

# LAGOONS

Integrated management  
of European lagoons



# Protecting fragile lagoon ecosystems

**Drs Ana Isabel Lillebø** and **Per Stålnacke** are dedicated to safeguarding the future of economically, socially and environmentally crucial lagoons. Here, they talk about their work, its links to other groundbreaking initiatives and the importance of transboundary cooperation



**To begin, what is the overall objective of the 'Integrated water resources and coastal zone management in European lagoons in the context of climate change' (LAGOONS) project?**

The key concept of LAGOONS 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 at the interface between science, policy and stakeholders – including the local population.

We believe that integrated management of European coastal lagoons requires the knowledge and insights from different



scientific disciplines combined with local knowledge and the views of stakeholders. This approach aims to increase understanding of land-sea processes and attention to the science-policy-stakeholder interface, in order to produce participatory scenarios of possible future economic development and environmental status in European coastal lagoons in the context of climate change.

**Lagoons play a fundamental role within their aquatic ecosystems. Can you elaborate on this and explain the wider implications of maintaining their integrity?**

Coastal lagoons are highly productive ecosystems, providing a number of essential services of vast ecological, social and economic importance. The final ecosystem services provided by coastal lagoons, and the goods and benefits that people gain or generate from them contribute significantly

to human wellbeing. At the same time, coastal lagoons are classified as high vulnerability zones due to increasing population growth and human activities in and around coastal areas, with climate change recognised as an additional pressure. Furthermore, there are potential conflicts between the various users, such as tensions between tourists and conservationists. The integrity of coastal lagoon ecosystem services will provide people with adequate access to essential goods and benefits which are indispensable in sustaining freedom of choice and action, good social relations, security and health.

**How will LAGOONS contribute to the decision-support methodologies for a coordinated approach to the Water Framework Directive (WFD) and the Marine Strategy Directive (MSFD)?**

The WFD is aiming for all European waters to have achieved a 'good ecological and chemical status' by 2015, which includes coastal lagoon transitional waters and the catchment boundary of coastal lagoons. Regarding the marine environment, which is the sea boundary of coastal lagoons, the MSFD, on the other hand, aims at achieving or maintaining a good environmental status by 2020 at the latest. LAGOONS scenarios





will provide a set of environmental and economical combinations demonstrating to decision makers the possible future scenarios of each potential management choice, with particular reference to lagoons.

#### **In what ways do actions proposed by LAGOONS relate to the Europe 2020 strategy?**

The main goal of Europe 2020 is the creation of 'a strategy for smart, sustainable and inclusive growth'. LAGOONS will use participatory scenario-building and modelling approaches to project the states of the four case study lagoons and their drainage basins in the near future, taking into account anticipated changes in climate, namely the occurrence of extreme weather events, human activities and economic development. These scenarios will be presented and discussed in the scenario workshops where the scientific community, the policy makers and the local population can jointly discuss and reflect on the possible options. After the four scenarios workshops, the team will extract the common recommendations to be considered at the pan-European level.

#### **Are there specific factors to consider when working on an international project of this type?**

In terms of areas, the majority of European river basins are transboundary, in that they are shared by two or more countries. This means that, even if the lagoon itself is located in only one country, there is a need for transboundary consideration and management. The project, for example, has been looking at the Vistula Lagoon, which is shared by Russia (Kaliningrad) and Poland and, subsequently, we have been working hard to pioneer a system of analysis which incorporates transboundary issues into the equation.

# A participatory approach to environmental research

The multidisciplinary, international **LAGOONS** project, supported by the European Commission, is applying a pioneering methodology for incorporating the preferences and knowledge of local citizens in the environmental decision-making process

AS POPULATION DENSITIES increase across Europe and the effects of climate change begin to take hold, careful management of the continent's vulnerable and essential ecosystems is more important than ever. Coastal lagoons provide a fascinating and crucial focus for this concern, existing at the nexus both of land-sea and science-policy-stakeholder considerations. Lagoons are shallow, elongated bodies of water which are separated from larger bodies such as the sea by a barrier – an island or reef, for example. A common feature of coastlines around the world, lagoons constitute rich and fragile ecosystems, which provide nursery habitats for diverse species of birds, fish, bivalves and crustaceans. However, faced by increases in extreme weather events, the growing use of fertilisers in farming and the continued expansion of coastal conurbations, lagoons are currently under significant threat.

In an attempt to increase scientific understanding of both the mechanisms behind the anthropogenic deterioration of lagoons and the impact of climate change, a groundbreaking interdisciplinary project, LAGOONS, has been developed by an international multidisciplinary consortium. The full name of the project is 'Integrated water resources and coastal zone management in European lagoons in the context of climate change', and the study seeks to facilitate the development of a science-based strategy for the future management of lagoons, and to support the integration of the EU's Water Framework and Habitat Directives, Integrated Coastal Zone Management Recommendation and Marine Strategy Directives. To do this, LAGOONS combines the collection and analysis of detailed and accurate science-based evidence about the current state of lagoons with the development of cutting-edge interactive models capable of assessing

future lagoon conditions given a variety of external variables. In this way the project is expected to provide an invaluable tool for policy makers and stakeholders that will help them ensure the protection of these valuable, vulnerable ecosystems.

#### **A NOVEL METHODOLOGY**

Funded by the European Commission, LAGOONS has chosen to focus their research on four sites scattered across the continent. The lagoons under examination are the Vistula Lagoon in the Baltic Sea, across the border between Poland and Russia; the Tylygulskiy Lagoon in the Black Sea in Ukraine; the Ria de Aveiro Lagoon in the Atlantic Ocean in Portugal; and the Mar Menor Lagoon in the Mediterranean Sea in Spain. The LAGOONS researchers will employ the same methodology at each site and, in doing so, expect to produce valuable, comparable results that can shed increasing light on lagoon thresholds and their response to changing environmental conditions. It is hoped that the results will aid attempts to identify a number of important biological processes which underpin ecosystem services and elucidate how such services may be affected by a changing climate. In addition, ecotoxicological studies of bio-indicators will enable the researchers to chart a variety of biological responses to climate change.

The research team at LAGOONS, coordinated by Dr Ana Isabel Lillebø, Assistant Researcher in both the Department of Biology and the Centre for Environmental and Marine Studies (CESAM) at the University of Aveiro, Portugal, and by Dr Per Stålnacke, Head of Department for Water Quality and Hydrology at Bioforsk Soil and Environment, Norway, is made up of experts in a variety of fields from leading universities



## INTELLIGENCE

# LAGOONS

### OBJECTIVES

To develop science-based strategies and decision support frameworks for the integrated management of lagoons, based on an increased understanding of land-sea processes and the science-policy-stakeholder interface.

### KEY COLLABORATORS

The University of Aveiro, Portugal • Bioforsk – The Norwegian Institute for Agricultural and Environmental Research, Norway • IBW PAN, Poland • ABIORAS, Russia • The Sea Fisheries Institute, Poland • University of Dundee, UK • OSENU, Odessa State Environmental University, Ukraine • The Potsdam Institute for Climate Impact Research, Germany • The University of Murcia, Spain

### FUNDING

EU Seventh Framework Programme (FP7) – contract no. 283157

### CONTACT

**Dr Ana Isabel Lillebø**  
Project Coordinator

Department of Biology & CESAM  
University of Aveiro  
Campus Universitário de Santiago  
3810-193 Aveiro, Portugal

T +35 123 437 0779  
E lillebo@ua.pt

**DR PER STÅLNACKE** holds a permanent position as Senior Research Scientist and is Head of the Water Quality and Hydrology Department at Bioforsk. Stålnacke has long-term experience in issues devoted to integrated water resources management with particular emphasis on studies of pollutant fluxes in river basins and statistical analysis of historical environmental monitoring data.

**DR ANA LILLEBØ** is an Assistant Researcher at the Department of Biology and The Centre for Environmental and Marine Studies (CESAM), University of Aveiro, Portugal. Dr Lillebø is a well-established researcher in Coastal Ecosystems, with research experience in ecology, anthropogenic impacts and environmental chemistry, but also with interests in ecosystem services and integrated coastal management strategies.

and research institutes across Europe. “In essence, the multidisciplinary nature of the team has allowed us to develop a scenario-based approach focused on the creation of alternative socioeconomical and environmental scenarios determined by a variety of selected drivers,” Lillebø explains. By incorporating inputs from such thematic fields as integrated water resource management, analysis of legal policy and institutional activities, climate change projection, hydrological and ecological modelling, ecology, toxicology and ecosystem services, LAGOONS aims to generate a wide-ranging and insightful approach to environmental studies.

### ENGAGING THE PUBLIC

Essential to the approach of the LAGOONS team is a commitment to work closely and openly with the local populations in each of the four locations. This engagement with the public is led by Professor Geoffrey D Gooch from the University of Dundee, and conducted through a three stage participatory process made up of focus groups (FGs), citizens’ juries (CJs) and stakeholder scenario workshops. The principle behind this method is the combination of scientific data with local knowledge and understanding, in order to develop a deeper understanding of potential drivers of change within each lagoon.

Gooch explains: “Each FG includes about eight members of the public who can help us identify the main issues at stake, and CJs enable around 12 individuals to listen to information from invited experts, to discuss this information, and to produce recommendations for the management of the lagoon over the next 20 years”. Finally, workshops are conducted in which the LAGOONS team presents a number of scenarios to an audience comprising the scientific community, policy makers and the local population. This process provides those living near the lagoons with a valuable platform from which to articulate their preferences about the policies and decisions which will determine the future direction of their region. “This methodology,” Stålnacke adds, “has a positive effect, requiring consideration of the future and not just historical and present problems – which often gives way to discussions about who is to

blame, rather than what can be done to make things better”.

### NEW PERSPECTIVES

During the course of the project, LAGOONS researchers have been delighted to discover the extent to which local populations are prepared to engage in discussions about the future of their coastal lagoons. “We were excited,” Lillebø recalls, “by the public’s will to actively participate in the project, take part in the participatory process and maintain interest throughout”. Local populations in each of the project countries – Russia, Poland, Ukraine, Portugal and Spain – impressed upon the LAGOONS team the importance of establishing formalised mechanisms for ensuring that their input is included within any future management decisions relating to their lagoons.

### THE FUTURE OF LAGOON MANAGEMENT

Building on their successes to date, the group aims to expand current integrated strategies for sustainable development by appointing a number of policy makers to the LAGOONS advisory board (AB). The AB holds annual meetings, after which it offers recommendations to the project consortium. The expectation is that by incorporating those involved in legislation in the LAGOONS project work, scientific and management findings will be more directly implementable, leading to a swifter and more efficient policy decision-making process.

The researchers at LAGOONS are also seeking to address the issues surrounding climate change related ‘bottlenecks’. “Such events include high precipitation in winter, which can lead to floods and changes in the water quality; and heat waves in summer, which can also result in changes in water quality,” Stålnacke clarifies. There is much optimism that, through the simultaneous evidence-based and modelling approach employed by LAGOONS, and the incorporation of citizen knowledge and expectations into the decision-making process, the resilience of lagoons to the effects of climate change, overpopulation and extreme weather can be increased, safeguarding the local populations and the delicate ecosystems on which they rely.

© O DERKACH

