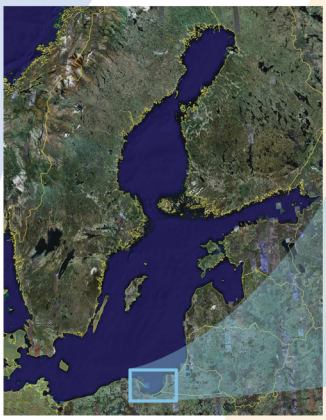
SPICOSA

SCIENCE AND POLICY INTEGRATION FOR COASTAL SYSTEM ASSESMENT

SSA No. 02 GULF OF GDAŃSK, POLAND

FORMULATION STEP



LOCATION OF SSA

SSA Gulf of Gdańsk is located on the SE part of the Baltic Sea and comprise of the Gulf of Gdansk marine area and coastal zone of the Baltic Sea in Gdańsk Region. The surface area of the gulf is approximately 1.3% of the surface area of the entire Baltic Sea.

SSA IN FIGURES

Surface Area: 4 940 km^2
Catchment area: 323 200 km^2
Major ports: Gdańsk, Gdynia, Kaliningrad, Hel, Puck (ca. 2 millions inhabitants)
Human activities: tourism, agriculture, fishing and shipping
Cultural heritage: Kashubian's tradition

POLICY ISSUE

The first stakeholder meeting has been organized in conjunction "Pomeranian Region ICZM Strategy development assembly" meeting on 12th of November 2007 in Stegna – small recreational village at the coast of Gulf of Gdańsk. The SPICOSA project has been discussed during one of the parallel sessions, devoted to the system design of SAF methodology implementation for SSA 2 – Gulf of Gdańsk. The SAF implementation process has been discussed with more than 70 participants of the meeting.

The four main policy issues have been recognized:

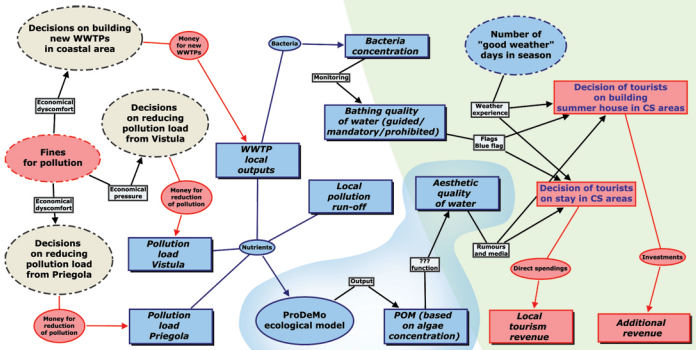
1. Sediment transport and coastal protection issues. The main implications for human activities is related to shipping and navigation, and flood and coastal protection.
2. Tourism capacity. The main implication for human activities are related in this case to problems with increasing anthropogenic pressure on coastal nature and coastal protection features, waste production in coastal zone.
3. Eutrophication with main impact on primary production increase leading to amongst others harmful algae blooms, being the major factor for limiting use of beaches in the Gulf of Gdańsk.
4. Water and sewage policy – still some amount of wastewater discharged directly to the Gulf of Gdańsk causing some of beaches being closed.

After assessment of available data as well as extensive discussion with stakeholders the answer to following question:

"How can we maintain sustainable tourism development with reduction of the eutrophication to water quality goals set by Water Framework Directive and Bathing Water Directive?"

has been selected as main policy issue to be simulated within SSA Gulf of Gdansk SPICOSA activity.

OVERALL CONCEPTUAL MODEL

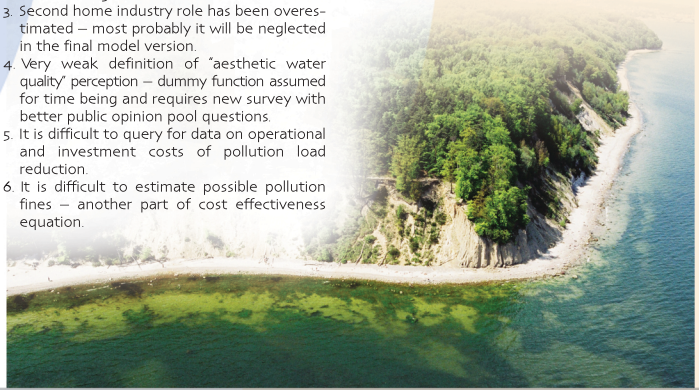


FORMULATION OF SOCIO-ECONOMIC COMPONENT

1. It looks like we obtained data to calibrate and validate economic results of changes in water quality however
2. We found "double-counting" issue in statistics of revenue of tourism industry (eg. institutional sales of food products – food stores treated as tourism industry). Additional study – survey in local communities – is being performed as today's results overestimates importance on tourism industry by an order of magnitude.
3. Second home industry role has been overestimated – most probably it will be neglected in the final model version.
4. Very weak definition of "aesthetic water quality" perception – dummy function assumed for time being and requires new survey with better public opinion pool questions.
5. It is difficult to query for data on operational and investment costs of pollution load reduction.
6. It is difficult to estimate possible pollution fines – another part of cost effectiveness equation.

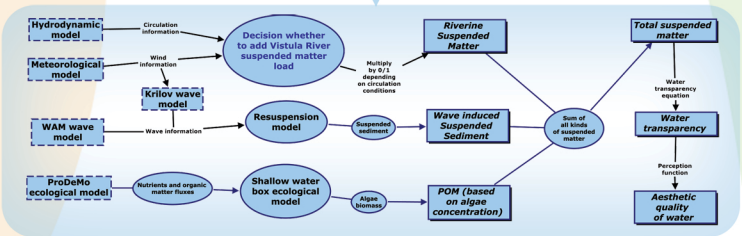
CHALLENGES PRIORITISED

1. Removal of "artificial information" from economical and social statistics.
2. Surface run-off model development.
3. Preparation of proper "aesthetic water quality" perception function.
4. Simulation of functions with memory and/or different time scales of information.



FORMULATION OF ENVIRONMENTAL COMPONENT

1. Main variable to be modeled is water transparency. Design step assumption was to model it with use of existing combined hydrodynamic and ecological model PRODEMO based on primary production and derived from this data POM concentration values.
2. However the resolution of the PRODEMO model (1 nautical mile) do not actually match spatial resolution required (including especially underestimations of POM due to much higher depths than required for modeling POM in near-shore waters). Direct use of PRODEMO-based POM concentrations shows 50 to 75% underestimation compared to measured water transparency (model overestimates Secci depths).
3. New model component including into account additional information is under development:
   a. Vistula River suspended sediment plume based on the decision whether or not circulation in Gulf of Gdansk allows for sediment to travel to chosen beach.
   b. Concentration of sediments related to wave-current interaction in coastal zone. Wave information is being tested on two basis – 1) simple Krilov estimation of waves based on wind or 2) operational wave model forecasts/hindcasts. Deep water wave is transformed to 4 meter depth for proper estimations.
   c. PRODEMO model is used for boundary conditions delivery only.
4. There is still underestimation of light extinction during extreme events – inclusion of loads from surface run-off might be necessary
5. Required data is collected for long term model validation – data on meteorological, wave, hydrodynamic fields and ecological model variables are collected in hourly intervals. Measured water transparency data unfortunately scattered both in space and time.



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