Enhancing bathing water quality for sustainable coastal bathing tourism - DE

1. Policy Objective & Theme

- ADAPTATION TO RISK: Managing impacts of climate change and safeguarding resilience of coasts/coastal systems
- ADAPTATION TO RISK: Preventing and managing natural hazards and technological (human-made) hazards
- ADAPTATION TO RISK: Integrating coherent strategies covering the risk-dimension (prevention to response) into planning and investment
- SUSTAINABLE USE OF RESOURCES: Preserving coastal environment (its functioning and integrity) to share space
- SUSTAINABLE ECONOMIC GROWTH: Balancing economic, social, cultural development whilst enhancing environment
- SUSTAINABLE ECONOMIC GROWTH: Improving competitiveness

2. Key Approaches

- Integration
- Participation
- Knowledge-based
- Ecosystems based approach
- Socio-economic
- Technical

3. Experiences that can be exchanged

Methods to find and identify pollution sources within bathing site catchments can easily be transferred to other bathing sites in the region and the EU. The impact of identified pollution sources on bathing water quality was assessed under different weather scenarios. Technical solutions to prevent contaminant introduction are suggested. For sites where technical solutions are inappropriate, a concept for a flexible warning system was developed to inform bathers of risks.

4. Overview of the case

The study was launched to meet the future stricter EU legislation on bathing water quality. Bathing tourism plays a major economic role in all coastal areas of northern Germany. Thus, it is crucial for economic welfare to identify and prevent bathing water pollution. State, regional, and local authorities, science, stakeholders from tourism and agriculture were integrated in the process.

5. Context and Objectives

a) Context

The German study sites were all situated in the county Rendsburg-Eckernförde in the federal state of Schleswig-Holstein. It encompasses 2,200 km2 land with 55 km Baltic Sea coast, 38 freshwater lakes. Schlei fjord and Kiel Canal form the northern and southern borders to the neighbour districts. It is a rural district with 75% agricultural land use. Agriculture and tourism are the major economies in most areas of the district.

The initiative region belongs to the so called technology region K.E.R.N., founded in 1995 by municipalities and economic associations of the city Kiel, the county Rendsburg-Eckernförde, and the city Neumünster (total inhabitants 548,000; 242,000

of them in the state's capital Kiel), and joined in 1996 by the county Plön that has been co-operating with the former Danish county Fyns Amt (population 465,000) for many years (a district reform dissolved Fyns Amt in 2007). The economic structure in the K.E.R.N. region is based on SMEs (small and medium sized enterprises). About 40% of the labour force belong to the service sector, about 30% to manufacturing industries, 2% to agriculture and 24% in administration and other sectors. In the past, reduced bathing water quality at some sites led to losses in tourism profit. The new European bathing water directive defines stricter threshold values for hygiene parameters. Beyond that, for each bathing site so called bathing water profiles have to be established to identify potential sources of pollution.

b) Objectives

The aim was to ensure an improvement of bathing water quality in the region and to prepare the bathing water profiles that are requested by the new framework directive, to provide a long-term perspective for the important tourism economy in the rural region.

6. Implementation of the ICZM Approach (i.e. management, tools, resources)

a) Management

The responsible authorities for bathing water quality are the Schleswig-Holstein Ministries of Social Affairs, Health, the Family, Youth, and Senior Citizens and that of Agriculture, the Environment, and Rural Areas, as well as the authorities of the county Rendsburg-Eckernförde, and local communities. The Danish Environmental Centre Fyn (Miljøcenter Fyn / Trekantområdet) co-operated as an international partner in the K.E.R.N. region. Partners from state, regional, and local administration, as well as from science, and an international scientific partner cooperated for the project.

b) ICZM tools

The work ran from January 2006 – September 2008. During the bathing season of 2006 the open Baltic Sea sites were analysed, in 2007 freshwater lake sites, and in 2008 bathing sites at the brackish fjord Schlei and the brackish Borgstedter Enge off the Kiel Canal, a major shipping canal connecting Baltic Sea and North Sea / Elbe estuary.

The environmental status of bathing sites and their catchment were analysed and sources for negative impact on water quality identified at a set of model bathing sites. Some 20 bathing sites on the open Baltic Sea coast, within the Schlei fjord, and at freshwater lakes in the coastal area were selected as study sites because these sites had encountered water quality problems in the past. The whole catchment of a given bathing water site was analysed, as well as topography, hydrology, ecology, and the agricultural environment. Potential contamination sources are: municipal and industrial wastewater treatment plants, discharge from private wastewater treatment plants, combined sewer overflows, storm water sewers, direct and diffuse discharge from agriculture and water fowl. The impact of pollution sources depends on meteorological and hydrological parameters such as sunshine, wind, outflow, current velocity, water temperature, and the capacity of sediments to retain or transport bacteria.

Potential pollution sources were identified at these sites – point sources as well as diffuse sources – and monitored. Their impact on bathing water quality was analysed under different weather scenarios. Depending on the source of contamination, technical solutions for prevention of future contamination were suggested. Or, if a technical solution was not feasible a concept for a flexible and rapid warning response scheme to contamination was developed. The resulting risk analysis and options for action are transferable to other regions that depend on a functioning bathing water tourism and with similar reasons for water quality problems, diffuse agricultural runoff and sporadic water treatment failures. Local municipality authorities and the public participated to find possible pollution sources in each area. Communication and participation between stakeholders responsible for contamination sources on one side and tourism on the other as well as administrative authorities promoted development of integrated solutions and recommendations to the problem.

In the county Rendsburg-Eckernförde water treatment plants (communal or private), overflows of combined wastewater and stormwater sewers, and rainwater drainages were identified as major point sources. Agriculture, and sediments were responsible for diffuse pollution, sediments due to their function to bind up to 60% of the faecal indicator bacteria. Animal manure plus precipitation was found to be a major source of enterococcal bacteria.

7. Cost and resources

The budget was €499,300 and was part financed by ERDF funds.

8. Effectiveness (i.e. were the foreseen goals/objectives of the work reached?)

Data for Bathing water profiles were produced at model sites, and point sources identified. Based on the study, recommendations for future risk management was developed together with stakeholders. The solutions aim at technical prevention or improved risk management by a warning system. Most important is a better monitoring of wastewater treatment plant runoff and additional measures to reduce the bacterial load. Regular maintenance and cleaning is important as well. Best practise recommendations to do so are further maturation ponds, UV-disinfection, membrane filtration, and as best bacterial reduction means, wetland construction. For bacterial load reduction of stormwater drainages soil retention filters combined with regular cleaning are helpful (to prevent re-suspension of bacteria after heavy rain). The same is true for combined sewage and drainage runoff and introduction of a storage step before that. Regular maintenance of sewage channels – requiring more personnel – could have prevented pollution due to technical failures. Agricultural diffuse sources could be easily reduced if the guidance on good agricultural practise were followed which is not always the case. More communication and awareness raising are necessary. Most objectives were achieved in due time. However, diffuse manure pollution was not clearly quantifiable. More thorough investigations are needed to clarify the impact of this pollution source. A concept for an early warning system was provided but for a working warning system more detailed analyses specific for each catchment are necessary.

9. Success and Fail factors

It was difficult to quantify the impact of organic manuring: follow up investigations are necessary. The sediment analysis method for bound bacteria concentrated on Escherichia coli, since methodological problems in determining enterococcal bacteria density and viability bound to sediments occurred. Further communication and awareness raising in the agricultural community is necessary for future success in reducing impact of this diffuse source.

10. Unforeseen outcomes

The analysis serves as a model for other coastal rural regions to develop bathing water profiles, and to work out recommendations for pollution prevention, and risk communication. The requirements of the Bathing Water Directive are the basis for the aims to improve water quality.

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13. Sources

- Abschlussbericht des INTERREG IIIA Forschungsprojektes Deutscher Projektpartner: Verbesserung und Sicherstellung der Badegewässerqualität im Kreis Rendsburg-Eckernförde, (September 2008). Holzapfel, I., Krause, N., Stresius, I., and M. Grottker
- Project information: http://www.interreg.kern.de/de/projektdet.php?id=45
- Project report: http://www.kreis-rendsburg-eckernfoerde.de/1648.html

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