



Coastal co-operation in SW Finland: Problems and challenges

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Abstract

The Archipelago Sea in SW coast of Finland is a valuable and vulnerable area where various interests regarding the use of the coastal area collide. The main problem affecting practically every other issue in the area is the eutrophication of the waters which is harmful for both nature and man. Agriculture is the biggest source of nutrient load, and it being a non-point source presents a major challenge for reducing the nutrient load. Development around more environmentally friendly cultivating methods and reducing erosion and nutrient runoff is active, but the effects are not very quickly visible in the Archipelago Sea itself. Nutrients from the waste waters of scattered settlements are being tackled by more strict regulations that have recently come into operation. Fish farming is the most debated issue whenever the state of the coastal waters is discussed and it presents a model example of conflict between a source of livelihood and environment. There are indications that the sea bed is leaking stored nutrients back into the water; the magnitude of this process is not yet known but it may be considerable. This process is hard to have an influence on, which often leads to doubt regarding the possibilities of improving the state of the coastal environment. Cross-sectoral co-operation based on the principles of ICZM has proven to be a good tool for addressing these problems but it is a challenge in itself to keep up a long-term co-operation when the fruits of it may be picked no sooner than after a few decades time.

1 Introduction

1.1 The Archipelago Sea: a valuable part of the Baltic

The Archipelago sea is one of the world's largest archipelago areas with more than 20 000 islands and over 14 000 kilometres of coastline (Granö & Roto 1991). This coastal area of 8 300 km² has high biodiversity as well as cultural diversity, and it has distinctive zones that contribute to the complexity of the archipelago. The Archipelago Sea is very shallow, the mean depth being only 23 metres. The drainage area is intensively cultivated, and a large number of cultivated land is prone to erosion.

Water currents generally flow through the Archipelago Sea from the Gulf of Finland and on to the Bothnian Bay, and the archipelago is said to be functioning as a filter between these two. The exchange of water in the sheltered archipelago environment is quite slow and often poor. The archipelago is also an area of upwelling, where nutrient-rich water from closer to the bottom also affects the biological processes. (Kirkkala 1998)

The coastal area has multiple uses and users. It is at the same time a tourist attraction, an agricultural area, a protected national park and an important fishing area just to mention a few. Still, especially the outer archipelago is slowly becoming desolate when people move to municipal centres on the main islands. In many cases permanent settlements are turning into summer residences, a schools and other year-round services vanish in lack of demand. This may lead to a vicious circle development. In spite of this, the goal is to keep the archipelago viable also in the future. The amount of developed shoreline in the Archipelago Sea is a little over 30 % (Granö, Roto & Laurila 1999).

1.2 Nutrient load form various sources

The special characteristics of the Archipelago Sea make the area especially susceptible to eutrophication. The general estimate is that about half of the nutrient load comes from outside the drainage area itself. The major anthropogenic sources of nutrient load in the area are agriculture and waste waters from scattered settlements. Atmospheric load is the most significant source of nitrogen. The distribution of the nutrient load (phosphorus and nitrogen) by source is indicated in figure 1.

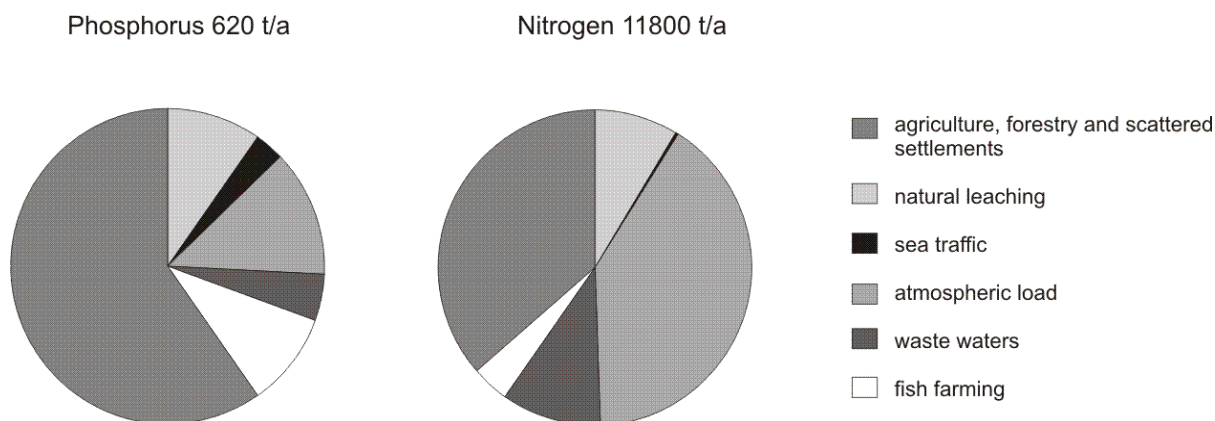


Figure 1: Sources for nutrient load of the Archipelago Sea in the mid-1990s (SW Finland regional environment centre 1999)

Regional goals for reducing the nutrient load have been set in the environmental program of Southwest Finland (Liski, Madekivi & Rauhala 2000). They are based on the decision-in-principle of the Council of the State on water protection goals for the year 2005. These goals are shown in table 1. Achieving these goals also forms a base for an initiative taken by three of the region's central authorities in 1999 to start a forum for coastal co-operation in order to improve the state of the Archipelago Sea (Southwest Finland Regional Environment Centre 1999).

Sector	Goal P	Goal N	Reference level (year)
Farming	- 50 %	- 50 %	1990
Fish farming	- 30 %	- 30 %	1993
Industries	- 50 %	- 50 %	1995
Scattered settlements	- 30 %	not specified	1990
Communities	- 35 %	- 50 - 70 % (communities of over 10 000 inhabitants)	1990

Table 1: Goals for 2005 for nutrient load reduction from different sectors (Liski, Madekivi & Rauhala 2000)

1.3 Problems and challenges on the regional level

In the last few decades significant decreases in the nutrient loads have been achieved, and improvements in the quality of water have been observed locally. Still, in some closely monitored areas an increase in the phosphorus content of the water has been observed, and every summer there are massive blooms of bluegreen algae especially in the outer parts of the archipelago.

The biggest challenge regionally is to decrease the nutrient load from agriculture. The agricultural sector generally has a very positive attitude towards the environmental actions, and much has indeed been done. The problem is that there are no ways to make this happen fast, as there is a large storage

of nutrients in the soil which will not be consumed very quickly even if we stop adding fertilisers altogether.

Industries and their nutrient loads are mostly controlled by environmental permits, so they have a legal obligation to stay within given limits. Regional co-operation has encouraged the companies to be more active and go even further than required in decreasing the nutrient load as well as other pollutants.

Fish farming is very much a scale-related issue. On the Baltic scale it is not a major source of nutrients, but at the local scale it can be significant in some sheltered area, where the exchange of water is poor. Nutrient load from fish farming has the most effects in the middle archipelago, and because of its local effects, it gets a lot of attention.

Concerning scattered settlements, municipalities should be further encouraged to expand the centralised sewer networks, through which the waste waters are led to a sewage treatment plant. Where this is not possible or cost-efficient, smaller networks should be established for several households or for villages. Careful land use planning is an important factor in achieving this. In waste water systems for individual houses one of the problems is proper maintenance, which is crucial for the systems to work and efficiently catch the nutrients.

There is also a large nutrient storage at the bottom of the sea, and its role in the eutrophication process is not very well known. Nutrient load from the Gulf of Finland and St. Petersburg in Russia affects the outer archipelago, but closer to the continental coastline domestic load is the most important source.

Apart from human activities, weather plays an important role in the nutrient cycle. In the past five years there have been both exceptionally rainy and exceptionally dry years in SW Finland. In dry years the amount runoff is small, and so is the amount of phosphorus brought to the sea by the region's rivers. It has been estimated that during the year 2003, which was dry, the amount of phosphorus load from the rivers was as much as about 70 % smaller when compared to an average based on information from the period of 1990 – 2002 (Suomela 2004).

2 Results

Among many other actions, through regional co-operation introduced by the Archipelago Sea forum Pro Saaristomeri, there are continuous efforts to decrease the nutrient load and to improve the state of the Archipelago Sea. This cross-sectoral co-operation is organised into seven working groups, which generate projects and initiatives. Many innovative projects have been carried out, including the ongoing work of forming a regional coastal management strategy to better identify the conflicts and solutions to them. The effects of more effective co-operation alone are difficult to measure, but clearly a lot of things have happened that wouldn't have been done without it. About 50 different projects have been carried out with total budgets adding up to 3,5 million euros.

Fish farming is the only sector to already have achieved the goals set for the reduction of nutrients presented in table 1 (Silvo et al.). This is mainly a result of development in fish feeding methods and in the feed itself. The declines in the number of fish farms as well as the amount of fish produced have also contributed to this. A positioning system for fish farms is under development to help decrease the effects of local eutrophication around the farms.

The nutrient load from communities has already reached the goal of nitrogen reduction, but being able to do the same with phosphorus would require special actions. Phosphorus load from scattered settlements is estimated to have decreased about 15 %, and with new, more strict regulations it is possible to achieve the goal in the beginning of 2010s.

It is difficult to estimate the changes in nutrient load from agriculture, but it is estimated that the goals won't be achieved by 2005. Pro Saaristomeri co-operation has initiated many regional projects around agricultural issues that have had good results. These projects are important steps forward in improving the state of the Archipelago Sea.

Pro Saaristomeri has provided a neutral forum for coastal co-operation which has had success in bringing together different regional actors to share views and to discuss common problems. Information on what other actors are planning and doing has also been actively disseminated, and this has led to more effective coastal work.

3 Discussion

It is clear that improvements in the water quality of the Archipelago Sea cannot be achieved in any short period of time, but long-term actions are needed to tackle this problem. Coastal co-operation following the principles of ICZM is an important part of guiding these actions, taking into consideration all relevant aspects of any given issue.

Nutrient loads from sectors like industries, fish farming and other sources of livelihood are mostly regulated by law. In these sectors one of the ways to improve environmental friendliness is to tighten the regulations, which often contradicts with the economical side of business. Taking care of the environment is a part of practically every company's agenda, though, and lots of improvements take place through projects that are carried out voluntarily. This is where national and EU-level financial support is often a key factor, and this is also where the networks and coordination provided by organised coastal management can be extremely helpful. Improving the state of the coastal waters is long-term work, and motivation for carrying out projects or actions tends to abate when you don't see results very quickly.

Every day individual people make decisions that affect the environment. It is important that they have the necessary information in order to make the right decisions. The choices and dedication of individuals are also important in waste water treatment of scattered settlements, although the law sets the basic standards for this. Closer co-operation between municipalities would also help in this sector. Further research is needed, since we still don't know enough of all the natural processes of the coastal environment. For example the magnitude of the nutrient leakage from the sea bed sediments remains unclear.

Even though there already is much co-operation, a more holistic approach is needed to tackle the problems and find solutions to the challenges concerning the state of the Archipelago Sea. ICZM provides a good tool for this, and it will be interesting to see if regional coastal strategies will become more common in other parts of Finland and the Baltic Sea. International coastal co-operation in the Baltic Sea will also become more important in the future, as solutions for our common environment are developed further.

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