

Scientific Knowledge Integration

Management strategies for lagoons and estuaries should be based upon two solid pillars: science and policy. The challenge for implementing existing science and policy is the lack of integration and interpretation between the two. A central feature of ARCH is to overcome this limitation by actively using existing knowledge and policy to form the basis of management strategy and to apply this in lagoon systems throughout Europe.

To achieve “sustainable lagoon management”, the following transitions are needed:

- From segregated disciplinary scientific results to well integrated and usable scientific knowledge
- From government to governance
- From an unaware and uninformed lagoon community towards an involved and well-informed community.

It is recognized that for sustainable management, a highly integrated approach is needed, which means that interdisciplinary scientific knowledge should be developed and applied in ways that are driven by interaction with users. This corresponds with a view of the changing role of science introduced by Gibbons *et al.*,¹ whereby science is undergoing a major shift from mode 1 science, for and within bounded disciplines, to mode 2 science, highly interdisciplinary scientific knowledge produced in the context of application.² The ARCH consortium is multi-disciplinary, bringing together expertise from the social, natural, and economic sciences. However, these scientific disciplines are still not well connected. ARCH is therefore taking

the following steps to improve scientific knowledge integration:

- Working in a highly interdisciplinary way emphasizing the process of interaction between the disciplines and evaluating these processes using:
 - Questionnaires after each meeting
 - Reflection workshop
 - Telephone interviews.
- Evaluating interdisciplinarity (degree of integration) as understanding changes when there is interaction between disciplines. Important factors include:
 - Working towards common vocabulary and shared understanding
 - Openness to other disciplines
 - Acknowledging the value of other disciplines
 - Face to face meetings, trust building
 - Joint knowledge production.

It is clear that we need to cross multiple boundaries, not only the science – policy boundary, but also boundaries between scientists, policy makers and stakeholders. Boundary spanning refers to activities that are undertaken to cross knowledge boundaries. These boundaries can be bridged through collaborative generation, integration, and application of so-called boundary objects. The ‘State-of-the-Lagoon’ reports prepared for each case study have functioned as boundary objects within the ARCH consortium. The reports have provided a good starting point for the stakeholder workshops. Their use to improve scientific knowledge integration continues to be evaluated, with the results presented in the next newsletter.



ARCH, LAGOONS and VILA project partners and ARCH Advisory Committee members – excursion to Vistula Lagoon, Poland on May 28th 2013.

¹ Gibbons, M., C. Limoges, H. Nowotny, S. Schwartzman, P. Scott, and M. Trow. 1994. *The new production of knowledge*, Sage Publications, London

² Nowotny, H., P. Scott, and M. Gibbons. 2003. “‘Mode 2’ Revisited: The New Production of Knowledge”, *Minerva*, 41: 179-194

Vistula Lagoon: a case study

Place. The Vistula Lagoon Region is located in the south-eastern part of the Baltic Sea, shared by two countries, spreading between the Vistula River mouth in Poland and Kaliningrad in Russia. The border between Poland and Kaliningrad Oblast designates the eastern EU border.



Marsh and grasses at Kąty Rybackie (photo: Ewa Zydlewska, Urząd Morski w Gdyni, 2004)

The Lagoon itself has an elongated shape, going from south-west to north-east, with a length of 91 km, an average width of about 9 km and an average depth of 2.7 m. The surface area is 838 km², of which 473 km² belongs to Russia, and the remaining part to Poland.

The Vistula Lagoon is separated from the Baltic Sea (the Gulf of Gdańsk) by the Vistula Spit, a sandy peninsula 55 km long. The Lagoon exchanges water with the sea through the Baltiysk Strait, a 2 km long strait that is artificially deepened (average depth of 8.8 m).



Aerial view of Bauda river flowing into Vistula Lagoon (photo: Piotr Domaradzki, Urząd Morski w Szczecinie, 2004)

The currents and water level fluctuations in the Lagoon are determined by three factors: river discharges, wind action and sea level changes in the Baltic Sea. There are no tidal fluctuations inside the Vistula Lagoon.

Natural system. The Vistula Lagoon Region is known for its valuable natural and water resources, healthy coastal microclimate, open landscape, panoramic vistas, favourable yachting conditions and precious cultural attributes.

In recent years the quality of the Lagoon water has improved. There are 38 species of fish, including those that live in freshwater or saltwater only, and some that can live in both habitats. The most valued species are eels, pike, perch and bream, while herrings are also caught in considerable numbers. This body of water is not only a refuge for plentiful species of birds, but large numbers live here permanently. The Vistula Lagoon (along with its surroundings) is on the list of preserved areas within the NATURA 2000 Programme.



Frombork harbour



Photo of seagulls flying nearshore.

Social communities. The attractions of the Vistula Lagoon region lie not only in its unique natural attributes, but also derive from its tourist and economic assets. The Region's main and historically-grounded function centres around port activities. A number of leisure and fishing harbours are located on the Lagoon shores. There are also several shipping routes connecting these harbours.

Another traditional activity is fishing; however, this is presently very scaled down. The main challenge seems to stem from both a decrease in the commercial fish population (and lack of effective stocking) and from the excessive population of black cormorants, which feed on the local fish population.

High natural, cultural and landscape values enable the development of different forms of active tourism. There are several pedestrian, bicycle, water and horse routes in the Region. These include historical routes devoted to local dwellers of interest, such as the life of Copernicus and the history of the Mennonites. There are many magnificent sandy beaches on the Baltic Sea side of the Vistula Spit and the coast of Sambia (Russian side) is the location of the world's largest deposits of amber.

Vulnerabilities. In some counties located in the Southern part of the lagoon region, the rate of unemployment is among the highest in Poland, even exceeding 30% in some cases. The exception is the city of Elbląg. The situation is different in the Northern part of the region, which is adjacent to the sea. Here the high rate of unemployment (29%) decreases during the summer season due to seasonal employment.

Despite these vulnerabilities, the region has been undergoing a profound transformation to improve the economic development of the area over the past few years. Communal, transport, environmental and social infrastructure has been built, extended or modernized. Higher education has been developed. The modernized border crossings facilitate international exchange of goods and passenger flow. The Elbląg seaport has already been enlarged and additional harbours are being modernized.

LAGOONS EU FP7 research project

LAGOONS - Integrated water resources and coastal zone management in European lagoons in the context of climate change.



The key concept of the LAGOONS project is that successful management of coastal lagoons is dependent not only on scientific information but also on the governance systems in which this knowledge is used and the interface between science, policy and stakeholders (including citizens). Knowledge produced by different scientific disciplines needs to be combined and integrated with local knowledge and the views of stakeholders, using a participative approach, in order to propose reliable integrated scenarios of future possible economic development and environmental conditions in the coastal lagoons. In this context, scenario-building and modelling have been recognised as useful tools for estimating and predicting likely states of the resource base and environmental conditions in the future.

The main objective of the LAGOONS project is to develop science-based strategies and a decision support framework for the integrated management of lagoons, based on an increased understanding of land-sea processes and the science-policy-stakeholder interface in the context of climate change.



Map showing locations of LAGOONS partners and the four case study sites.

The LAGOONS project aims to assess environmental and social responses under different climate change scenarios, river basin management scenarios and coastal lagoon management scenarios, using four case studies selected to represent a set of diverse "hotspot" coastal lagoons with a wide and balanced geographical distribution and different characteristics:

- Ria de Aveiro Lagoon in the Atlantic Ocean (Portugal);
- Mar Menor in the Mediterranean Sea (Spain);
- Vistula Lagoon in the Baltic Sea (Poland/Russia);
- Tylygulskyi Lagoon in the Black Sea (Ukraine).

By means of elaborating integrated strategies for sustainable development of the case study lagoons (and respective drainage basins) in the climate change context, the LAGOONS project will contribute to enhancing connectivity between research and policy-making in lagoons. It takes a proactive approach to water issues, assuring that existing research results will be used with greater efficiency. Effecting land-coastal zone connectivity is another feature of the project, to be achieved by means of modelling drainage basin loading and its ecological impact on the lagoons. In management terms, LAGOONS will contribute to the decision-support methodologies for a coordinated approach to the Water Framework Directive and the Marine Strategy Directive. In addition, LAGOONS will propose actions to tackle bottlenecks in the context of climate change, that is, LAGOONS will propose actions foreseen in the goals of Europe 2020 – ‘a strategy for smart, sustainable and inclusive growth’.



The three pillars of LAGOONS (MSFD – Marine Strategy Framework Directive; ICZM – Integrated Coastal Zone Management; WFD – Water Framework Directive).

