be in compliance with the INSPIRE requirements and Estonia has take that into account. The INSPIRE draft will lower the costs for complying spatial data with the specific directive requirements, e.g. EU Water Framework Directive.
Already now, Estonia has the majority of spatial data listed in the directive annexes. Most of them have been produced pursuant to OpenGIS, ISO etc. standards. The main task will become into compliance with the quality requirements. The main problem is missing meta-data. There are almost no meta-data in compliance with ISO etc. standards.
Conclusions

This document shall be considered a description of the current situation and it may change in the course of work.
There is a need for a clear strategy. This could also include a need for training, education in environmental awareness, integration of scientific and applied research with users etc. in addition to that a need for a meta-database should be pointed out. Proposals for Estonian strategy on spatial data could also include the development and promotion of this database.
<table>
<thead>
<tr>
<th>Organisation</th>
<th>Contact</th>
<th>Resources</th>
<th>Data needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estonian Meteorological and Hydrological Institute</td>
<td>Ivo Saaremäe</td>
<td>Meteorological monitoring data (temperature, moisture, precipitation etc), surface water monitoring data, climatological data, data from meteorological radars and satellites.</td>
<td>Basic Map (received from Land Board) and land use data.</td>
</tr>
<tr>
<td>Estonian Environmental Research Centre</td>
<td>Enn Otsa</td>
<td>Ordered by the MoE: air monitoring data, integrated monitoring data, precipitation chemistry, waste water control monitoring data, hazardous substances in surface water.</td>
<td>EELIS layers (cooperation with ITC) Cadastral borders in vector format (there exists a data exchange agreement with the Land Board) Soil map (received from the Land Board) Orthophotos (exchange agreement with ARIB)</td>
</tr>
<tr>
<td>Centre of Forest Protection and Silviculture</td>
<td>Kalle Karoles</td>
<td>Forest register, 50% of data comes from RMK, the rest from private forest managers.</td>
<td></td>
</tr>
<tr>
<td>Geological Survey of Estonia</td>
<td>Jaan Kivisilla</td>
<td>Ground water cadaster, coastal register, drillholes database, coast monitoring data, ground water monitoring; geological maps in scale 1:400 000 (top layer, ground base, crystal subsoil, hydro-geology, ground water protection, subsoil natural resources); geo-physics fields: abnormalities of gravity and magnetic fields; natural resources register and geological mapping in scale 1:50 000 ordered by the Land Board</td>
<td></td>
</tr>
<tr>
<td>State Forest Management Centre</td>
<td>Margarita Selli</td>
<td>Data on state forest</td>
<td></td>
</tr>
<tr>
<td>PRIA/ARIB</td>
<td>Ülli Reimets</td>
<td>Field massif register (field massif borders and features), Location livestock buildings</td>
<td>We are interested in all data concerning the use of land that could be of help in controlling applications for area-based subsidies. We are also interested in information about aerophotos existing in Estonia.</td>
</tr>
<tr>
<td>ARCHIPELAGO</td>
<td>Urve Pill</td>
<td>Data on Hiiumaa. The rest are produced during a project, they can be disseminated by the orderer.</td>
<td>Majority of data outside Hiiumaa is hardly available</td>
</tr>
<tr>
<td>Health Protection Inspectorate</td>
<td>Niina Sossulina</td>
<td>Data on drinking and swimming water quality</td>
<td>Ambient air data from the Marine Institute; Estonian Geology Centre;</td>
</tr>
</tbody>
</table>
| TU Estonian Marine Institute | Tiit Kutser  
Tiit.kutser@sea.ee  
Arno Pöllumä  
arno@sea.ee | Monitoring data, based on aerophotos  
Sea monitoring data: hydro-chemistry and hydro-physics data of sea water and several biological parameters (e.g. Cyanophyceae) | Information about existing satellite photos in Estonia  
Meteorology data, data on river inflow  
Wider data about water |
|-----------------------------|------------------------------------------------|-----------------------------------------------------------------|------------------------------------------------------------------|
| Tartu Observatory           | Anu Reinart  
Anu.reinart@aai.ee | Satelliit photos about Estonia  
Optical density of aerosol (AERONET)  
Insolation (incl. spectral ultraviolet)  
Long term data about the ozone layer above Estonia | Information about existing satellite photos in Estonia  
Data from EMHI, limnology station, data on forest monitoring |