

Actualities

Development of conceptual integrated model of socioeconomic biodiversity pressures, drivers and impacts for the long-term socioecological research platform of Latvia

Long-term Co-operative Project funded by Latvian Council of Science, Project coordinator Prof. V. Melecis (2010-2014)

Project background

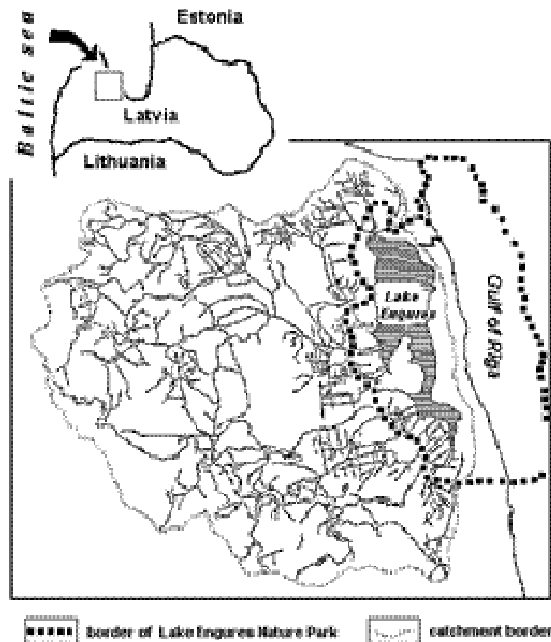
The International Long-term Ecological Research network (ILTER) since its origin was focused on long-term studies of ecosystem structure and functioning. It provides a vast array of different data sets concerning biodiversity and ecosystems. Human influence was mostly considered as one of external factors. During the last ILTER meeting in Stara Lesna (Slovakia) in 2008 a new research strategy was set forward which focused on threshold interaction between environmental and socio-economic dynamics at multiple scales and possibly forecast the effects of these interactions on biodiversity and ecological resilience. These objectives set a new challenge to the development of methodological approaches in studying complex landscape-level interactions between humans and ecosystems in different climate zones and under different economies. These studies should be based on the set of Long-term Socioecological Research (LT(S)ER) platforms arranged by the ILTER consortium members. At present the metadatabase of LTER Europe includes 21 LT(S)ER platform all around the EU. A Workshop of LT(S)ER platform managers in Krusne Hory (Czech Republic), 2008 discussed some guidelines to implementation of the research programmes in the LT(S)ER platforms in particular concerning the socioecological component of the study. A promising attempt was made by three LTER countries Austria, Germany and Spain in the development of biodiversity pressures and drivers models for three different LT(S)ER sites of Europe (Haberl et al., 2008). The aim of the model is to guide research aimed at improving our understanding of socioeconomic biodiversity pressures and drivers and to serve as a basis for the development of formal, quantitative models in that field. However, it was concluded that the development of such a mathematical model demands considerable investments in monitoring and reconstruction of past trajectories of ecological and socioeconomic parameters. There are still many unresolved questions regarding how to quantify the interrelation processes between society and ecosystems.

Project description

The aim of the project is to work out conceptual model of socioeconomic biodiversity pressures, drivers and impacts of the European Long-term Socioecological Research (LT(S)ER) platform – Engure region in Latvia.

General characteristics of the Engure LT(S)ER region

The platform region (644 km²) represents drainage area of the coastal Lake Engure with Lake Engure Nature Park, the Ramsar site (198 km²), large forested and farmland territories, and coastal part of the Riga Gulf, the Baltic Sea.



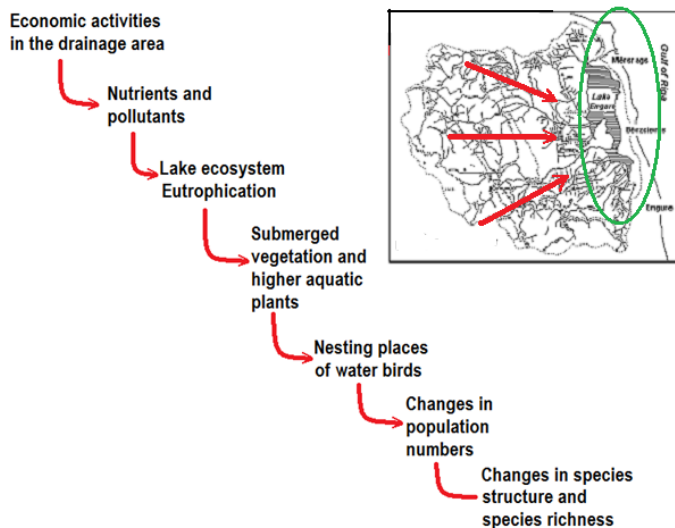
The region is characterised by high biodiversity (186 species of birds, 844 species of vascular plants, more than 1000 species of insects recorded till now). The Lake Engures is a Ramsar site since 1995. The Lake and its wetlands can provide nesting places for more than 20 000 water birds during the season.

The traditional settlement type was the former fishermen's village, which is characterized by its linear structure along the seashore and farmsteads inland. Human activities have been shaping ecosystems and biodiversity of the region for centuries. The water level of the Lake was lowered by 1.5 m during the XX century by constructing a channel in 1842, which connects the Lake with the sea. At present its area is reduced to about 41 sq.km. The ecosystems of the region have been under the impact of at least three different economies during the last two centuries:

- Period of conventional farmland agriculture until 50s;
- Period of socialistic intensive agriculture 1950 - 1991;
- Decrease in agricultural activities after privatization of lands since 1991 in independent Latvia.

The former fishermen's village has been subject to a wave of summer cottage, second home and guest house construction. The main industry (fishing and fish processing) has sharply declined. Fish processing factories are closed. Nowadays, the highest number of employees is in the service sector (wholesale, catering, tourism and leisure industries).

At present new economical situation has radically changed the previously existing relative balance between man and nature in the region. Decrease in agricultural activities caused overgrowing of meadows by bushes and forests. Many meadow biotopes of European importance are endangered. Climate warming considerably affected wetlands of the Lake. A decrease in numbers of nesting birds has been observed during the last years. Water bird populations are negatively affected also by American mink – an invasive species. The nutrients and agricultural pollution from the drainage area have changed the nutritious status of the Lake Engures and the overgrowing of it will result in loss of water bird species diversity in the future.



- Collection of the existing data and information scattered throughout different sources of information on the region's ecological and socioeconomic characteristics and creation of an integrated database.
- Studies of the current state of the biodiversity and socioeconomic factors.
- Development of a model of biodiversity pressures, drivers and impacts by integrated analysis of the historical and recent data.

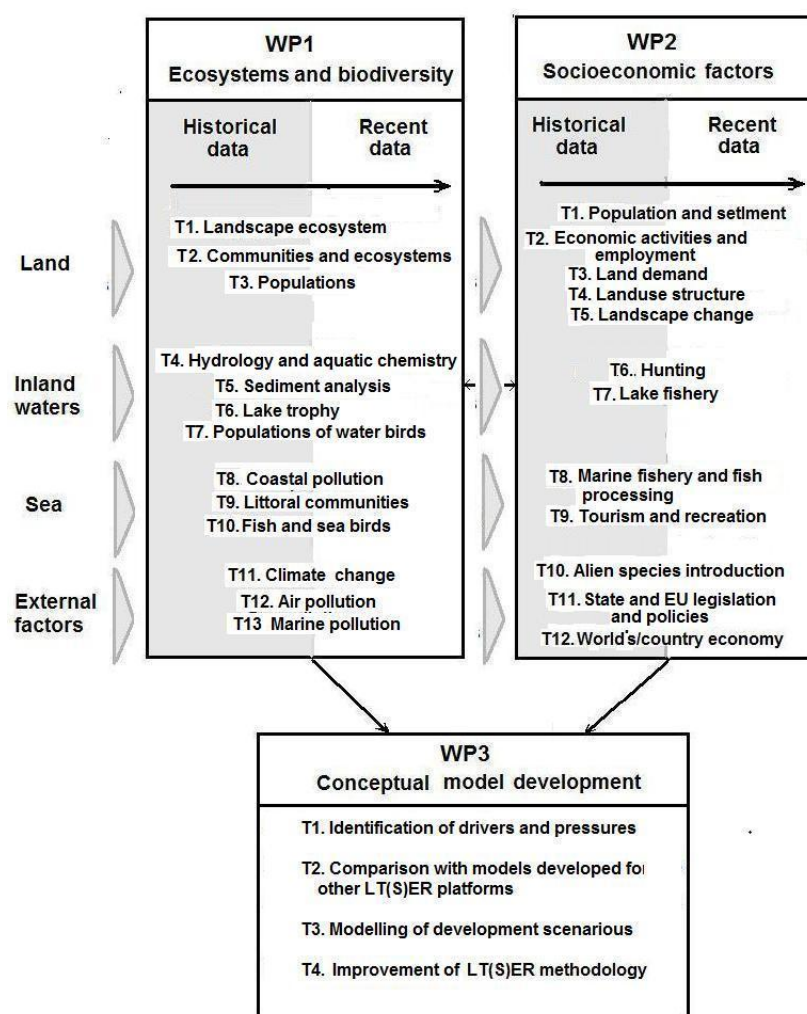
As a result of the project LT(S)ER methodology will be improved. Scenarios of the region development will be worked out. Local authorities and stakeholders will be involved in development of plans of sustainable development of the region. The project involves partners from several research institutions and university departments of Latvia:

- [Institute of Biology, University of Latvia \(IB\)](#) is a project coordinator. The Institute is also a coordinator of the national LTER network of Latvia. The following research laboratories of the IB are included in project consortium: Laboratory of Ornithology, Laboratory of Geobotany, Laboratory of Botany, Laboratory of Bioindication, Laboratory of Hydrobiology, Laboratory of Marine Ecology. The IB is responsible for biodiversity research and long term studies of biodiversity changes within the permanent LTER sample plots of terrestrial sites and wetlands, the aquatic ecosystems of the Lake and the littoral part of the Riga Gulf.
- [The Latvian Institute of Aquatic Ecology \(LIAE\)](#) being the main institute in Latvia specializing in applied and academic marine environmental research. LIAE is responsible for studies of marine ecosystems of the Riga Gulf and collecting data on fish resources and sea pollution
- [Department of Botany and Ecology of the Faculty of Biology, University of Latvia \(FB\)](#) is responsible for dendroclimatological studies of the region.
- [Department of Environmental Science of the Faculty of Geography and Earth Sciences \(FGES\)](#) is carrying out sediment analysis and modelling hydrology of the region.
- [Department of Human Geography of the Faculty of Geography and Earth Sciences](#) is responsible for collection of data on population and settlement and economic activities within the region.

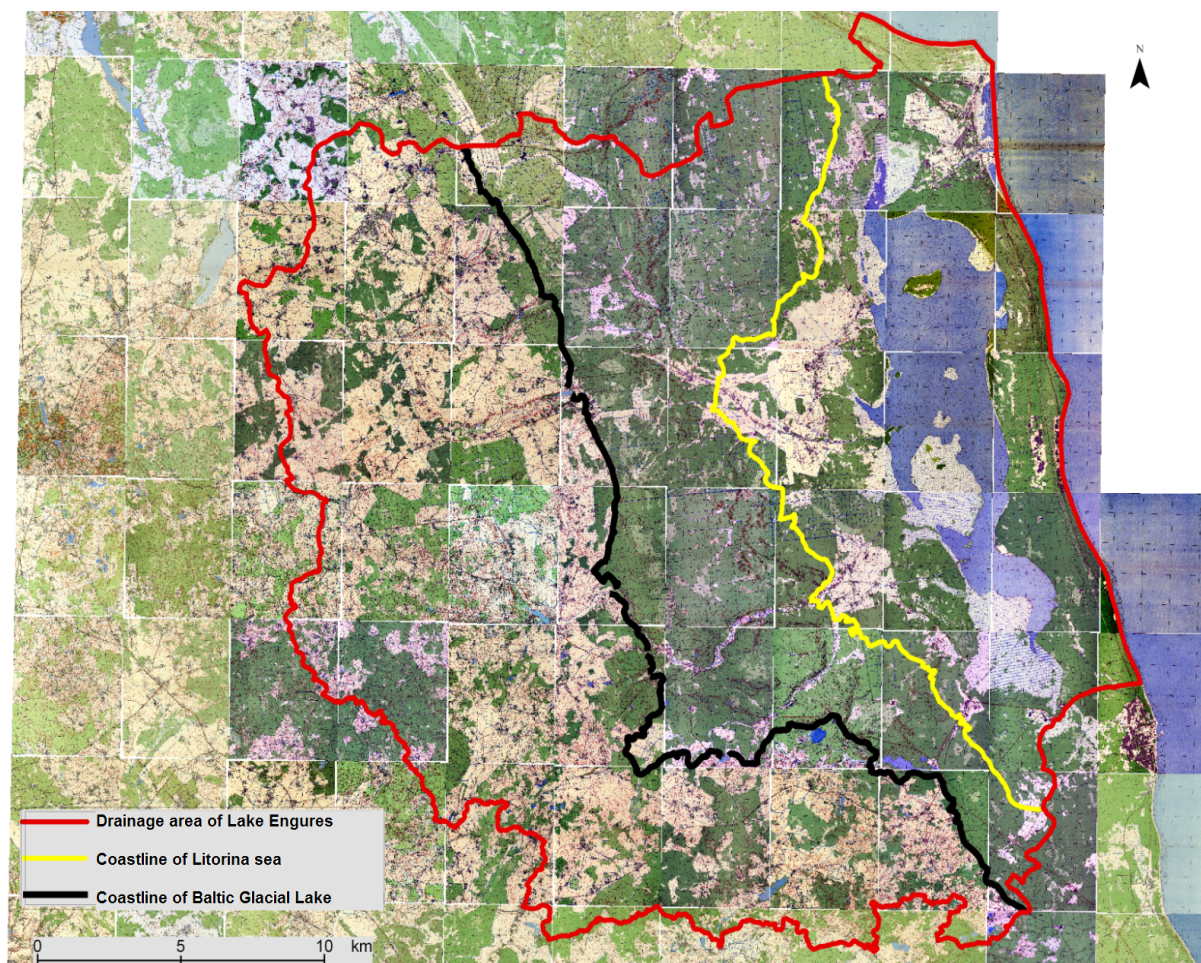
The project includes three work packages:

- WP1 Ecosystems and biodiversity (IB, LIAE, FB)
- WP2 Socioeconomic factors (FGES)
- WP3 Conceptual model development (FGES, IB, LIAE, FB)

WP1 and WP2 have horizontal and vertical structure. Vertical structure considers aspects of historical data (maps, archive documents, research protocols etc.) and data analysis in the framework of the current national LTER programme. Availability of historical data will be checked. Preliminary data-base will be made of existing data. Horizontal structure considers tasks performed on the main physiographical components of the region and eventual external factors.



WP1 Task 1 will be performed by Institute of Biology, Laboratory of Geobotany and Faculty of Biology. Both institutions have experiences specialists in GIS and will provide electronic maps and printouts for the other consortium partners. WP1 T2 and T3 involve mainly partners from different laboratories of the Institute of Biology. WP1 T3 and T5 will be performed by consortium partners from the Faculty of Geography and Earth sciences in cooperation with WP2 T4. WP1 T6 to T9 will be performed by researchers from the Institute of Biology (Laboratory of Hydrobiology and Laboratory of Marine Ecology). Tasks T10 and T13 will be performed by the Institute of aquatic ecology. Dendrochronological analysis will be performed by researchers from Faculty of Biology. Data analysis of air pollution will be assessed by Faculty of Geography. Phytoindication of the region environmental conditions will be assessed by the Institute of Biology. Most of the data of WP2 will be provided by human geographers and sociologists from the Faculty of Geography. However in certain set of tasks T6 to T9 strong cooperation with ecologists is expected. The tasks of the package WP3 will need integrated research of all consortium partners. On this stage experts from Europe LTER will also be involved on bilateral and multilateral basis: international workshops and individual visits of experts.



Digital map of the region