12. The Black Sea Basin and ICZM

Environmental setting

The Black Sea[41] is one of the most remarkable regional seas in the world, being almost completely separated from the rest of the world's oceans and embodying an abyssal basin with maximum depth of 2300 m adjoining a very wide continental shelf area. Its waters are permanently stratified under the influence of fresh water supplied by large rivers (Fig. 1) and the inflow of Mediterranean water through the Bosphorus and Dardanelles Straits.

Figure 62: The Catchment Area of the Black Sea (source: http://envirogrids.net)

The Black Sea is considered to be a fantastic laboratory naturally hosting oxic, hypoxic and anoxic water masses permanently existing due to strong vertical stratification. While strong vertical stratification supports isopycnal distribution of various biogeochemical species, the wide range of redox conditions supports specific processes rendering the Black Sea a unique place to study

[41] Introductory presentation of the Black Sea Basin is tightly following the reference TÜBİTAK (2011).

the Earth System responses to climate changes and anthropogenic forcing. Since a large part of the basin (i.e. approx. deeper than 100 m) is anoxic, life forms in the Black Sea display limited diversity and almost all pelagic and benthic fauna and flora dwell in the shallower upper oxic water layers.

Besides its natural peculiarities and disadvantages[42], the long-term and intensive anthropogenic pressures exerted on the system aggravated the threats to the Black Sea ecosystem related to climate change[43]. Large amounts of various pollutants (oil, trace metals, nutrients, pesticides, etc.) have been discharged from coastal sources to the nearshore waters since the 1960's. Excessive nutrients are considered to be the most persistent in negative effects comparing to all other pollutants. Their input via rivers, agricultural drainage waters, and insufficiently treated municipal/industrial wastewaters has increased many-fold over the last few decades, supporting progressive cultural eutrophication. The latter has led to radical changes in the Black Sea ecosystem since the 1960s and especially after 1970s when critically important key habitats disappeared from the large shelf areas. It has been scientifically and politically accepted that eutrophication has caused a major transboundary impact on water quality, biological diversity, bio-resources abundance, adversely affecting all sectors relying on marine services.

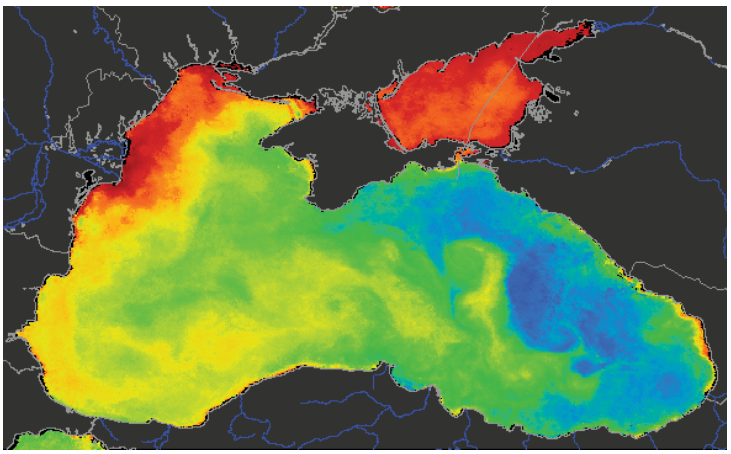

Figure 63: Typical summer bio-optical remote sensing "colour" of the Black Sea (see more on this in Barale and Jaquet, 2006)

It was also recognised that other anthropogenic forces like overfishing and the use of destructive fishing techniques, coastal zone mismanagement and the introduction of invasive species (most notably the ctenophore jelly *Mnemiopsis leidyi*) simultaneously occurred further damaging the functioning of this ecosystem through trophic cascades.

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[42] Since Black Sea is virtually isolated, its resilience to change is weak. The presence of a permanent anoxic zone is an additional risk factor.

[43] Climatic changes are associated with increased frequency in floods, north-bound movement of species, sea-level rise, etc.

Some recovery started by mid-90s due to less extensive use of fertilizers for economic reasons. Consequently, anthropogenically-induced hypoxic conditions at the sea shelf somewhat decreased and biodiversity in benthic flora and fauna increased. The appearance and establishment of the predator of *Mnemiopsis* (*Beroe ovata*) was seen to improve certain ecosystem parameters.

More than 300 rivers contribute inflow to the Black and Azov Seas. The north-western Black Sea receives the discharge of the largest rivers in the Black Sea drainage area - the Danube River with a mean water discharge of about 200 km^3/yr and the Ukrainian rivers Dniepr, Southern Bug and Dniestr contributing with about 65 km^3/yr.

The influence of the Danube River and its large Delta is predominant regarding the sedimentation on the north-western Black Sea shelf area, and not only. The Delta impact on hydrographic processes, transport of species and the gene pool formation, chemical content of water and sediment, migrations of fish populations and birds, etc., opens a range of scientific challenges.

From this perspective, the existence of the Danube Delta – the Europe's largest deltaic system – further increases the special characteristics of the Black Sea.

Impacts of climatic variability and/or climate change are clearly indicated by the arrival of more Mediterranean species and establishment of new niches in the Black Sea, phenological changes in biota, direct correlations between sea water temperature changes and abundance/biomass of species (plankton to fish) as well as variations in the dissolved oxygen content of upper water column layers.

Governance arrangements

The Bucharest Convention and its Protocols together with their implementation plan, SAP (2009), constitute the regional legal/policy framework for the protection of the Black Sea environment. The Black Sea Commission (BSC) is made up of one member from each of the six Black Sea national governments. Six regional activity centres and six thematic advisory groups of the BSC contribute to the regional implementation scheme.

At a regional level, the four priority transboundary problems for the Black Sea ecosystem, re-confirmed by Black Sea Transboundary Diagnostic Analysis (TDA, 2008) and by the Strategic Action Plan for the Environmental Protection and Rehabilitation of the Black Sea (SAP, 2009), are (1) eutrophication/nutrient enrichment, (2) changes in marine living resources, (3) chemical pollution (including oil), (4) biodiversity/habitat changes, including alien species introduction. The BS SAP (2009) defined the comprehensive set of Ecosystem Quality Objectives (EcoQOs) to manage these four transboundary environmental issues (SAP, 2009. See also Box 2 in TÜBİTAK, 2011).

The Causal Chain Analyses in the Black Sea TDA (2008) found that four trans-boundary problems cannot be dealt with individually. It is stated that "*improvements in management of one problem will have knock-on effects for other problems, and addressing individual causes is likely to*

improve the situation with regard to at least two, if not more, of the four environmental problems". Clear, coherent scientific understanding of coastal (land and water) margins and efficient management of human activities in these areas are vitally important for achieving all four SAP (2009) EcoQOs.

In particular, through signing the BS-SAP (2009) countries confirmed (Article 3.1) to adhere to the following governance and management approaches: (i) Integrated Coastal Zone Management (ICZM); (ii) The Ecosystem Approach; and (iii) Integrated River Basin Management (IRBM).

The geographical scope for the basin is defined by the Bucharest Convention and its Protocols as the marine and coastal waters of the Black Sea proper. However, in terms of linkage to the Mediterranean, the Turkish Straits System as well as the Azov Sea and the Kerch Strait can also be considered in the context of the marine and coastal governance such as ICZM.

ICZM is also aimed to integrate coastal governance issues with the events within the catchment basins of rivers draining into the sea (Fig. 1). Hence, the Black Sea with its watersheds (catchment area), being one of the Large Marine Ecosystems (LME) of the world with ecology dissimilar from that of the adjacent seas and ocean, has to be considered in this context either.

The combined application of ICZM and IRBM was affirmed as a legally binding general obligation in the updated Protocol on the Protection of the Marine Environment of the Black Sea from Land-Based Sources and Activities (LBSA, 2009), which is urging countries (Article 4f) "*to endeavour applying the integrated management of coastal zones and watersheds*".

Another Protocol, relevant for ICZM is the Black Sea Biodiversity and Landscape Conservation Protocol to the Convention on the Protection of the Black Sea Against Pollution (BLC, 2002). At least two its articles are directly relevant to the issue of ICZM. Under its Article 3, the Protocol applies to *coastal zone*, which have to be designated by each Contracting Party, including wetlands. Importantly, the Contracting Parties have also committed themselves "*to encourage introduction of intersectoral interaction on regional and national levels through the introduction of the principles and development of legal instrument of integrated coastal zone management seeking the ways for sustainable use of natural resources and promotion of environmentally friendly human activities in the coastal zone*" (Article 7).

The regional Black Sea institutional framework for the protection of the marine environment involves two regional organizations: primarily the Commission on the Protection of the Black Sea Against Pollution (Black Sea Commission, BSC), established *de jure* in 1992[44] through Article 17 of the Bucharest Convention and supported by the United Nations Environmental Programme, and the Organization of the Black Sea Economic Cooperation (BSEC), also established in 1992. The Black Sea Commission (http://www.blacksea-commission.org) was established exclusively for the protection of the Black Sea marine environment and is composed of the Black Sea coastal states, while BSEC, as a regional economic cooperation forum, includes even states not falling within the

[44] BSC Permanent Secretariat became operational in October, 2000.

ecological limits of the Black Sea Catchment. BSC and BSEC have granted each other the observer status.

Institutionally the Black Sea Commission (BSC) is the intergovernmental organization responsible for the implementation of the Convention for the Protection of the Black Sea Against Pollution (Bucharest Convention), its four Protocols and Strategic Action Plan, aiming at preserving the Black Sea ecosystem as a valuable natural endowment of the region, while ensuring the protection of its marine and coastal living resources as a condition for sustainable development of the Black Sea coastal states, well-being, health, and security of their population.

The Permanent Secretariat of the BSC started functioning in 2000. One of its subsidiary bodies is the ICZM Advisory Group, which actively supports the ICZM activities of the BSC. The group is responsible for the annual ICZM report of the BSC, submitting also regularly data on the state of the coast and development of ICZM in the Black Sea states. The annually reported data covers development of policy/legislation, projects and different ICZM indicators in the fields and sectors of: population and geography, energy, water and wastewater, biodiversity, coastal erosion, economy, tourism, solid waste management, agriculture, industry, transport, and climate.

In the period of 2002-2013 as of to date 17 meetings of ICZM AG were organized with participation of Black Sea countries representatives and international experts (including Pegaso partners). Activities were connected not only with ICZM issues (development of set of indicators for the assessment of coastal zone, introduction of ICZM principles, guidelines on Environmental Impact Assessment in a Transboundary Context, etc.), but also with other shared problems. The Black Sea Biodiversity Strategy was discussed and improved jointly with Advisory Group on Conservation of Biological Diversity, while jointly with the Advisory Group on Land-Based Sources of Pollution ICZM AG worked to improve the updated Protocol for the Protection of the Marine Environment of the Black Sea from Land-Based Sources and Activities and ICZM component in this Protocol.

The ICZM AG accepted in 2007 to measure the implementation of ICZM in the Black Sea region using the colour coded marker set of indicators, developed earlier by the ICZM Expert Group of the European Commission (EC, 2005). The results were published in the SAP Implementation report of the BSC 2002-2007 (BSC, 2009), showing certain progress in the region during the previous 5 years in coastal management and development of legal/policy framework for ICZM at the national level. This exercise will be repeated in 2014 to report to Ministerial of the Bucharest Convention Parties.

Programmes and projects

International institutions firmly committed to the protection, preservation and rehabilitation of the Black Sea marine environment include European Commission, GEF/UNDP, the Intergovernmental Oceanographic Commission of UNESCO, International Maritime Organization (IMO), Memorandum of Understanding on Port State Control in the Black Sea Region (MoU PSC), International Commission for the Protection of the Danube River (ICPDR), Danube Commission,

United Nations Economic Commission for Europe (UNECE), United Nations Environment Programme (UNEP), Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and continuous Atlantic area (ACCOBAMS), Organization for Security and Co-operation in Europe (OSCE), International Atomic Energy Agency (IAEA), regional NGO networks and many others.

Black Sea cooperation has therefore been activated by many pan-European, regional scale and bilateral/multilateral projects between the Black Sea countries. Investigating and understanding the Black Sea ecosystem and its problems at regional and sub-regional scales have been supported by different donors like EU, UNDP/GEF, NATO, The World Bank, EBRD, UNEP, IMO and others.

The EU Framework Programme(s) (IV-VII) funded daNUbs, EUROGEL, IASON, SESAME, HERMES, HYPOX, MEECE, ODEMM, THRESHOLDS, PERSEUS, and many other projects to tackle with Black Sea ecosystem issues considering both climatic and anthropogenic forces.

Another group of EU FP (VI, VII) Projects are focused on the achievement of efficient governance practices including ecosystem-based management to support sustainable development in the Region, like INTERREG PlanCOAST, SPICOSA, ENCORA, DEDUCE, KnowSeas, ODEMM, COCONET, as well as the IASON, enviroGRIDS and PEGASO.

GEF funded and executed through UNDP BSEP[45] and BSERP[46] (Phases I and II) projects in support of the Bucharest Convention implementation. It contributed to sustainable human development in the Black Sea area through reinforcing the cooperation of the Black Sea countries to take effective measures in reducing nutrients and other hazardous substances to levels necessary to permit Black Sea ecosystem recovery.

EU/TACIS/EuropeAid Projects, such as ECBSea, SASEPOL served to strengthen regional cooperation for the protection of the Black Sea.

Projects focused specifically towards improving the monitoring and forecasting capacities and the operational status of oceanographic services in conjunction with better management of data collection and networking of the Black Sea scientists are: ARENA (FP5), ASCOBOS (FP6), ECOOP (FP6), MONINFO (EC), BS SCENE/UBSS (FP6, 7), SEADATANET I/II (FP6, 7) EnviroGRIDS (FP7), EMODNET. Such projects have had valuable impact on networking and capacity building in the Black Sea marine research area.

In relation to the development of Global Monitoring for Environment and Security (GMES) core services, MyOcean (FP7) has also played an important role through its implementation in the Black Sea. Finally, the EC EuroARGO Project (part of GOOS) has enhanced efforts to deploy Argo floats in the Black Sea to support GMES services and did the advancement of operational monitoring in the Black Sea region.

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[45] Black Sea Environment Program

[46] Black Sea Ecosystem Recovery Project

The Black Sea ERA NET (2009-2012) and RUS ERA NET (2009-2013) Projects have been crucial to identify long term thematic priorities of environment, health, energy, marine & maritime research in the region (TÜBİTAK, 2011).

ICZM experiences

Management of complex systems requires integrated approach which allows rationally and in a coordinated way to bring together numerous contradicting and overlapping interests. The Black Sea countries[47], Bulgaria, Georgia, Romania, Russian Federation, Turkey, and Ukraine, have reached a consensus on the necessity of reconstruction of existing management systems in compliance with ICZM principles in the Odessa Declaration (1993), Strategic Action Plan (1996), and in the new Strategic Action Plan for the Protection and Rehabilitation of the Black Sea which was adopted in April 2009 (SAP, 2009).

The history of ICZM in the Black Sea region started following the signing of the Convention on the Protection of the Black Sea Against Pollution (Bucharest Convention, 1992). ICZM activities were launched within the Black Sea Environmental Program (BSEP) funded by GEF and jointly managed by UNDP, UNEP, World Bank, and European Union's PHARE, TACIS and EuropeAid programs in the period 1993- 2008.

ICZM initiation activities were carried out within several international programmes, such as BSEP (1993-1999), EU TACIS-PHARE/EuropeAid (in three phases, 1995, 1998-2000 and 2002-2004), Black Sea Ecosystem Recovery Project (BSERP, 2002-2007, GEF/ UNDP).

Main achievements of BSEP Phase I (1993-1997) included the establishment of the ICZM Regional Activity Centre (RAC) in Krasnodar, Russian Federation (not operational currently); presentation of ICZM concepts, methodologies and tools to various authorities in Black Sea countries; elaboration of the guidelines for defining national coastal zone boundaries; preparation of National ICZM Reports; based on which RAC prepared Report on ICZM in the Black Sea Region.

Since 1995 the EC has provided technical assistance to BSEP, especially through Phase I and Phase II of the TACIS project (1995, 1997 funds) and PHARE. In 1995 a number of training courses and workshops on ICZM, EIA, and Ecological Audit were organized for different experts in Bulgaria, Georgia, Romania, Russian Federation, and Ukraine. Within the TACIS project further in 1998-2000 the number of documents were produced, including the Policy of Coastal Defence, perspectives of sustainable tourism development, as well as the Coastal Code of Conduct for the Azov and Black Seas (latter based on similar European document); and the importantly the Methodology of Spatial Planning for the Coastal Zones (TACIS, 2000, further developed by Yarmak, 2004). Draft Regional Black Sea Strategy on ICZM was developed by the RAC with a technical support from the EuropeAid Project "Technical Assistance to the Black Sea Environmental Program". The Black Sea Commission endorsed the Strategy during its 11th Meeting (November, 2004).

[47] Presentation in this subsection is closely following the reference Antonidze (2010).

Based on above methodology two ICZM pilot projects were implemented for the coastal resorts of Malaya Yalta (Ukraine, Azov Sea coast) and Gelendzhik (Russia, Black Sea coast) in 1998-2000 (TACIS) and 2002-2004 (EuropeAid) project support (see ICZM RAC, 2004), followed by another two ICZM pilots with BSERP support in Akçakoca Municipality on the Black Sea coast of Turkey (ITU, 2007) and with EuropeAid Environmental Collaboration for the Black Sea (2006-2009) project support in Tskaltsminda community of Georgia (ECBSea, 2009a, see Fig. 3), latter complemented with the participatory development of national ICZM Strategy for this country (ECBSea, 2009b). See also Ozhan (1997) for concise presentation of the typical conflicts between coastal development and conservation for Gelendzhik and other locations around the Black Sea.

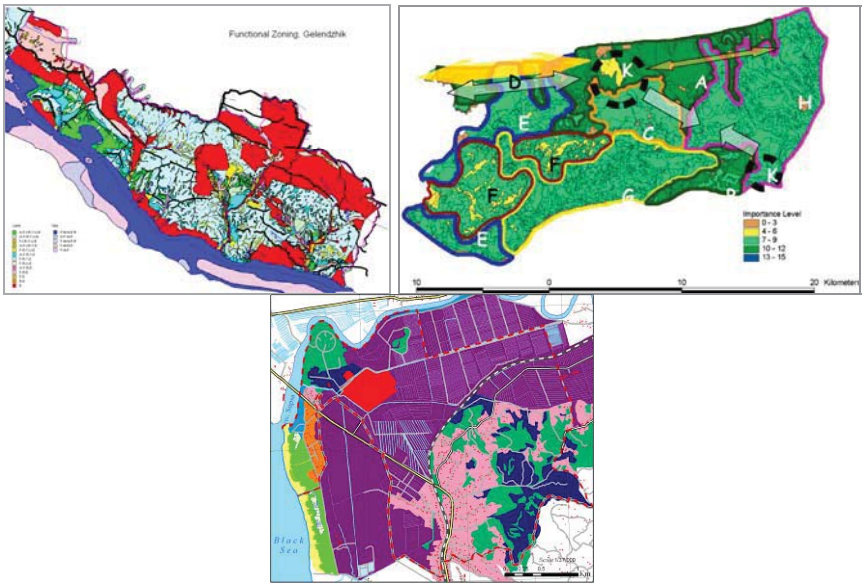

Figure 64: Functional zoning maps for Gelendzhik, Akçakoca and Tskaltsminda pilot areas

Latest pre-Pegaso ICZM activity worth mentioning is the feasibility study on ICZM instrument to the Bucharest by Vinogradov (2007), implemented under BSERP. After a comprehensive analysis, this reference recommended a two-step approach for ICZM in the Black Sea Regional: (i) adoption and implementation of the suggested combination of ICZM instruments: ICZM Declaration, Code of Practice, and Action Plan in the short-medium term (2-5 years); and elaboration of an ICZM protocol to the Bucharest Convention Long-term (5-10 years).

Based on these recommendations, the Black Sea SAP (2009) contains two broadly defined targets (and related outputs) in the field of ICZM: (i) to further recognise and implement integrated coastal zone management principles (through development of ICZM Guidelines); and (ii) to

disseminate the knowledge of ICZM at various levels of governance (through development of education packages and delivery of practical training).

Two seminal joint international Mediterranean and Black Sea conferences, organized by Medcoast (1996, 2008) network should also be mentioned in the context of cooperation between two basins.

Against above described background and backdrop is where the comprehensive and multi-scale range of Pegaso activities were implemented as part of the Shared Mediterranean and Black Sea ICZM Governance Platform pioneered by PEGASO, including experiences with three Black Sea CASES described and reported further below in this deliverable.

ICZM stock-taking exercise under PEGASO contributed enormously to further documenting the issues and progress with ICZM in the Black Sea Basin. Comprehensive compilation of ICZM events and activities in the countries and the region, as well as the stock-taking assessment with regard to the requirements measured against the model of the Mediterranean ICZM Protocol is reported elsewhere in Abaza et al. (2011) and Pegaso Deliverable D2.2C (Antonidze et al., 2013).

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13. Guria Coastal Region (Georgia)

1.1 Introduction and case setting

Guria Coastal Region is located along the Black Sea coast of Georgia spreading approx. 21.5 km from River Natanebi to the southern edge of the city of Poti. Another coastal region of Adjara Autonomous Republic is located to the south, while to the north the region is neighboured by the port city of Poti in Samegrelo-Zemo Svaneti. The region is composed of two administrative districts belonging to Lanchkhuti and Ozurgeti Municipalities – two most important settlements of the region, both of which are non-coastal and located in the mountain foothill hinterland. Four small settlements are located along the Guria coast, from north to south: Grigoleti and Tskaltsminda (Lanchkhuti Municipality), Ureki and Shekvetili (Ozurgeti Municipality). Ozurgeti is the administrative centre of Guria – one of the 12 administrative-territorial regions of Georgia.

There are two main landscape types (this subsection closely follows Halcrow, 2005):

Coastal plains, which are characterised by flat, open landscapes with distant views of the Caucasus Mountains. The undeveloped coastline in Guria is characterised by a lack of human influence, special qualities of natural light and wide open vistas of sea and sky.

1.1.1 Foothills of the Lesser Caucasus

This area is essentially a transition between the coast and the higher mountains of the Lesser Caucasus, stretching from Guria further south to Adjara, where it is characterised by a very attractive undulating topography, of changing vistas and panoramic views of the sea. Agriculture is dominated by tea and citrus plantations, which produces a very attractive, wooded agricultural landscape.

Large parts of the lowlands were brought into agricultural use. In the dryer areas agriculture is more intensive and larger scale. Towards the wetter areas landuse is more extensive and the plots are divided by rows of trees, ditches and canals. In the lowlands the settlements have mainly grown up on sand/clay ridges between the boggy wetlands. This has resulted in an elongated settlement pattern, which has developed into typical ribbon development (e.g. Lanchkhuti). Maize, vegetables, citrus, fruit, tea, and honey are key products produced in the coastal area of Guria. Ozurgeti is particularly important for tea, vegetable and honey production. There is particular potential to develop fuelwood plantations to relieve pressures on natural forests. Suitable sites for these should be sought in accessible locations on the edge of settlements.

Agriculture is and should probably remain the predominant land use in this area. Support and encouragement to the agricultural sector is required to sustain and improve rural livelihoods,

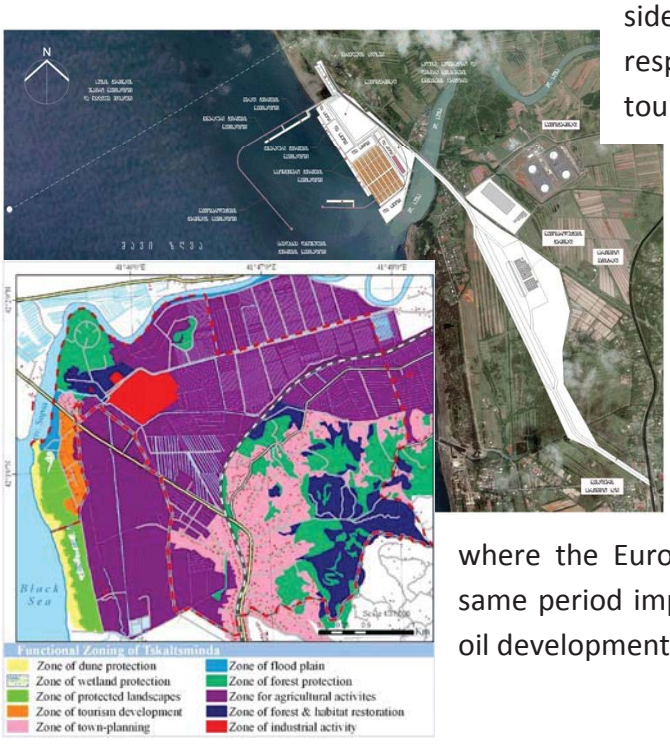
though the prospect of increased agricultural activity in the coastal area needs to be managed to control environmental impacts, including increased run-off of sediments, fertilisers and pesticides and the effects of drainage works on valuable wetlands. In the lowlands buffer zones of uncultivated land between agricultural land and waterways would have three principal functions: to reduce erosion; to reduce transport of sediment and other contaminants; to provide wildlife habitat.

Shoreline in Guria area is influenced by the character of the coastal bathymetry, which is considerably shallower than in gravel dominated coastline stretches in Adjara to the south. The majority of the coastal substrata here is comprised of coarse to fine sands, including the important magnetite black sand beaches in Ureki.

Coastal lowlands are either within or adjacent to the buffer zones to the Kolkheti National Park, so land use and management decisions need to be guided by the need to protect these important environmental assets. The management plan governs detailed land management decisions in the Park, therefore the following brief comments are made here on the character of the terrestrial environment outside the protected areas, where the following two southern and northern sub-units can be identified and briefly characterized for the Guria Coastal Region:

1.1.2 River Natanebi to River Supsa

There is an important cluster of tourism activities centred on Ureki resort. Potential is to focus further small scale tourism development here, as a nucleus of activities already exists and the area has good accessibility to the local railway station. Recent developments have been uncoordinated and have detracted from the environment of the beach and the amenities of neighbours. Coastal setbacks need to be better defined and enforced and there must be no physical restrictions imposed on public access to the beach. The southern (Shekvetili) and northern (Tskaltsminda) parts of this area should be proposed as Undeveloped Coastline, either side of the rivers Natanebi and Supsa, respectively. A potentially damaging tourism/marina development is under construction to the south (construction is currently stalled due to unreliable funding). This will require careful monitoring and may justify mitigation measures elsewhere. Even more alarming is the recently revealed proposal to develop new oil terminal (see figure with strikingly different plans) in the same location where the BP's subsidiary is operating Supsa terminal and where the EuropeAid supported ICZM pilot project in the same period implemented planning effort with no room for oil development identified.



The British Petroleum controls Supsa oil terminal with 4 x 40,000 m^3 storage capacity and tanker loading facility 3 km offshore for exporting oil pumped with small diameter Baku-Supsa pipeline. Adjoined are the areas proposed as Undeveloped Coastline, within which there is a strong presumption against development. Any proposals for expansion (or addition) of the terminal would have to establish a clear and compelling need for development, including examination of potential alternatives, to overcome this policy objection and to demonstrate there would be no adverse impacts on the adjacent coastline or environment through a satisfactory EIA.

The seabed here supports faunally reduced communities in the deeper waters, with the anaerobic environment potentially extending into water less than 100m in depth. This area also has the most contaminated seabed sediments with respect to hydrocarbons, which are apparently caused by natural infiltration of oil from the seabed. Restrictions are imposed on fishing activities near the Supsa Oil terminal and there needs to be an improved dialogue established between the terminal operators and the fishing community. Impact of the terminal illuminations on flocks of birds migrating along the coastline should be better recognized and mitigated.

1.1.3 River Supsa to south of Poti

The levels of suspended solids within this section of coastline are periodically raised above background due to the influence of the River Rioni, Lake Paliastomi and River Supsa. Although some seabed contaminants are raised above background levels, they are for the most part not indicative of serious seabed contamination. The Rioni would appear, however, to be the main source of any contamination that exists. The benthic communities in this sector were the most diverse along this part of the coast. The coastal environment comprises fine sandy beaches. In several areas coastal features of environmental interest exist, particularly in relation to the river mouths and adjacent to the entrance to Lake Paliastomi. These include isolated bodies of brackish water that may constitute coastal lagoons, although several of these have already been developed.

The landscape of the Kolkheti lowlands was formed after the rise in sea level from the breakthrough of the Bosporus. Stimulated by the damp climate and high rainfall, boggy lowlands developed; lakes were filled up with sphagnum resulting in raised peat bogs with a thickness of up to 12 metres. The landform is characterised by a small scale boggy landscape, with swampy forest, flooded meadows, cross cut by rivers mainly fed by rain and snow from the mountains. Sand and gravel from the rivers spread along the coast under the influence of wind and waves, resulting in gravel and sandy beaches and low sand dunes with wet valleys. The dunes are now forested with mixed woodland; partly natural and partly planted pine forest. This pine vegetation on the back beaches provides attractive shade areas and helps to define a visual boundary to the coastline.

The coastline just south of Poti can be regarded as relatively undeveloped. The channel connecting Lake Paliastomi to the sea is not within the National Park boundary but is vital to the maintenance of water levels throughout the Park. Consideration should be given to extending

the Park boundary here, and to include the area of former peat extraction immediately to the south of Lake Paliastomi.

The northern part of this sub-unit along Grigoleti settlement contains unauthorised dacha (summer house) developments. These are in an area prone to coastal flooding and vigilance is required to ensure there is no further expansion of this type of development.

Offshore facility of the Supsa oil terminal is actually located in this sub-unit on the right bank-side of the river mouth. Just between this large diameter pipeline connecting the terminal with the single mooring loading buoy and the river it was proposed to squeeze-in new port and oil terminal with rail shipment. Two operators operating adjacently and with little to no coordination invites for substantial increase in risks of collision and major oil spill. If this ever happens the valuable beaches of Ureki would vanish with unrecoverable impact on tourism and public perception of oil industry.

1.2 Coastal Issues

Figures 65: Clean and not very clean: "beautiful waves on the sandy beach in Ureki (left) and "huge quantity of trash at Ureki beach" (right) (photos and titles from Panoramio by Pogromca Gašnič)

1.2.1 Identification of coastal issues, their socio-economic and policy relevance

Long list of issues in Drivers Pressures State Impact Responses (DPSIR) framework, provided in Appendix 3.1, includes the issues such as coastal access and encroachment, habitat loss, tourism development, oil transhipment and port development pressures, oil spill risks, inadequate erosion control, deficient infrastructure, bathing water quality, beach litter, solid waste, pollution.

Following are the short list of choices made and justifications:

Habitat loss – rural and urban encroachment and development pressures lead to loss of habitats and transformation of green or less developed coastal and open areas into developed and congested spaces along the coast, in the hinterland and the watershed. Due to 'creeping' nature

of such changes spatial indicator toolsets are needed to take account of these gradual but mostly irreversible transformations.

Coastal development projects (such as port and oil transhipment) – such projects are primarily funded from international lending sources (public and private) with benefits collected at that level, while serious costs are born at all levels (local, national, international). Related to this is weak quality of EIA process.

Inadequate erosion control – leading to potential loss of most valuable beaches (Ureki resort) due to potential port and oil marine infrastructure developments. Improved capability for assessment of coastal dynamics would require watershed management and sediment flow modelling tools.

Bathing water quality and beach litter – this is the pervasive issue along the Black Sea coast at the local, national and international levels. This issue is focused along the coastline. It seems appropriate to facilitate the establishment of indicator based beach management tools.

It should be recognized, that ICZM is a long term process, and major outcomes are unlikely to expect within one research project. There have been no improvements observed in bathing water quality or beach litter management. EIA regulations and quality of EIAs for coastal development projects remain weak. Supsa Port EIA is a good example – low quality of EIA was approved, and as was recently reported in the media, initiated works resulted in destruction of coastal habitat (natural wetland), but construction is now halted probably due to lack of financing. In addition, dozens of local households were resettled from their lands. Positive factor of halt in construction is that expected coastal erosion risk was not enhanced further.

1.2.2 Application of indicators and other tools to illustrate issues

On a more positive side it should be concluded that application of PEGASO tools provide excellent basis for addressing these management issues with persistent efforts in the long run.

Indicators tools were applied (but obviously more work needs to be done in future), to take account of changes in land cover and land use in the coastal zone, as illustrated on figure 3, utilising SDI to disseminate detailed dataset for small community within cases area, Figure 5, where the spatially explicit indices are used to visualise development pressures and natural capital and Figure 6, outlining natural capital and urban spaces at the cases level.

Of great help both to address coastal erosion due to projected sea level rise as well as the beach management would be the Black Sea beaches dataset developed by UNIGE Pegaso partner (see Allenbach at al. 2014) and available in PEGASO SDI.

Perhaps the most important is the role played by the application of these tools in approaching case stakeholders and to inform the participatory process, which may result in changes in governance of the coastal zone to address the shortcomings in the medium to long term. It

indeed seems that participatory process provided good groundwork for positive consideration and decision by key stakeholders to start resolving the problems (see further below in participation part).

1.3 Relations between coastal issues and ICZM Protocol and Principles.

By participating in PEGASO the Black Sea partners agreed to test the applicability of the legal instrument such as ICZM Protocol to this region. CASES work proceeded in a manner to maintain compatibility with the requirements of the Protocol.

1.3.1 Selection of coastal issues in relation to the ICZM principles and protocol

At least the following themes provided for in the ICZM Protocol were of relevance for Guria Coastal Region CASE Site in Georgia:

Article 15 Awareness-raising, Training, Education and Research – regional and local level training in various aspects of ICZM such as application of indicators (workshop organized in November 2013).

Article 16 Monitoring and Observation Mechanisms and Networks – applying coastal inventories and indicators at the regional as well as CASES level (certain progress achieved).

Article 18 National Coastal Strategies, Plans and Programmes – monitoring the performance of the local ICZM plan developed earlier (progress with Tskaltsminda pilot project evaluated).

Article 19 Environmental Assessment – accomplished through monitoring of EIA quality in the entire national coastal zone (two examples include Adjara by-pass road and analysis of EIAs for hydropower projects including for rivers draining into the Black Sea, including from Guria Region).

Article 22 Natural Hazards – assessing coastal erosion (utilising watershed modelling); anticipating in an integrated manner the impacts of the coastal erosion (such as effects of sea level rise).

Article 27 Exchange of Information and Activities of Common Interest – defining coastal management indicators and cooperating with stakeholders in the use of such indicators; as well as by implementing demonstration ICZM projects such as CASES.

More information on applicability of ICZM Protocol to Georgia is provided for in the responses to ICZM Stock-Taking Questionnaire (finalized in June, 2012, see references).

1.4 Policy issues and ICZM principles and approaches

Again, as yet local and regional governments had only limited progress in addressing coastal issues, although some progress was monitored at the local level, as documented by the participatory meeting in local community where small ICZM pilot project was implemented in recent past (see Appendix 3.2). This illustrates that long term attention and monitoring of

progress has certain positive impact. It is therefore expected that despite limited progress by the end of the project in changing the governance practice, the outcomes of the participatory training workshop with local and regional authorities (Appendix 3.3) sensitized them to usefulness of ICZM process and indicator tools applied at local and regional levels and resulted in agreement of stakeholders to maintain the process and proceed further with the establishment of regional coastal council as an institutional mechanism of informed participation. Availability of regional and national instruments mandating the application of ICZM principles and tools would indeed support and enhance the process.

1.5 Relevance with national ICZM process

ICZM Initiatives in Georgia (as in all other Black Sea countries) can be traced back in time since the signing of the Bucharest Convention (1992) and the first mentioning of ICZM in the Odessa Ministerial Declaration (1993); therefore initiatives taken were mostly of top-down nature. There were certain national implementation initiatives concerned with the Georgian CASE, the Guria Region. Firstly, the Ramsar Site (since 1996) and wetland Kolkheti National Park (since 1999) were established along the coast, at Kolkheti Lowland, with large and important peatland part of Imnati-Grigoleti and part of Paliastomi Lake belonging to coastal Region of Guria. The World Bank and GEF supported these initiatives in the period of 1999-2005. Second initiative was concerned with the development of an ICZM Pilot Project for small Tskaltsminda community: the ECBSea project, implemented with support of the EuropeAid in the period of 2008-2009. This pilot activity was complemented by the development of the ICZM Strategy – not approved yet, similar to draft of the ICZM Law for Georgia (latter with World Bank support), which is also long pending consultation and adoption.

CASE work under PEGASO project was very relevant for the national ICZM process. Regional and local level engagement is pretty much in line with national arrangements contemplated in the draft legislation and draft national ICZM strategy. Conversely, activities and progress at the cases level can undoubtedly inform the national process and work done in Guria Region can be of immediate interest for other coastal regions of the country, while cases experience can also inform ICZM needs and activities at the international arena as well within the Black Sea Commission framework. Process was indeed strongly supported by development of tools and instruments within the major European project such as PEGASO.

Main constraint felt was the lack of genuine political commitment at the national level to act on already existing policy instruments such as national ICZM strategy and draft legislation. Binding or guiding instrument at Black Sea regional level could definitely contribute in this respect.

1.6 Stakeholders involvement

The approach undertaken in Georgia CASE was to capitalize on earlier developments and to implement the PEGASO process and tools as the continuation and gradual expansion of earlier initiatives, treating the process as part of the national ICZM program and plan of actions, rather than isolated short-term project initiative. This was indeed one of the reasons for selecting

coastal Region of Guria, which was hosting earlier ICZM activities for Kolkheti wetlands and Tskaltsminda pilot project.

Similar approach was pursued in terms of participatory process, trying to balance the immediate project need to provide for "participatory action" with the longer term need, not to risk raising false expectations, but at the same time not to delay actions and thus risk loosing the interest of key stakeholders and decision-makers. It is considered important, therefore, to maintain the integrity of the process in post-PEGASO period as well.

1.6.1 Stakeholder identification

The first step in the participatory process was the identification of the Guria CASE stakeholders, which was relatively easy step to make due to previous history of interaction and earlier project work, moreover that selected CASE coordinator was key representative of the regional civic society and the leader of a local NGO: Lanchkhuti Information Centre, a key stakeholder in one of the two coastal municipalities of Lanchkhuti and Ozurgeti in the Guria Region). It is interesting to reproduce initial stakeholder list with the list of actual parties involved in the participatory process at various phases of the PEGASO project, indicated with bold and colour in Table 1 below.

Stakeholder	Role in coastal zone management
International: Black Sea Commission	**Black Sea ICZM guidance and forum (ICZM Advisory Group), international cooperation and exchange with the other PEGASO CASES – thanks to the ICZM Governance Platform**
Ministry of Environment & Natural Resources Protection (MoE) of Georgia	**Black Sea Commission Member (represented by ICZM Focal Point and CASE Coordinator**)
Ministry of Economy and Sustainable Development	**Spatial planning**
Department of Tourism, Ministry of Economy and Sustainable Development	Tourism
Ministry of Regional Development and Infrastructure	Water, roads, coastal protection and other infrastructure
GeoStat	**Statistical data on socio-economic indicators**
MoE National Environmental Agency	Research and monitoring
Guria Governor Administration	Regional government
Ozurgeti and Lanchkhuti Municipalities	**Local municipal government**
Grigoleti, Tskaltsminda, Ureki and Shekvetili	**Local community government**
NGO Lanchkhuti Information Centre	**Public participation, facilitation**
Georgia Pipeline Company	Operation of Supsa oil terminal and its marine base
NGO Tchaobi	**Wetland and coastal habitat conservation**
Kolkheti National Park	Wetland protected areas management
National, regional, local level and other appropriate stakeholders would be invited to from the Regional Coastal Council. Members would be persons with experience or responsibilities relevant to coastal management on regional scale, and would include representatives of the central authorities with critical ICZM mandates, executive offices of the Governor of Guria, local government, local self-governance, coast protection, tourism, environment and nature protection, fisheries, ports, energy and industry. At least half of the members would be representatives of NGOs and elected bodies of local government.	

Table 20: List of initially identified and factually involved ICZM stakeholders, Georgia CASE

1.6.2 Implementation of the participatory process

In the Guria CASE the participatory process was addressed at several levels: international, national, and most importantly sub-national: regional and local levels. As mentioned above, the first step in the participatory process was the identification of the CASE stakeholders al all levels.

At **international level** participation was accomplished through presentations and information provisions to regional fora, such as the ICZM Advisory Group to the Black Sea Commission. At the **national level**, the Black Sea Commission Member of Georgia was informed on progress through regular briefings. Participation of the representatives of central agencies, such as Ministry of Economy and GeoStat was accomplished though their involvement in the CASE Workshop. At the **local level** the CASE coordinator conducted the progress monitoring sessions with the local Tskaltsminda community to assess and evaluate in a participatory manner the progress achieved with the implementation and outstanding actions in the local ICZM plan, developed earlier. As for the participation at the **regional level**, key stakeholders were introduced with PEGASO tools, such as ICZM indicators, at the CASES Workshop held on 20 November 2013 in Grigoleti (Guria Region, Georgia). The outcome of this important technical workshop was the endorsement by the key regional decision-makers of the agreed way forward for this coastal region through the establishment of the Guria Regional Coastal Council, a participatory forum, which is in line with the very nature of PEGASO ICZM Governance Platform, as well as the requirements of the national policy instruments such as the draft ICZM Strategy and draft ICZM Law for Georgia. (Participation at local and regional level is further documented in Appendices 3.2 and 3.3.)

It is noted indeed with satisfaction that in the course of implementation Guria CASE Coordinator, key representative of the regional civic society and the leader of a local NGO, was elected as the Chairperson of Lanchkhuti Municipal Council, becoming the key stakeholder and end user.

1.6.3 Results and prospects for future

There were some advantages of engagement with high level stakeholders and decision-makers in the process at the later stages of PEGASO. The project was indeed more prepared to present the achievements of PEGASO, to share with stakeholders and local end-users substantially advanced tools (such as coastal sustainability and progress indicators), as well as to be prepared to answer and meet complicated issues raised and requests made by the regional level decision-makers. Participation of the PEGASO Coordinator and WP3 representative (VLIZ) in the training workshop was of particular importance in achieving the understanding of the multi-scale nature of ICZM by Georgian CASE stakeholders, setting the comprehensive context of linkages between international, national, regional and local processes. In addition, it was very helpful to demonstrate coastal sustainability indicators already produced by partners for Constanta (Romania, Black Sea) and Bouches du Rhône (France, Mediterranean).

The following can be identified as the Strengths, Weaknesses, Opportunities and Threats (SWOT) for Participatory ICZM in the Guria Coastal Region:

STRENGTHS	OPPORTUNITIES
- Existing international/regional network through Black Sea Commission and its ICZM AG - Best practices set by ICZM Protocol with regard to requirements for public participation and ICZM - Network of Mediterranean and Black Sea ICZM practitioners well established, thanks to the ICZM Governance Platform - International governance supportive for ICZM and participation - Limited but positive experience with participatory engagement of stakeholders within the Guria CASE - Certain experience gained by national and local coastal managers within international demonstration activities and earlier international/national ICZM efforts - Local stakeholders participating in the ICZM Governance Platform	- Positive attitude expressed by regional and local stakeholders in support of proposed forum, such as the Guria Regional Coastal Council, and their willingness to participate further - Immediate availability of certain international projects in support of participatory ICZM in Guria, and the potential for further EU and regional support through the Black Sea ICZM network - Increased visibility of the Guria coast and the availability of the ecosystem based governance options for as yet undeveloped parts of the coastline in the Georgian CASE - Changing policies of Georgian state with more support for regulatory framework, including for more participation in decision-making process - Availability of internationally validated toolsets
WEAKNESSES	**THREATS**
- Lack of some essential coastal data for filling the information gaps and for using ICZM tools - Lack of binding instruments in support for ICZM and participatory process - Weak or non-existent legislation for environmental and strategic assessment as well as spatial planning, including the integrated framework for coastal development projects, plans and programs - Development pressures from private sector along the coastline and lack of setback rules - Decision making in closed elites versus open process through participatory fora	- Non-binding nature of ICZM instruments, available at international and national levels - Further delays with the introduction of legal and policy instruments for ICZM such as coastal legislation and national strategy as well as stronger international instruments - Continued trends in coastal development pressures both from private and public funding - Potential for change in national policies with regard to participatory governance, reverting back to libertarian economy and non-regulation of development pressures, at the coast in particular

Table 21: SWOT Analysis for ICZM process and participation, Georgia CASE Site

It can be considered as excellent “exist strategy” for the Georgia CASE to proceed with the establishment of the Regional Coastal Council for Guria and to have the consensus of the stakeholders with this regard, much in line with participatory nature of the PEGASO ICZM Governance Platform, as well as the requirements of the national policy instruments such as the draft ICZM Strategy and draft ICZM Law for Georgia. Guria stakeholders are already beginning to implement the provisions of these important draft national policy documents, and prospects seem positive for the Guria Coastal Region in joining, as well as contributing into the Joint Governance Platform for ICZM in the Mediterranean and the Black Sea.

In this regard the newly apprised regional project “Integrated Land-use Management Modelling of Black Sea Estuaries” under Joint Operational Programme for the Black Sea Basin may provide bridging support; it was deliberate decision to include Georgian CASE, Guria Region, as the pilot case area under this follow-up project as well, covering the coastal zone and the catchment. Hopes are also high for sustainability of the PEGASO Platform, so that methodological advancements can be used in the subsequent work at the CASES level.

Similarly hopes are connected with the project IASON entitled "Fostering sustainability and uptake of research results through Networking activities in Black Sea & Mediterranean areas" is the FP7 project under the Theme "Knowledge platforms, networking and uptake of research results for more strategic international R&I cooperation Knowledge platforms, networking and uptake of research results for more strategic international R&I cooperation", to 'uptake' the expertise and methodologies of EU projects including enviroGRIDS and PEGASO).

1.6.4 Constraints identified

Following are among the constraints faced in the participatory process:

- There is no statutory requirement for the participatory process in ICZM. Stakeholders will appear several times due to personal respect and due to project initiatives, but statutory requirements are needed to make process permanent and establish quality forum for the discussion and resolution of coastal issues at local and regional as well as national level.
- Lack of funding may prevent continued engagement of the coastal forum. Without proper funding even consultation process can not be continued, not to mention the resolution of coastal issues. It would be indeed desirable to tie-up participatory process with provision of certain earmarked funds for the implementation of particular actions (such as beach cleanup, bathing water quality monitoring, coastal planning, indicator data collection, geonode and alike). Participatory process would then allow building capacity in most reasonable allocation of resources to address the issues and identify new ones.
- Programmatic approach should be favoured rather than *ad hoc* interventions. Engagement of stakeholders would lead to demotivation of stakeholders if end of project funding would stop the participatory process. The subsequent iteration would then be faced with the difficulty to motivate the stakeholders to reengage again.

1.7 Tools applied and main results of the case

The great advantage of PEGASO was the rich selection of ICZM set of tools furnished at the disposal of CASES. Georgian case opted for those which were relatively easy to implement within the lifetime of the project and which would be more accessible for understanding of the stakeholders. Such tools include indicators, simple form of LEAC and SDI utilised for dissemination of results and stimulation of informed participation, while more sophisticate instruments such as scenarios and economic assessment and valuation will be retained for subsequent application. In addition to this, even the tools applied were implemented at the inception level and much more needs to be done in the immediate future to fully utilise the potential of these instruments.

The following below is the brief description of capacity building, research and dissemination activities accomplished under the Georgian CASES (Guria Region), including the presentation of main achievements, as well as discussion on some constraints encountered and lessons learned.

More detailed discussions on application of each of these instruments are provided in publications generated within the PEGASO effort, reproduced in the references section at the end. This section only provided some graphical illustration and brief characterisation to provide the snapshot of results derived.

1.7.1 Application of Spatial Data Infrastructure (SDI)

Testing and succeeding in SDI deployment of the existing local pilot project spatial planning unit GIS for Guria region. Online version was made accessible through PEGASO Viewer / Catalog, as well as enviroGRIDS portal, latter providing GeoServer space (published in proceedings of the Global Congress on ICM, Gvilava at al., 2013a). SDI Atlas proved as an excellent avenue for dissemination.

Guria Coastal Region case - Tskaltsminda Community GIS Atlas | Print |

Published on Thursday, 23 January 2014 12:15

Integrated Plan for Sustainable Development of Tskaltsminda Coastal Community – a small settlement located in Guria Region along the Black Sea coast of Georgia – was developed earlier with EuropeAid project support, attempting to address through coordinated action planning the main challenges and opportunities of this local stretch of the coastal zone. The challenges encompass broken municipal infrastructure, limited possibility to upgrade professional skills, or erosion of the beach. Opportunities on the other hand stem from the fact that the village population has an advanced level of education, has innovative ideas and can make use of its close neighbourhood to the Kolkheti National Park, the city of Poti or the tourism centre of Ureki. The maps produced show how the land is used today, highlight where the ecologically valuable areas are located, and propose different zones for future development. The plan, approved in 2009 by local municipal council, can be accessed at the link indicated above.

PEGASO project provided Atlas capability for SDI dissemination of the GIS layers created earlier for this small community in Guria Coastal Region case in Georgia. In addition to this, a simple spatially explicit colour-coded indicator map was created, demonstrating artificialisation and development pressures against the natural capital in the coastal zone.

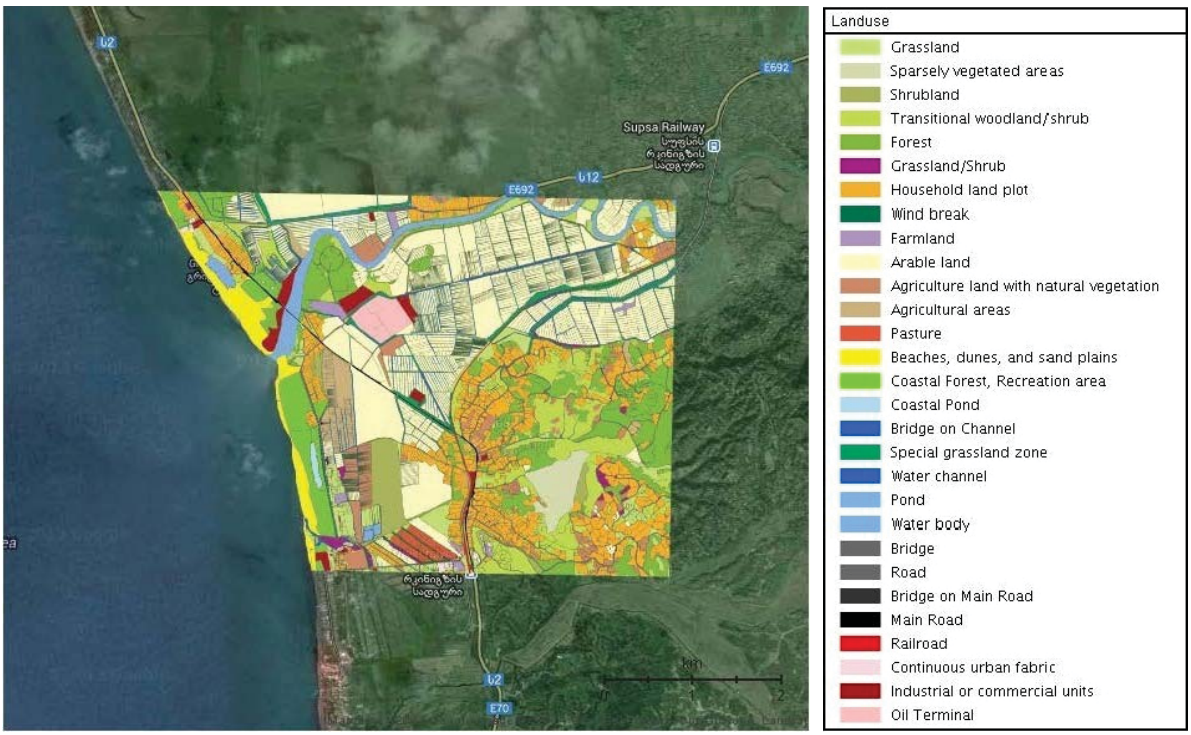


Figure 66: Land-use map of local ICZM pilot project area as rendered PEGASO Atlas at http://pegasosdi.uab.es/geoportal/index.php/guria-coastal-region-case

1.7.2 Spatially explicit ICZM indicators

Attempt was made for the same area to apply the traffic light type mapping as integral land and water use and development indicator for this small pilot case for which more detailed datasets were available (abstract and poster prepared for the Black Sea Outlook 2011, Gvilava et al. 2011; article publication pending).

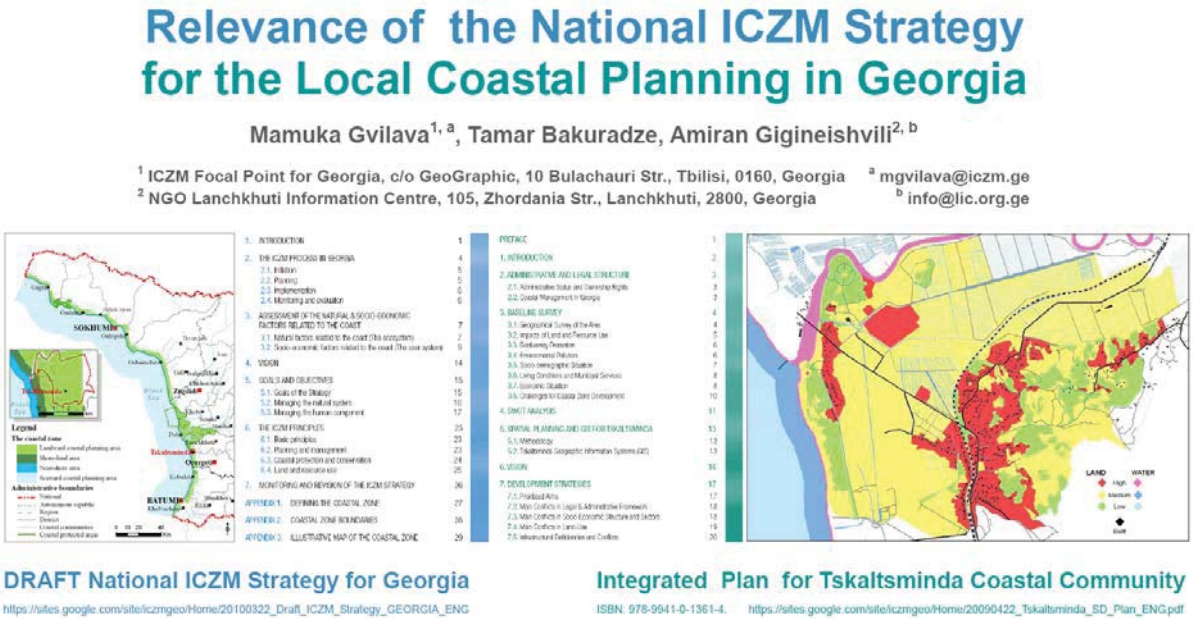


Figure 67: Spatially explicit coastal indicators at local level in the context of the national ICZM strategy

1.7.3 ICZM progress marker indicators

Georgia CASES Coordinator and ICZM NFP developed tool for simplified compilation of EU ICZM Progress Indicators for application at international, national, regional and local levels. Tool is currently being used and tasted by ICZM Advisory Group Members of the Black Sea region. After the testing intention is to make software tool and source code available through coastwiki. Tool is generic for application by any regional sea end users, even at local level of governance (presented at and published in the proceedings of the Global Congress on ICM, Gvilava & Gigineishvili, 2013a).

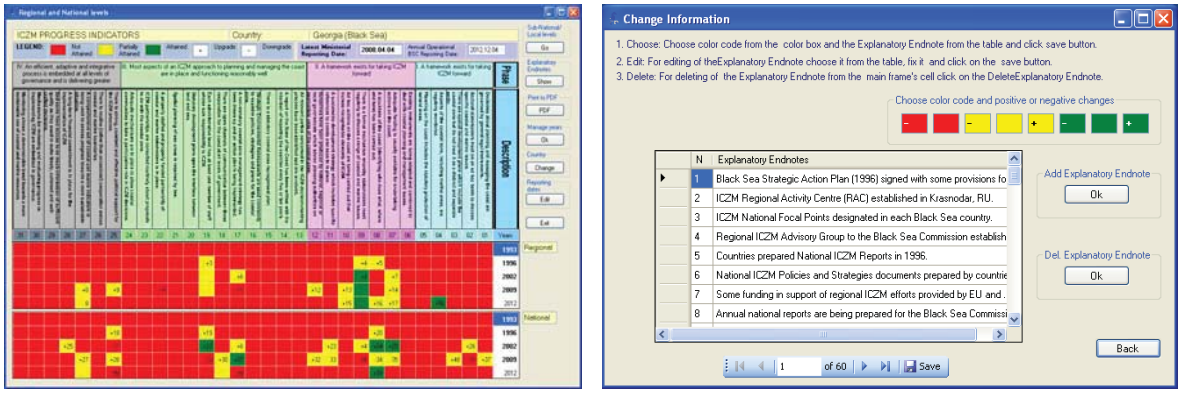


Figure 68: Main and sample pop-up windows of the ICZM progress indicator software tool

1.7.4 Hydrological modelling

In synergy with enviroGRIDS project, hydrological modelling tools were applied to Guria Region and its main rivers Supsa and Natanebi. Figure below display basins of these two key rivers discharging to the Black Sea in Georgian CASE (Guria Region): Supsa (north) and Natanebi (south). Image map shows topography, land cover and soils in the river basins. Administrative boundaries of Guria Region are shown in red colour as well. Layers are overlaid against MODIS true colour image. These images show data-sets available for hydrological modelling the river basins of the Guria Region.

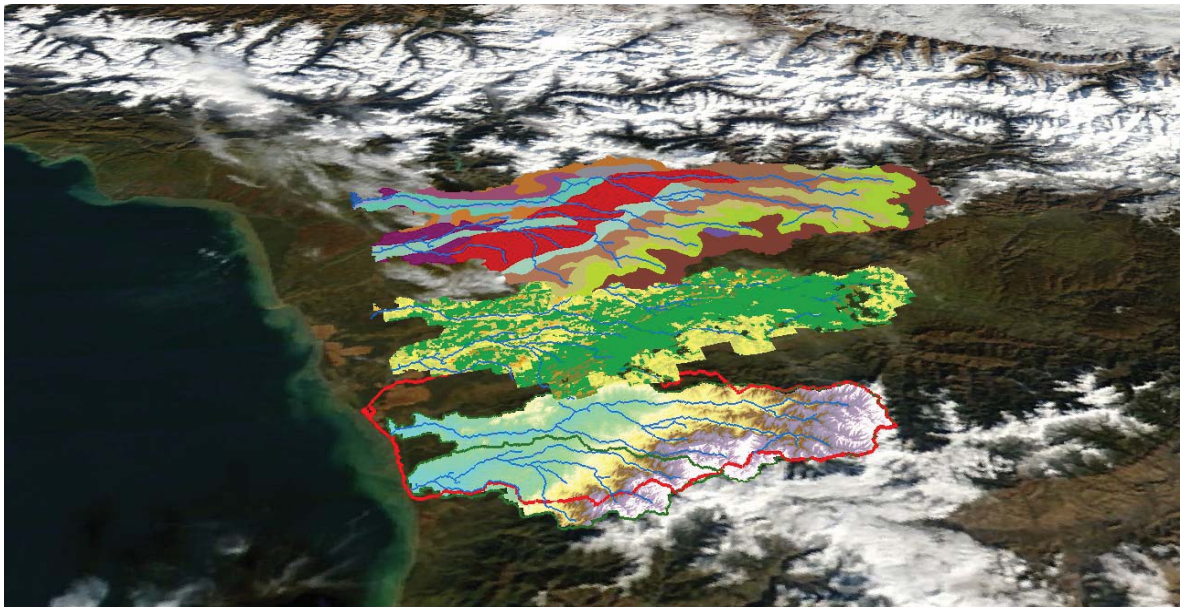


Figure 69: Guria region* and data-sets available for hydrological modelling *its two main river basins

1.7.5 Some of the constraints faced during the application of tools

Significant experience was gained with the application of PEGASO Toolbox, but there were certain constraints encountered as well in this process, listing some of these below:

- Lack of essential data or access to quality data was experienced while collecting indicator data.
- Some indicators may not be possible to compile without major data generation effort.
- Calibration of hydrological model with in-situ daily discharge time series is required, which is not freely available.
- Despite simplicity in mind when developing the PEGASO Toolbox, still significant learning curve is required from users before arriving to meaningful results.
- Would have been more helpful organizing training on tools at earlier stages, but online and international training opportunities mitigated this issue, moreover that training took place at more advanced level of development.
- Continuity of efforts is indeed required to achieve changes in the governance practice through consistent application and use of ICZM tools.

1.7.6 Remote sensing of natural capital and urban development

Demonstration of the application of tools is completed with an example of the utilisation of remote sending datasets to rapidly visualize the urban development pressures in the coastal zone.

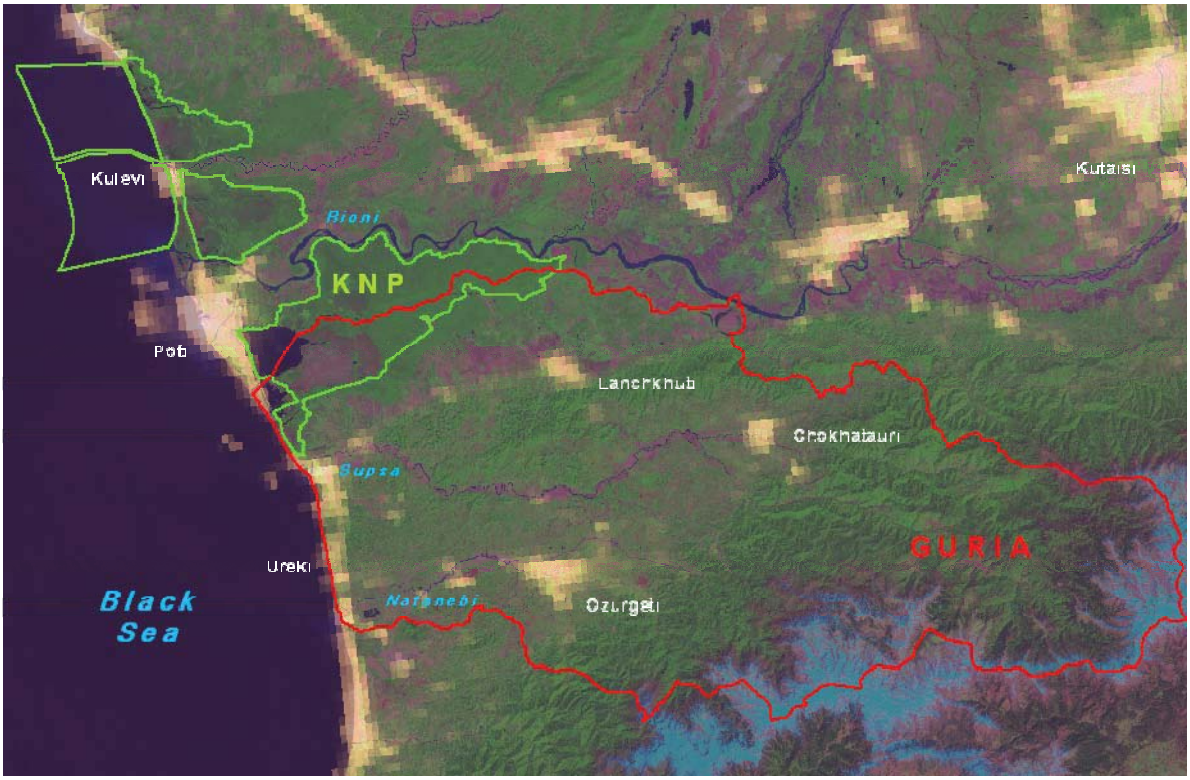


Figure 70: Draping urban sprawl (as indicated with NPP VIIRS day-night band) over the natural capital (represented by Landsat 8) for Guria Coastal Region (red) & wetlands of Kolkheti National Park (green)

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— **Appendices**

3.1 Coastal issues in DPSIR framework

Drivers	Pressures	State	Impact	Responses
Economic and social problems. Absence of employment opportunities.	Decline in traditional economic sectors such as fisheries. Increase in subsistence fishing.	Neglect of fisheries sector. Overfishing. Poaching.	Reduction in the diversity and abundance of species and stocks. Depletion of fisheries.	Kolkheti National Park Management Plan (weak enforcement in Paliastomi Lake). Catch licensing.
Human activities. Economic & social problems. Drainage. Deforestation. International demand for peat resources. Urban development.	Encroachment on wetlands and other habitats. Peat extraction from wetlands. Urban encroachment	Decline in areas occupied by wetlands and other habitats. Expansion of agriculture into natural areas. Decrease in agricultural land areas on the expense of settlements.	Loss of habitats (wetlands in particular). Pollution of inland waters due to destruction of wetlands. Pollution from agricultural run-offs. Peatland degradation.	Establishment of Kolkheti protected areas. Management plans. Demarcation of boundaries. Equipment of protected areas personnel. Awareness raising.
Demand for coastal developments and tourism, including for private residences. Residential development close to the coastline.	Accelerated land privatisation in coastal locations. Beachfront development. Development in erosion, flood and other hazard prone areas. Demand for protection from coastal hazards.	Increase built up areas along the coast. Number of developments without sanitation facilities. Decreased natural and semi-natural areas. Coastal pine forest cuts. Landscape alteration. Coastal defence construction. Fences along the coastline.	Loss of coastal habitats (wetlands in particular). Pollution and waste from tourism facilities (including noise and light pollution). Limited coastal access and congestion. Impact of coastal defence structures on tourism. Increased flood exposure.	
Global demand for oil. Fluctuating oil prices. Increased investment opportunities for oil shipment and	Coastal natural, tourism and agricultural land take for oil facilities. Increased competition between oil facilities. Increased	Expected increase of built-up and industrial areas along the coast. Increased pollution levels including noise and light pollution.	Habitat loss. Agricultural land loss. Impact on tourism. Increased oil spill risk. Limited access to coast. Impact on bird migration.	EIA capacity (weak). National oil spill plan. Spatial plan (missing). Enforcement (weak).

Drivers	Pressures	State	Impact	Responses
processing.	interference with smooth oil export operations.		Lost opportunities for development options. Fishing exclusion zones.	
Pollution from untreated municipal sources in the watershed and along the coast, as well as from tourist facilities.	Pollution of bating waters. Declining beach amenities. Pollution of inland water bodies. Spread of deceases.	Elevated bacterial pollution of bating waters in summer. Inadequate and declining infrastructure.	Impact on tourists and visitors. Health hazard. Impact on terrestrial and marine environments and species.	Provision of beach toilet facilities (insufficient coverage).
Waste generated in the watersheds without control. Tourist and beach user waste.	Litter on the beaches. Hazardous litter (including medical waste) on the beaches.	Amount of litter on the beaches. Amount of hazardous litter (including medical waste) on the beaches.	Impact on tourists and visitors. Declining visual appearance of the coast. Severe health hazard. Impact on terrestrial and marine environments and species.	Priority beach cleanup (sporadic, seasonal). Provision of bins (isolated coverage).

3.2 Local participatory meeting

Public Meeting in Tskaltsminda Community, 2013.03.13

Figures 71: Meeting with local community in Tskaltsminda, Lanchkhuti Municipality, Guria Region

Background

Coastal Village Tskaltsminda, belonging to Grmagele Community, is located in Lanchkhuti Municipality, Guria Region of Georgia, on the southern/left bank of Supsa River where it discharges to the Black Sea. Average sea level is 2 m. The village infrastructure includes public school, one hotel, other tourism facilities developing, fishing. The beaches are quite valuable with magnetite containing grey sand. BP has built and opened in 1999 Supsa Oil Terminal and Offshore Loading Facility – end point of the Baku-Supsa western route oil pipeline with 4 reservoirs of 40,000 tones capacity each.

Initial considerations

In 2008 was completed implementation of the EuropeAid funded project EU funded project Environmental Collaboration for the Black Sea (see ECBSea, 2009), which supported ICZM pilot project, with objective of setting an example of spatial planning in support of the sustainable development of the local coastal community by maintaining natural environment and simultaneously enhancing economic potential of the community, contributing into improved incomes and living conditions for local people.

Location selected for such a pilot project was Tskaltsminda village in Lanchkhuti Municipality, for which the integrated plan for sustainable development was elaborated (ECBSea, 2009). The Plans was approved by the Sakrebulo (Council) of Lanchkhuti Municipality in May, 2008.

The objective of the public meeting with the local population was to jointly review the progress with the implementation of the plan, problems encountered and perspectives for future.

General Impressions

The meeting was held in the centre of Tskaltsminda, in local hotel "Prestige". Special credit should be given to strong participation of Tskaltsminda community representatives. They have fully realised the importance of the meeting, therefore were strongly engaged in the discussions and working process. This active participation pleasantly resulted in the accomplishment of all tasks set for the meeting.

Figures 72: Public meeting and discussions with Tskaltsminda community in Lanchkhuti, Guria.

Amiran Gigineishvili, Georgian CASE Coordinator for BSC PS, in the introduction has presented Pegaso project ideas to participants, explained the importance and basic principles of integrated coastal zone management, briefly presented ongoing activities under this international project, answered questions of participants.

Special importance was given to the value of active participation of Tskaltsminda population in success of the project activities in Georgian CASE. Participants appreciated the importance of public participation, which in this case means participation in local decision-making and active stewardship for the development of the village and the community and caring for its future.

Reviewing the progress with the implementation of Tskaltsminda Plan

As mentioned above, Sakrebulo of Lanchkhuti Municipality with its Ordinance No. 12, dated May 27, 2009 approved Integrated Plan for Sustainable Development of Tskaltsminda Coastal Community, prepared with support of the EU funded Environmental Collaboration for the Black Sea (ECBSea) Project. The facilitator of the public meeting, Amiran Gigineishvili reminded

participants the plan of action written in this document. He invited participants to express their opinions which actions were implemented and which are pending from this plan. It appeared that following planned actions were implemented:

- Provision of water supply in two districts of the village
- Cleaning of river/stream banks from waste
- Publication of information booklet about Tskaltsminda
- Construction of sports field
- Opening of alternative kindergarten

It was highlighted that many planned actions are outstanding, including:

- Provision of public access from community centre to the beach (the territory was expropriated by the investor for the purposes of Supsa Port construction).
- Part of internal roads rehabilitated but they again need repairs.
- Sewage system is still to be arranged in the village.

Working on new project ideas

Participants through Brainstorming Methodology elaborated on following project ideas:

- Rehabilitating internal roads in several districts of the village.
- Coastal protection works.
- Organizing full board kindergarten.
- Connection of the village to water supply and canalisation system of the nearby Ureki resort.
- Transfer of abandoned road traffic police building to local community to establish new youth centre.
- Construct mini-stadium next to the newly built police headquarters.
- Shifting from collective electricity meter system to individual metering system.
- Allocating public bus to school for transportation of children to classes.

Summary and next steps

Work in target groups was summarized by Amiran Gigineishvili. He thanked participants for productive work and explained what could be the next steps in the process. Participants expressed their satisfaction to further collaborate for the benefit of the development of their community. Amiran Gigineishvili promised that as a newly elected Chairperson he will bring these meters to the attention of Lanchkhuti Municipality Sakrebulo (Local Council), initiating the proper amendments to the action plan, to reflect community project ideas as the endorsed planned activities.

3.3 Stakeholders training workshop

Training workshop on coastal sustainability indicators, organized by FP7 Pegaso project was held in Grigoleti, Guria Coastal Region of Georgia, on 20 November 2013. Objective of the training workshop was to provide basic understanding of coastal indicators in the view of their application at the international level, as well as to apply coastal indicators for the Guria case as the basis for regional level reporting on the state of the coastal environment.

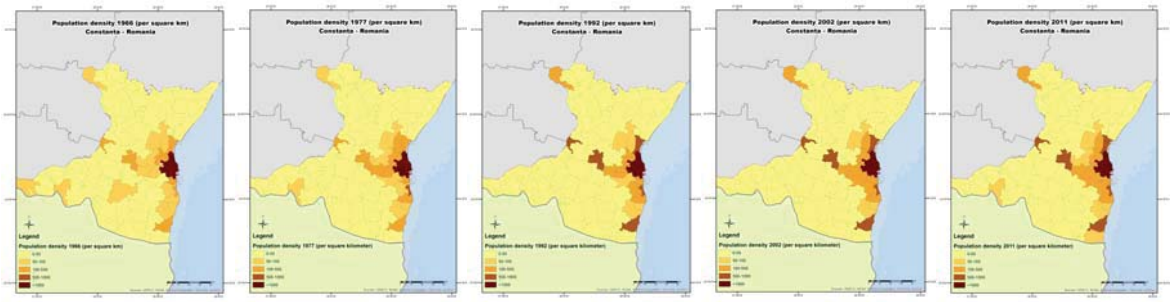
Main content of the training workshop was delivered by Pegaso representatives Dr Françoise Breton, Manager & Coordinator of FP7 Pegaso Project (Universitat Autònoma de Barcelona, UAB) and Nathalie De Hauwere of Pegaso project partner from Flanders Marine Institute (VLIZ). Dr Breton presented Pegaso project in details as well as elaborated on subjects such as Land cover and Cumulative Index Mapping of coastal and marine environments. Ms De Hauwere provided comprehensive introduction into coastal sustainability indicators on example of European DEDUCE and PEGASO and other coastal indicators, as well as conducted an interactive session illustrating the use of Spatial Data Infrastructure (SDI) in disseminating the coastal indicators.

Participants of the training workshop included those agencies and organizations (local, national), which can contribute into the coastal indicator data and information provision and compilation, represented by personnel from Georgian Statistics Office GeoStat and the spatial planning unit of the Ministry of Economy and Sustainable Development of Georgia. Regional/local level participants included public servants from Lanchkhuti and Ozurgeti Municipalities, represented by the Members of the Municipal Councils of these two coastal districts of Guria Region. Participants (25 in total) also included some representatives of the local public and environmental NGO.

Figures 73: Facilitators of the training content: Dr Breton and Ms De Hauwere (left). Stakeholders from Guria Region viewing Pegaso video presentations (right)

The meeting was moderated by Françoise Breton, supported with local facilitation function by the Chairman of the Municipal Council of Lanchkhuti Municipality Mr Amiran Gigineishvili. In addition to facilitation of the meeting agenda, Mr Gigineishvili, together with Dr Mamuka

Gvilava, BSC PS Task Manager for Pegaso and ICZM NFP for Georgia, presented the software instrument developed in support of the compilation of European progress marker indicators for integrated coastal zone management. Mamuka Gvilava also demonstrated presentations on behalf of Alina Spinu of NIMROD, Romania (see Figure 10 below) and Lisa Ernoul of Tour du Valat results of the indicator and LEAC work respectively, highlighting that similar datasets for Guria are highly desirable.

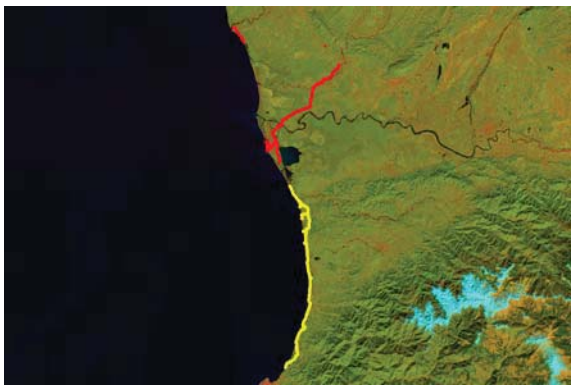


Figures 74: Population density time series at NUTS 5 / LAU2 level for Constanta, Romania

(source: A. Spinu, M. Golumbeanu, NIMRD "Grigore Antipa", Romania)

The training workshop benefited by detailed presentation of "Integrated Land-use Management Modelling of Black Sea Estuaries", performed by Mr Giorgi Meskhidze of NGO Civitas Georgica. He alerted participants that within ILMM-BSE project it might be feasible through research and data collection activities to compile in a comprehensive way all core sets of coastal sustainability indicators for Guria Region. This could be an excellent follow up of the Pegaso in Georgian CASE.

The technical and introductory presentations were followed by the open discussion session, with major contribution of regional and local level decision-makers and representatives of the public. Most interesting outcome of the meeting is that stakeholders agreed to support the formation of the joint regional coastal forum/council to further the policy discussion on good coastal governance in Guria Region. Georgian CASE can indeed capitalize on this agreement and provide its facilitation and support in organizing further more detailed actions at the regional and local levels.



Figures 75: Kolkheti wetlands & Greater Caucasus, photo by Nathalie De Hauwere (left) Reconnaissance of Georgian coast pre- and post-training workshop (right)

Training participants at the end of the workshop filled evaluation forms rating the training content and expressing opinions on various aspects of the training session. The meeting was filmed by local TV station team, planning to produce short video about the training and the pre- and post-workshop fact-finding visits along the Guria coast to observe negative and positive examples of coastal management.

3.4 Summary list of case activities

Figures 76: SDI capacity building training in Oostende, Belgium, 22-25 October 2012 (left) and two Municipal Council Chairmen from Guria at PEGASO annual meeting, 19-22 April, 2012, Rabat, Morocco

PEGASO capacity building, coordination and dissemination events

Participation in all PEGASO CASES meetings except final:
Project Meeting, Tulcea, Romania (2011.07.04-08);
CASES-2 Meeting, Venice, Italy (2012.07.02-03);
Visioning Workshop for the Black Sea; BSC-PS, Istanbul, Turkey (2012.12.05-07);
Project Meeting, Rabat, Morocco (2013.03.19-22).
ICZM AG Meeting 15, Istanbul, Turkey (2011.10.04)

Participatory Training (Oct 31-3 Nov, 2011), organized by UNIVE.

E-learning SDI training organized by WP3 in April-June 2012.

Training on SDI, 22-25 Oct 2012, UNESCO/IOC/IODE, Oostende, Belgium.

Participation of CASES Coordinator in MedOpen Basic and Advanced e-learning (2012).

enviroGRIDS Final Meeting and Black Sea Day 2012.10.31, Batumi, Georgia

ICZM AG Meeting 16, Istanbul, Turkey (2012.12.04)

ICZM AG Meeting 17, Istanbul, Turkey (2013.09.11)

Black Sea BS-GES Biannual Conference (2013.10.27-30)

EMECS/Medcoast Global Congress on ICM (2013.11.01-03)

Participatory process

Evaluation meeting to assess progress since the adoption of local community pilot ICZM plan (Tskaltsminda, Guria Region, 2013.03.13).

Organizing CASES training on PEGASO Indicators for National and Guria Region stakeholders and end users (Grigoleti, Guria Region, 2013.11.20-21).

Research publications

Preparation of 2 research papers, one abstract and one poster for 2 international conferences (BS Outlook 2011, Medcoast Global Congress 2013, BS-GES 2013).

In the course of the project Georgia CASES Coordinator, visible representative of the non-governmental sector, was elected as the Chairperson of Lanchkhuti Municipal Council. This development can enormously contribute into the dissemination and the application of Pegaso experience at local governance level.

Reports and outputs generated

Preparatory Report for Georgia CASES Participatory Training (submitted 2011.10.24).

Georgia CASES Report for Phase I Period 2 (submitted 2012.03.04).

Georgia CASES Report Phase II Period 2 (submitted 2012.05.07).

CASES-2 Meeting Working Group Report on BS ICZM Guidelines (submitted 2012.07.13).

CASES-2 Meeting Working Group Report on Pegaso and Protocol (submitted 2012.07.13).

Filled CASES Questionnaire for PEGASO Rabat General Meeting (submitted 2013.03.14).

Participatory Meeting in Tskaltsminda Community, 13.03.13 (report submitted 2013.03.16).

CASES Update for Pegaso Steering Committee, September, 2013 (submitted 2013.08.28).

Georgia CASES Training Workshop (Agenda Outline) for Pegaso Steering Committee, September, 2013 (submitted 2013.09.02).

Two papers submitted for Global Congress on ICM – Pegaso Session (see references).

Final CASE evaluation report (submitted 2014.01.30)

Planned follow-up actions

Posting more resources on PEGASO SDI Viewer, Catalogue and Atlas utilising enviroGRIDS SDI geoserver and geonetwork repositories.

Building prototype local level GeoNode for Lanchkhuti Municipality (http://lanchkhuti.org.ge).

Further application of selected and feasible coastal indicators for Guria Region.

Calibration of hydrological model for Guria case with in-situ daily discharge time series data.

Development of beach management initiatives to start addressing litter and erosion problems.

Establishment and organizing regular work of the Guria Region Coastal Council.

14. Sevastopol Bay (Ukraine)

Section 1. Coastal Issues:
1.2 Why did you select the identified coastal issues?

The Bay of Sevastopol (Fig. 1) is one of rare natural inland harbors at the coast of Crimea on the Black Sea that has being serving as a marine shelter and residence for sequencing human civilizations for over 25 centuries. This bay that is several hundred meters wide in its seaward part goes inland for about 8 km providing excellent conditions for ship docking, harboring, and other maritime activities. This is the very reason that Ancient Greek city Khersoness was found here in the 6th century B.C. and later Sevastopol as a Russian navy base was founded in 1783. This bay has been under very heavy anthropogenic/industrial pollution for several recent decades, though it is an area that is vitally valuable for recreation and inhabitation. This bay had also served as place for intensive fishing and harvesting other marine biological resources before the fleet related activities almost completely destroyed its ecosystem and minimized its biodiversity to a state of a polluted marine desert in its inner part. Biogeochemical conditions in the bay's environment have become so extreme that hypoxia is a regular feature of the inner part of the bay on summer time. Sediments have become sulfidic and serve as a source of hydrogen sulfide for the bottom layer of water and destroying benthic communities. To make matter worse, up to 40 µM of sulfide have been registered in the bottom layer of waters. Thus, the inner part of the Bay is a site, where regular hypoxic/anoxic events and consequences can be traced to study the effects of anthropogenic/industrial pollution and water exchange.

Fig. 1: The Bay of Sevastopol (images have been taken from http://gamelika.com/imaginator/1/4e5fa9dd2ed5a_sevastopol.jpg and http://www.sevtaksi.com/foto/0014-crimea-sevastopol-juzhnaja-buhta-foto.html).

Historically, this bay is the natural reason for the existence of Sevastopol, as a navy base and the city with all its maritime activities. Thus, the Bay has been intensively used since Sevastopol was founded in 1783, but the importance of specific maritime activities has been changing over a two-century period. Most important maritime activities were related to navy and seafood harvesting in the initial period. Recreational activities became important at the beginning of the

20th century, but they were almost completely wiped out on Soviet time, when the navy activities became of the primary and exclusive importance. Currently, navy activities are modest and the Sevastopol Bay is a place for a big and intensively growing seaport (the total length of place for ship docking and mooring in ~11 km), ship docking, sea-land transportation of various goods. The population of Sevastopol is about 400,000 permanent residents, but this population can easily double on summer time. Unfortunately, the major part of municipal and industrial sewage waters (~10,000 m3 per day) loaded to the bay from ~30 sewers without or after minimal treatment.

The outer part of the bay is still rather clean. This part is actually a paleo-river bed of the same river that currently releases its waters in the head of Bay. Intensive alongshore currents effectively mix and transport pollutants off the coastal sources and the bay. Hypoxic events, pollution and intensive eutrophication have never been reported for the water outer part of the Sevastopol Bay and the oxygen content is under influence of natural seasonal changes in T-S properties and biological activities. Still, reducing conditions have been recently reported for bottom sediments from this site that accumulates particulate organic carbon. This part can serve as a reference site with rather natural conditions in the water column and with potentially hypoxic conditions in the upper bottom sediments.

The Bay goes almost precisely latitudinally from East to West, but its southern coast is far more developed, as compared to its northern coast, and it comprises for a number of sub-bays. The seaward part of the Bay has been artificially blocked by two coastal dams. This has decrease the water exchange by 40-70% and doubled the residence time of the bay's waters.

The Black (Chernaya) river loads its waters to the most inner part of the bay. The river load is on average 56.8·106 m3 per year of fresh water, but 80% of this amount is loaded on winter and spring time.

The thermohaline structure of the bay's waters depends on the water exchange with the open sea and the water discharge regime of the Black river. It varies dramatically on the seasonal and synoptic scale, depending on cooling or heating and depending greatly on the wind stress.

There is patchy information that the circulation pattern is typical for a two-layer system on the warm period, when the vertical stratification is strong and supported by the load of fresh riverine waters and warmer surface waters. On average, the currents in the upper layer are directed seaward and support transportation of fresh riverine waters off the bay. There is an average transport of water from the sea to the bay in the bottom layer. Incoming waters of a higher salinity are mixed with the surface waters of a lower salinity to form the observed distributions of salinity. This mixing is restricted on summer time, but it is far more intensive on winter time, when cold surface waters sink and intensify mixing between the surface and bottom waters. As the result, the thermohaline structure reveals a strong vertical stratification on summer time, but a lateral stratification is typical on winter time.

In order to account for the Sevastopol bay environmental problems, the next PEGASO CASE priority issues have been identified:

- eutrophication and pollution, especially pollution from coastal sources;
- biological desertification and changes;

- climate change and extreme meteorological events.

There are several other threats. These are urban development, industrial development, recreational development, agricultural development, dramatic changes in land use, and coastal erosion. They are currently less important but they will grow in line with the coastal development. These coastal issues and problems are very usual for the Black Sea coast of Ukraine (Odessa, Chernomorskoe, Eupatoria, Yalta, Feodosia, Kerch, etc.) and, as far as it can be seen from the published data, this is true for the entire coast of the Black Sea.

1.3 What is the social, political and economical relevance of the identified coastal issues?

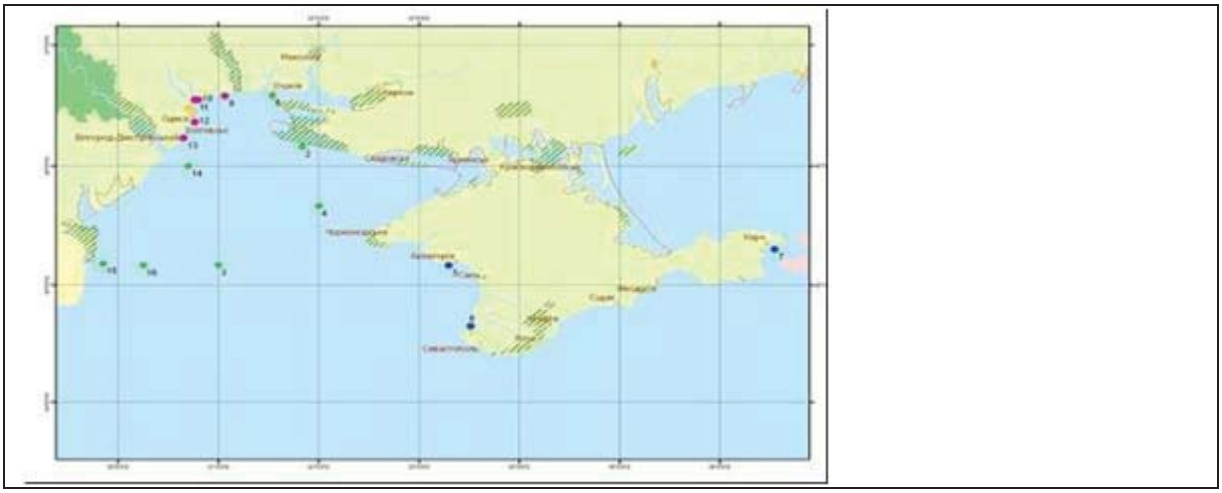
- (Please provide data that can confirm their relevance).
- Have you developed, selected or calculated indicators in order to depict the situation and the problems you planned to consider?

There are national regulations to address individual ICZM issues. There is an ICSM group at the Ministry of Ecology. Yet, an integrated on-going National ICZM Strategy does not exist, as well as there is no ICSM Protocol for the Black Sea.

National Institutions involved in national monitoring:

- UkrSCES - the Ukrainian Scientific Center of Ecology of the Sea, MoEP
- SABSI – State Ecological Inspection of Azov and Black Seas, MoEP
- SEINWRBS - State Ecological Inspection of Environmental Protection of the Black Sea's North-West region, MoEP

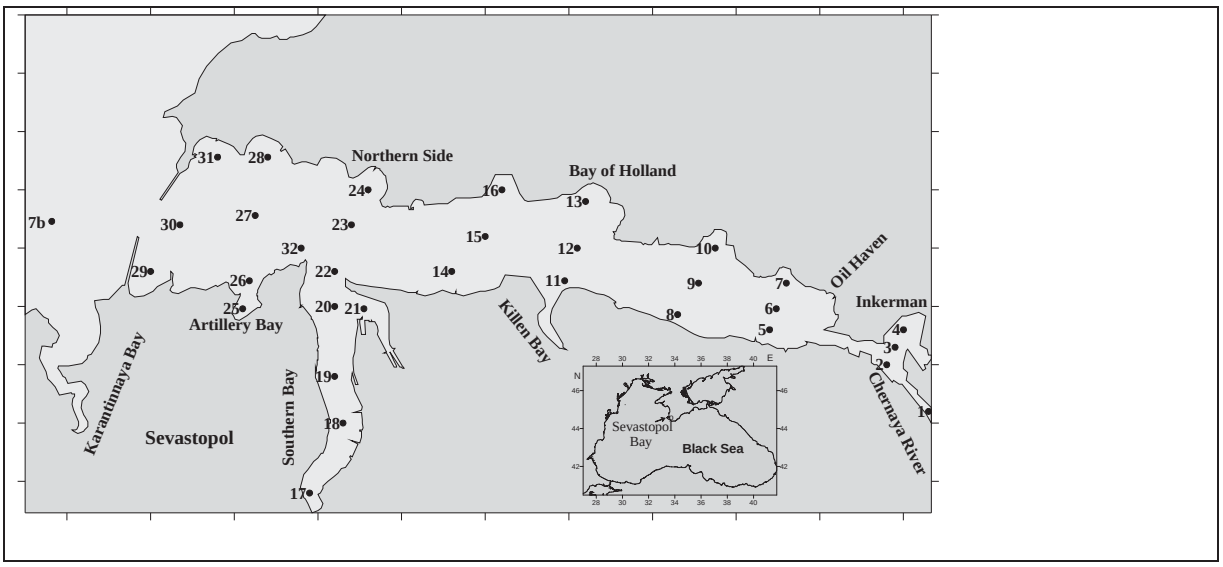
The Programme is annually supported and biological investigations are included. The biological monitoring is carried out by the Institute of Southern Seas – Odessa which is not organized in parallel with the hydrochemical investigations. Biological data concerning for the N-W part is reported, data from Crimea and other UA waters are not made available.



Map of sampling stations in Ukrainian Black Sea waters. Fishery - YugNIRO, Kerch, Crimea (Southern Scientific Research. Institute of Marine Fisheries and Oceanography).

The stations given on the map are not regularly supported during each year. For instance, the map for 2008 looks in a different way and only the stations of the Odessa Ecological Inspection (they cover the region of the city of Odessa, nearby hot spots situated) are sustained on an annual basis and reported. Other UA waters are not reported. This kind of data is compiled in the

Marine Branch of the Ukrainian Hydro-Meteorological Institute (MB UHMI) –Sevastopol.
Monitoring at defined stations network is carried out by the UA ecological inspections on a monthly basis (or as otherwise stated below) since 2003 and less frequently before that. A full set of hydrochemical parameters, including contaminants in water are monitored. Contaminants in biota and sediments are not included in the Programme.
In addition, MB UHMI – Sevastopol is in position to compile data from all ecological inspection stations in Ukraine – these stations (of SABSI and SEINWRBS) are annually reported in the Marine Water Pollution Annual Report of the State Oceanographic Institute (SOI) – Moscow. The stations monitored are in most affected by human activities areas (hot spots):
In front of the rivers Danube, Suhoi Liman (nearby Ilichevsk), river South Bug and Bugskii Liman, Odessa port, Yalta – monthly observations; Ilichevsk town – once per two months; In the branches of the Danube river – April-September; Dniepr Liman – April-November.
National monitoring activities in the Black Sea states are supported by Ministries of Environment. Other Ministries, such as Ministry of Education, Agriculture, Transport and Academies of Science support problem-oriented monitoring in the frames of different projects. Ministries of Agriculture are responsible for fisheries investigations (stock assessments, catches, fishing fleets, etc.) and Ministries of Transport support/supervise most of the investigations related to environment safety aspects of shipping.
The Bay of Sevastopol has become and remains the subject of regular oceanographic investigations and monitoring since 1997. It has been initiated by several international projects (INTAS 96-1961, INTAS 99-01390, INTAS 03-51-6196) and it is currently supported by national ("Marine Expeditions", "Fundamental Oceanography", "Ecoshelf", "Interaction" 05-05-10У) and international (EC FP7 "Hypox" #226213,) projects. Various issues of the Sevastopol Bay meteorology, hydrology, biogeochemistry, biology, and chemical pollution have been intensively studied. These data have been traditionally summarized in the form of oceanographic atlases (Konovalov et al., 2009). Though these atlases are a valuable source of scientific information, its form has always limited its utilization to scientific studies leaving stakeholders and managers with the problems of data accessibility and utilization of data of different nature for integrated coastal zone management.
The FP7 PEGASO project (2010-2014, #244170) has been recently launched to investigate different aspects of and local conditions for integrated coastal zone management (ICZM) and application of the ICZM Protocol in the Mediterranean and Black Seas. The Bay of Sevastopol has been chosen as one of the sites (CASES) for practical application of the results of the project, to assess local conditions and provide practically useful end-products for the purpose of ICZM implementation. Thus, when the ICZM Protocol is developed, adopted, and put in force, the local stakeholders will have practical tools to implement the ICZM principles.
Regular oceanographic studies and monitoring of environmental conditions of the Sevastopol Bay are typically carried out at 32 oceanographic stations at a quarterly basis.



Oceanographic stations in the Sevastopol Bay.

Results of monitoring have been contributed to data bases of the National oceanographic center of Ukraine (http://www.nodc.org.ua/) and presented in a number of publications and, in particular, in the form of "Atlas of the Sebastopol Bay oceanographic properties" (Konovalov et al., 2009). This has made possible a detailed oceanographic description of the Sevastopol Bay.

Several research institutions, including Marine Hydrophysical institute and Institute of Biology of the Southern Seas of the National academy of sciences of Ukraine, and controlling organizations carry out monitoring programs for the state of the marine environment of the Sevastopol Bay. The currently accounted data for utilization in the PEGASO project are limited to those in Table 1.

Table 1 Data for utilization in the PEGASO project.

Data description	Typology	Temporal series	Spatial resolution
Weather conditions	Meteorological	From 1997 to 2012	1 point per bay
River discharge	Hydrology	From 1997 to 2012	1 point per bay
Marine environment	Physical data	From 1997 to 2012	Up to 40 points per bay
Marine environment	Chemical data	From 1997 to 2012	Up to 40 points per bay
Marine environment	Biological data	From 1997 to 2012	Up to 5 points per bay

Results of monitoring have been contributed to data bases of the National oceanographic center of Ukraine (http://www.nodc.org.ua/) and presented in a number of publications and, in particular, in the form of "Atlas of the Sebastopol Bay oceanographic properties" (Konovalov et al., 2009). This has made possible a detailed oceanographic description of the Sevastopol Bay (Konovalov et al., 2011) and utilization of these data as a metrics for marine provinces identification in the Sevastopol Bay (Dolotov et al., 2012).

Section 2. Relations between coastal issues and ICZM Protocol and Principles.

2.1 How do the selected coastal issues relate to the ICZM principles and protocol?

The following objectives of "Protocol on Integrated Coastal Zone Management in the Mediterranean" (UNEP/MAP/PAP, 2008) listed in Article 5 have been found relevant for work in

the Sevastopol Bay CASE:

(a) facilitate, through the rational planning of activities, the sustainable development of coastal zones by ensuring that the environment and landscapes are taken into account in harmony with economic, social and cultural development;

(c) ensure the sustainable use of natural resources, particularly with regard to water use;

(e) prevent and/or reduce the effects of natural hazards and in particular of climate change, which can be induced by natural or human activities.

The following general principles of "Protocol on Integrated Coastal Zone Management in the Mediterranean" (UNEP/MAP/PAP, 2008) listed in Article 6 have been found relevant for work in the Sevastopol Bay CASE:

(a) The biological wealth and the natural dynamics and functioning of the intertidal area and the complementary and interdependent nature of the marine part and the land part forming a single entity shall be taken particularly into account.

(b) All elements relating to hydrological, geomorphological, climatic, ecological, socio-economic and cultural systems shall be taken into account in an integrated manner, so as not to exceed the carrying capacity of the coastal zone and to prevent the negative effects of natural disasters and of development.

(c) The ecosystems approach to coastal planning and management shall be applied so as to ensure the sustainable development of coastal zones.

(d) Appropriate governance allowing adequate and timely participation in a transparent decision-making process by local populations and stakeholders in civil society concerned with coastal zones shall be ensured.

(e) Cross-sectorally organized institutional coordination of the various administrative services and regional and local authorities competent in coastal zones shall be required.

(i) Preliminary assessments shall be made of the risks associated with the various human activities and infrastructure so as to prevent and reduce their negative impact on coastal zones.

(j) Damage to the coastal environment shall be prevented and, where it occurs, appropriate restoration shall be effected.

The ICZM protocol has not been implemented at the national, regional, or local level, but there are different agencies and official guidelines and instructions.

The following OBJECTIVES OF INTEGRATED COASTAL ZONE MANAGEMENT (listed in Article 5) have been found relevant for work in the Sevastopol Bay CASE:

(a) facilitate, through the rational planning of activities, the sustainable development of coastal zones by ensuring that the environment and landscapes are taken into account in harmony with economic, social and cultural development;

(c) ensure the sustainable use of natural resources, particularly with regard to water use;

(e) prevent and/or reduce the effects of natural hazards and in particular of climate change, which can be induced by natural or human activities.

The following GENERAL PRINCIPLES OF INTEGRATED COASTAL ZONE MANAGEMENT (listed in Article 6) have been found relevant for work in the Sevastopol Bay CASE:

(a) The biological wealth and the natural dynamics and functioning of the intertidal area and the complementary and interdependent nature of the marine part and the land part forming a single entity shall be taken particularly into account.

(b) All elements relating to hydrological, geomorphological, climatic, ecological, socio-economic and cultural systems shall be taken into account in an integrated manner, so as not to exceed the carrying capacity of the coastal zone and to prevent the negative effects of natural disasters and of development.

(c) The ecosystems approach to coastal planning and management shall be applied so as to ensure the sustainable development of coastal zones.

(d) Appropriate governance allowing adequate and timely participation in a transparent decision-making process by local populations and stakeholders in civil society concerned with coastal zones shall be ensured.

(e) Cross-sectorally organized institutional coordination of the various administrative services and regional and local authorities competent in coastal zones shall be required.

(i) Preliminary assessments shall be made of the risks associated with the various human activities and infrastructure so as to prevent and reduce their negative impact on coastal zones.

(j) Damage to the coastal environment shall be prevented and, where it occurs, appropriate restoration shall be effected.

The following articles from the ICZM Protocol have been found relevant for work in the Sevastopol Bay CASE:
Article 8. PROTECTION AND SUSTAINABLE USE OF THE COASTAL ZONE
Article 9. ECONOMIC ACTIVITIES
Article 10. SPECIFIC COASTAL ECOSYSTEMS
Article 15. AWARENESS-RAISING, TRAINING, EDUCATION AND RESEARCH

Where it comes to INSTRUMENTS FOR INTEGRATED COASTAL ZONE MANAGEMENT, the following articles have been found relevant for work in the Sevastopol Bay CASE:
Article 16. MONITORING AND OBSERVATION MECHANISMS AND NETWORKS
Article 19. ENVIRONMENTAL ASSESSMENT

Where it comes to RISKS AFFECTING THE COASTAL ZONE, the following articles have been found relevant for work in the Sevastopol Bay CASE:
Article 22. NATURAL HAZARDS
Article 24. RESPONSE TO NATURAL DISASTERS

Where it comes to INTERNATIONAL COOPERATION, the following articles have been found relevant for work in the Sevastopol Bay CASE:
Article 25. TRAINING AND RESEARCH
Article 26. SCIENTIFIC AND TECHNICAL ASSISTANCE
Article 27. EXCHANGE OF INFORMATION AND ACTIVITIES OF COMMON INTEREST

Section 3. Policy issues and ICZM principles and approaches.

3.1 So far, how have been the coastal issues addressed by the local/regional government?

The Sevastopol City Authorities declare the importance of ICZM for Sevastopol city, thus for the Sevastopol Bay, yet the current state of the bay's environment and inter-annual trends of the bay's environmental properties expose serious concerns about effective ISZM.

3.2 At which spatial scale?

Local.

3.3 Can you assess the results of the implemented policies? Which are the main results achieved?

There are national regulations to address individual ICZM issues. There is an ICSM group at the Ministry of Ecology of Ukraine. The ICZM activities in the Black Sea region date back to 1992, when the Convention on the Protection of the Black Sea Against Pollution (Bucharest Convention) was signed (Antonidze, 2010). Yet, an integrated on-going National ICZM Strategy does not exist, as well as there is no ICSM Protocol for the Black Sea. All ICZM issues are addressed within the frame of national and regional regulations, yet all these issues are poorly addressed considering the state of the Black Sea and its coastal areas ('Diagnostic Report' to guide improvements to the regular reporting process on the state of the Black Sea environment, 2010).

Where it comes to the regional scale, some progress has been achieved and the Black Sea ecological crisis has been "softened".

Where it comes to the local scale, th problems of industrial pollution have been changed for the very serious problems of domestic pollution.

3.4. On the basis of the ICZM principles (as they are expressed by the Protocol), do you think that the coastal issues were addressed with an integrated approach (in terms of organization, politics, tools, etc)?

There are national regulations to address individual ICZM issues. There is an ICSM group at the Ministry of Ecology. Yet, an integrated on-going National ICZM Strategy does not exist, as well as there is no ICSM Protocol for the Black Sea. All ICZM issues are addressed within the frame of national and regional regulations, yet all these issues are poorly addressed considering the state of the Black Sea and its coastal areas (the Diagnostic Report of the Black Sea Commission, 2011).

The Sevastopol City Authorities declare the importance of ICZM for Sevastopol city, thus for the Sevastopol Bay, yet the current state of the bay's environment and inter-annual trends of the bay's environmental properties expose serious concerns about effective ISZM.

It has been stated in Strategic Action Plan for the Rehabilitation and Protection of the Black Sea:

1. The Black Sea ecosystem continues to be threatened by **inputs of certain pollutants, notably nutrients**. Nutrients enter the Black Sea from land based sources, and in

particular through rivers. The Danube river accounts for well over half of the nutrient input to the Black Sea. **Eutrophication** is a phenomenon which occurs over wide areas of the Black Sea and should be of concern to the countries of the Black Sea basin.

2. **Inputs of insufficiently treated sewage** result in the presence of microbiological contaminants, which constitute a **threat to public health** and in some cases pose a **barrier to the development of sustainable tourism and aquaculture**.
3. In addition, **inputs of other harmful substances**, and **especially oil**, continue to **threaten the Black Sea ecosystem**. Oil enters the environment as a result of accidental and operational discharges from vessels, as well as through land based sources. Almost half of the inputs of oil from land based activities are brought to the Black Sea via the Danube river.
4. Moreover, the past **introduction of exotic species**, through the deballasting of vessels, has **seriously damaged the Black Sea ecosystem** and constitutes a threat to the adjacent Mediterranean and Caspian Seas.
5. **Inadequate resources management** and, in particular, inadequate policies with respect to fisheries and coastal zone management continue to **impede the sustainable development** of the Black Sea region. Most fish stocks in the Black Sea, already stressed as a consequence of pollution, have been over exploited or are threatened by over exploitation; many coastal areas have deteriorated as a result of erosion and uncontrolled urban and industrial development, including the resultant construction activities. Consequently, there is a **serious risk of losing valuable habitats and landscape and ultimately, the biological diversity and productivity of the Black Sea ecosystem.**
6. The above considerations led to suggestions that the process of degradation of the Black Sea is irreversible. However, environmental monitoring, conducted over the past 4-5 years, reflects perceptible and continued improvements in the state of, some localised components of the Black Sea ecosystem. These improvements appear to be the indirect result of reduced economic activity in the region, and to a certain degree of protective measures taken by governments. **The challenge which the region now faces is to secure a healthy Black Sea environment at a time when economic recovery and further development are also being pursued.**

"In 1993 for the implementation of the ICZM component of the Black Sea Environmental Program an Activity Center on Development of Common Methodologies for ICZM (ICZM Activity Center) was established in Krasnodar (Russian Federation) by order of the Minister of Natural Resources of the Russian Federation and with the support of Black Sea Environmental Program (BSEP, 1993–1997, GEF/UNDP). Experts of the Center with support of international consultants initiated the introduction of ICZM principles in the Black Sea region. Relevant activities were carried out within several international projects, such as BSEP (1993–1999), EU TACIS–PHARE/EuropeAid (in three phases, 1995, 1998–2000 and 2002–2004), Black Sea Ecosystem Recovery Project (BSERP, 2002–2007, GEF/UNDP).

During phase I of BSEP (1993-1997) three ICZM Workshops were held with participation of representatives of all Black Sea countries and the Black Sea ICZM network was created. There was

a constant exchange of experience, for capacity building specialists were trained (World Bank training on ICZM, Sustainable Development and Sustainable Tourism, Bulgaria, Varna, 1995).

The main achievements of BSEP Phase I were:
– ICZM Activity Center was established with trained staff, a number of consultants were involved in the activity of the Center, equipment was supplied;
– ICZM concept, methodology and tools were presented and distributed at governmental and local levels; authorities and experts were involved in ICZM implementation;
– Guidelines for defining of National Coastal Zone Boundaries were approved, National Boundaries of coastal zones were defined in all 6 countries;
– National ICZM Reports were prepared; the actual situation, problems, priorities in ICZM development were presented;
Based on ICZM National Reports the ICZM Activity Center prepared Report on ICZM in the Black Sea Region." (Antonidze E. J. Coast. Conserv., 2009)

Section 4. Relevance with National ICZM process

4.1 Do you think that your work is relevant for the ICZM process of your country? Why and how?
Scientific support, which is one of the components of ICZM (UNEP/MAP/PAP, 2008), assumes participation of various specialists and utilization of various data depending on a specific task. The major disadvantage of traditional sources of data, which are atlases and data base, is the need to address various specialists, different sources of information, and usually paper-printed materials. Geographic Information Systems (GIS) are more helpful. This is the reason that we have designed the system incorporating the data base, digital atlas and GIS features, but also allowing interaction with data and application of different ICZM tools.
A standalone version of the GIS-type system for the Sevastopol Bay is available at http://wiki.iczm.org.ua/en/index.php/Download_the_latest_version_of_the_atlas. It starts with information on data available for specific chemical, physical, ecological parameters and pollutants for individual months and years. The system incorporates general information for the Sevastopol Bay, including meteorological, physical, biogeochemical, and ecological properties, and supplementary materials, but it also incorporates an extensive set of documents and scientific publications. Yet, the most valuable part of this atlas in the set of preprocessed maps that can be displayed and compared or printed for further analysis.

4.2 On the basis of the work that you have done, which are in your opinion, the main constraints in implementing ICZM principles and tools? What is missing? Where are the main gaps? Where we should put more energy and resources in the future?
The main gap is in the absence of the ICZM Protocol for the Black Sea. Another problem is in the existing mechanisms that divide, rather than consolidate and cooperate, legal authorities, stakeholders, and scientists.

Section 5. Stakeholders involvement

5.1 Have you involved the main stakeholders?

At the first stage, we have made an extensive set of potential stakeholders/end-users:

Name	Link
National authority	
Verkhovna Rada (Parliament) of Ukraine, Committee on environmental policy, nature management and breakdown elimination of Chernobyl	http://w1.c1.rada.gov.ua/pls/site/p_komity?pidid=2074
Ministry of Ecology and Natural Recourses of Ukraine	http://menr.gov.ua/
Ministry of Economical Development and Trading of Ukraine	http://me.gov.ua/
Ministry of Agricultural Policy and Food of Ukraine	http://www.minagro.kiev.ua/
Ministry of Emergency Situations of Ukraine	http://mns.gov.ua/
Ministry of Public Health of Ukraine	http://www.moz.gov.ua/ua/portal/
Ministry of Culture and Tourism of Ukraine	http://mincult.kmu.gov.ua/mincult/uk/index
Ministry of regional development, construction and housing and communal services of Ukraine	http://www.minregionbud.gov.ua/uk/index
Ministry of education, science, youth and sport of Ukraine	http://www.mon.gov.ua/
National Agency for Ecological Investments	http://neia.gov.ua/nature/control/uk/index
Regional authority	
Representative office of the President of Ukraine in the Autonomous Republic of Crime	http://www.ppu.gov.ua/
Crimean Regional Center Of Innovative Development	http://www.krcir.org.ua/
Ministry of Agricultural Policy of Crimea	http://www.minagro.crimea-portal.gov.ua/rus/index.php?v=1
Ministry of Public Health of Crimea	http://www.minzdrav.crimea-portal.gov.ua
Ministry of Health Resorts and Tourism of Crimea	www.tourism.crimea.ua
Ministry of Abdication and Science of Crimea	http://minobr.crimea-portal.gov.ua
Ministry of Industrial Policy of Crimea	http://www.minindustry.crimea-portal.gov.ua
Ministry of Economy of Crimes	www.minek.crimea-portal.gov.ua
Republic Committee of Crimea on Hydro economic construction and Irrigated Cropping	www.vodhoz.crimea.ua
Republic Committee of Crimea on Forestry and Hunting	www.comleshos.crimea-portal.gov.ua
Republic Committee of Crimea on Land Resources	http://comzem.crimea-portal.gov.ua/
Republic Committee of Crimea on Cultural Heritage Protection	http://www.commonuments.crimea-portal.gov.ua
Republic Committee of Crimea on environmental protection	www.arhus.crimea.ua
Local authorities	
Sevastopol City State Administration , Sevastopol City Deputy Council	http://sev.gov.ua/
Permanent Commission on Land Management	http://sev.gov.ua/economy/zemleystroistvo/norm_akti_zemleystr/
Fund of Municipal Assets of Sevastopol City Administration	http://fki.com.ua/
Nakhimov District City Administration (DCA)	http://sev.gov.ua/district/nahim/strukrukN/
Leninska DCA	http://sev.gov.ua/district/lenin/strukrukL/
Gagarinska DCA	http://sev.gov.ua/district/gagarin/
Balakhlavska DCA	http://sev.gov.ua/district/balaklava/
State Agency on Environmental Protection in Sevastopol	http://menr.gov.ua/content/article/41

NGO	
Ukrainian society for the protection of birds (USPB) / BirdsLife Partner in Ukraine	http://www.birdlife.org.ua/index.htm
Mama-86	www.mama-86.org.ua
All-Ukrainian Ecological League	www.ecoleague.net
National Ecological Center of Ukraine (NECU, partner of Bankwatch international)	www.necu.org.ua/
Greenpeace Ukraine	www.greenpeace.org
WWF Ukraine	http://wwf.panda.org/who_we_are/wwf_offices/ukraine/
Center on Research City's Problems	http://www.municipalcentre.org
International NGO "Black Sea Commission on Sea Mammals"	http://www.dolphin.com.ua/index.php?page=4smm_links
Regional NGO	
Association of the farmers of Crimea	http://www.afzk.org/index.php?option=com_content&view=article&id=21&Itemid=6
Society of Geoecologists	www.ccssu.crimea.ua/internet/Education/geoecology
Zelenyi Svit / Friends of the Earth Ukraine	http://www.zelenysvit.org.ua/
Crimean Republican Association EKOLOGIYA i MIR	http://www.ekomir.crimea.ua/
Chamber of Commerce and Industry of Crimea	http://cci.crimea.ua/
Creative union of scientific and engineering societies of Crimea	http://old.crimea-portal.gov.ua/index.php?&v=10&tek=169&par=105&f=ua
Local NGO	
Sevastopol Chamber of Commerce and Industry	http://www.stpp.org.ua/
Scientific and education organizations	
Marine Hydro physical Institute NAS of Ukraine	www.mhi.iuf.net
IBSS NAS of Ukraine	www.ibss.org.ua
Sevastopol National Technical University	http://sevntu.com.ua/
Sevastopol National University of Nuclear Energy and Industry	http://www.sinp.com.ua/
Research Institute of City Economy and Development	http://sevastopol.osp-ua.info/ch-1_fl-cii.html
Companies	
Public enterprises Sevgorvodokanal	http://sevgorvodokanal.org.ua/
State sanitary-and-epidemiologic institution of Sevastopol	http://sevses.gov.ua/
Chornomor-tur Co Ltd	http://www.chernomor.com/
Sea Depth Co Ltd	
Diving Company Crimea-Marine-Service	http://www.cmsdive.com.ua/
Sevastopol Marine Fishing Port	http://www.sevmrp.com/ru/index.htm
Sevastopol Marine Commercial Port	http://www.morport.sebastopol.ua/
National Preserve Tauric Chersonesos	http://www.chersonesos.org/
Sevastopol Shipyard of Black Sea Navy	http://who-is-who.com.ua/bookmaket/sevast/4/69.html
Shipyard "South Sevastopol"	http://yusev.com.ua/ru/main/
Sevastopol Fish Cannery	http://www.rada.com.ua/ukr/catalog/8421/

Several organizations and institutions have been identified as stakeholders/end-users to present and utilize results of the project: National focal point of ICZM in Ukraine, Ministry for environmental protection and natural resources, Public Administration on Ecology and Environmental Resources in Sevastopol, Black Sea Commission, Sevastopol's authorities, Stevedore Enterprise (private enterprise), and Sevastopol's department of the Geographic society of Ukraine.

To provide information about ICZM tools (firsts of all, on local indicators); to improve the knowledge of the coastal zone; to provide tools for scientific support of ICZM a web-portal (http://wiki.iczm.org.ua/en/index.php/Main_Page), a WMS server (as the first example, http://193.42.157.77/ru/index.php?r=atlas/wms/view&id=19), and a standalone CD version of a GIS-type tool for the Sevastopol Bay (http://wiki.iczm.org.ua/en/index.php/Download_the_latest_version_of_the_atlas) has been updated from their initial version to further improve data coverage and provided tools (legal arrangements, environmental status and assessment, interactive digital atlas, indexes, scenarios). This system has made possible to effectively interact with stakeholders (National focal point of ICZM in Ukraine, Ministry for environmental protection and natural resources, Public Administration on Ecology and Environmental Resources in Sevastopol, Black Sea Commission, Sevastopol's department of the Geographic society of Ukraine, etc.) both demonstrating the importance of ICZM principles and possibilities of ICZM. Regular discussions of all project-related issues with stakeholders, presentation of current results of the PEGASO project, assessment of their responses have become elements of a joint platform. As the results a number of letters of endorsement have been issues by stakeholders of different level and nature: Permanent commission on environmental protection and safety, and emergencies of the Sevastopol city council; "SGS PLUS" Ltd., Sevastopol; Levant Inc., Crimea; Yalta city council, department of ecology, etc. This has also made possible to disseminate the results of this work through local newspapers and television, as well as via translated issues of the PEGASO newsletters (http://wiki.iczm.org.ua/en/index.php/Dissemination).

5.2 How have you involved them (e.g. focus group, interviews, questionnaire)?

Target Audience *(whom do you need to communicate with ?)*	**Objective** *(why communicate, what is the aim ?)*	**Communication tool** e.g. report, seminar, meeting etc	Date/ Frequency *(when ?)*
Sevastopol's department, Ministry of Environment (MoE)	Discussion of the PEGASO project interaction with official bodies at the local level, data collection, results distribution.	Phone calls, meeting	Quarterly
National ICZM focal point at the Ministry of Environment (MoE)	Discussion of the PEGASO project interaction with official bodies at the national level.	Phone calls	Annually
Local branch of the Geographic Society of Ukraine	Identification of ICZM issues, distribution of the results.	Meeting	Quarterly
Ecological commission of the local (city) government	Discussion of the PEGASO project interaction with official bodies at the local level.	Phone calls	Annually
Black Sea Commission, ICZM Advisory Group	Discussion of the PEGASO project interaction with official bodies at the regional level.	Email, meeting	Several times per year

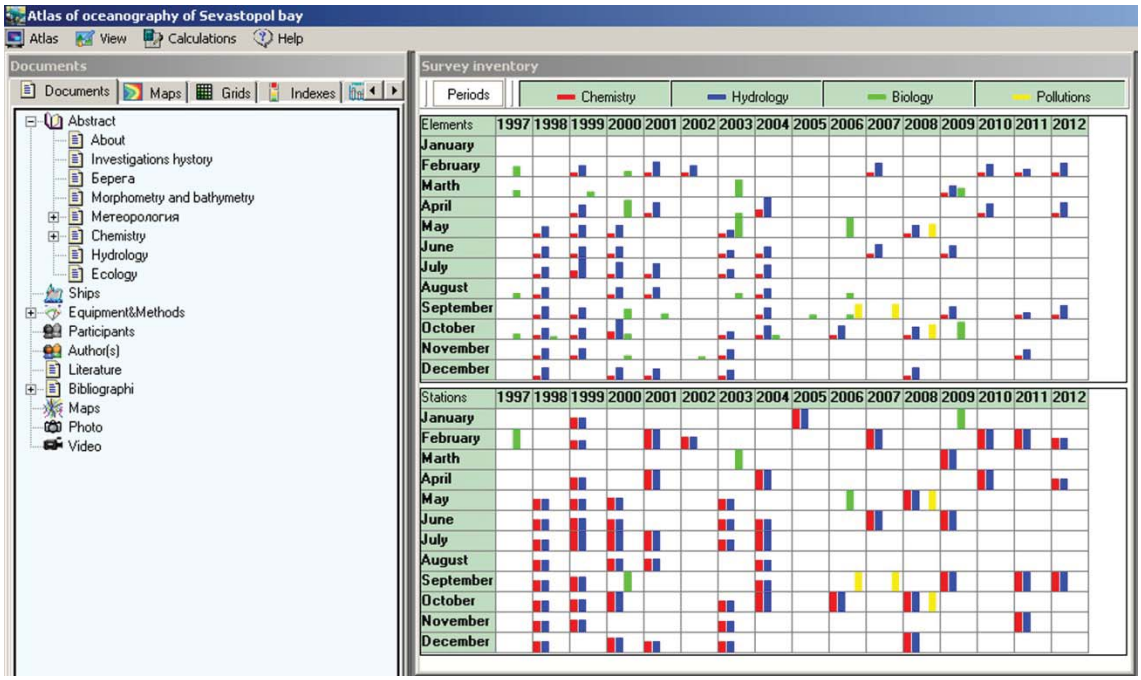
5.3 Which kind of constraints have you faced?

The absence of the Black Sea ICZM Protocol as the basis for legal and required cooperation in ICZM issues.

Section 6. Tools

6.1 Which tools (indicators, LEAC, scenario, participation, economic assessment and social valuation or others) have you used during the activities of the CASES?

There are several tools developed within the frame of the PEGASO project and incorporated in the GIS-type system for the Sevastopol Bay (Fig. 2). The major of these tools are GIS and indexes. The GIS tool is basically an extended set of regular numerical grids for all considered properties (Fig. 3) that can be arranged as needed (scale of maps, color scheme, isolines and their format) and combined with other layers of information (municipal and industrial buildings, sources of pollutants and their properties, etc.). Though this tool is far more powerful for environmental assessment, it still provides basically scientific information, but it serves as a basis for calculation of indexes.



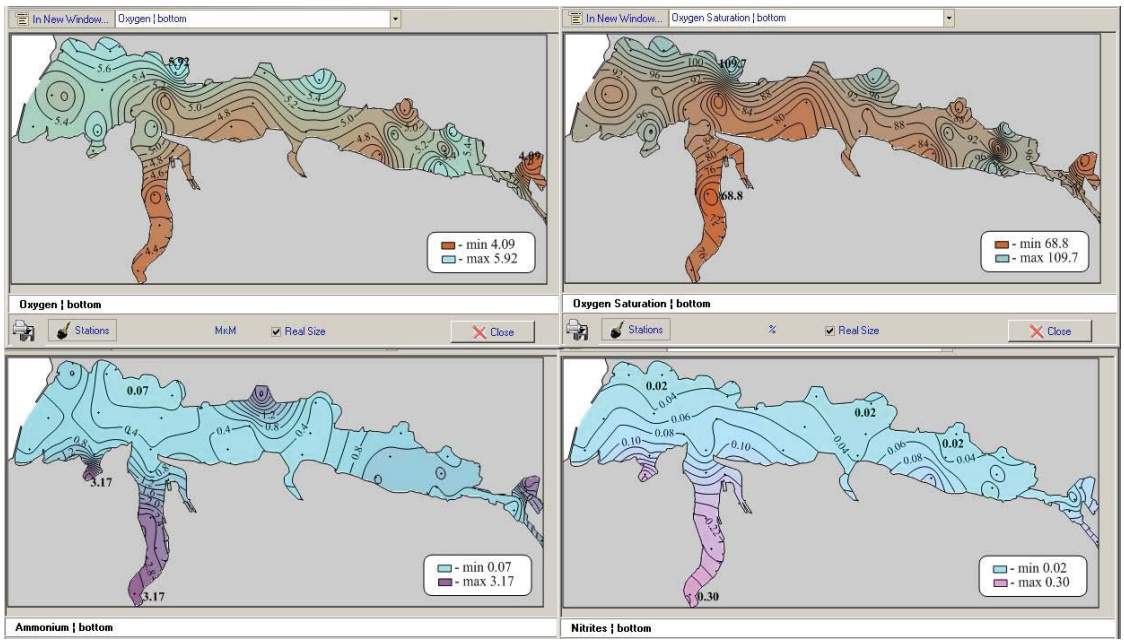


Fig. 2: The data base and digital atlas of the Sevastopol Bay.

While interaction with gridded data makes possible to construct different maps, which have not been preloaded, indexes make possible to evaluate the state of environment (Marti-Rague, 2007) and achieve an integrated regional assessment and ICZM (Antonidze, 2010). Thus, for example, a "traffic light" index has been constructed and introduced into the system. This index is universal and can be applied to any analyzed properties. As an example, this index has been applied to assess average summer concentrations of ammonium in the surface layer of water (Fig. 4). The five-grade color scale is color and boundary value adjustable either following the expert values or making a personal choice. We have used 1-, 3-, 5-, and 10-fold the maximum allowed concentrations for coastal waters used for common purposes. The result clearly demonstrates that only the central part of the bay can be considered as "clean", but the most inner part of the bay and that one under heavy municipal and maritime pressures are highly polluted.

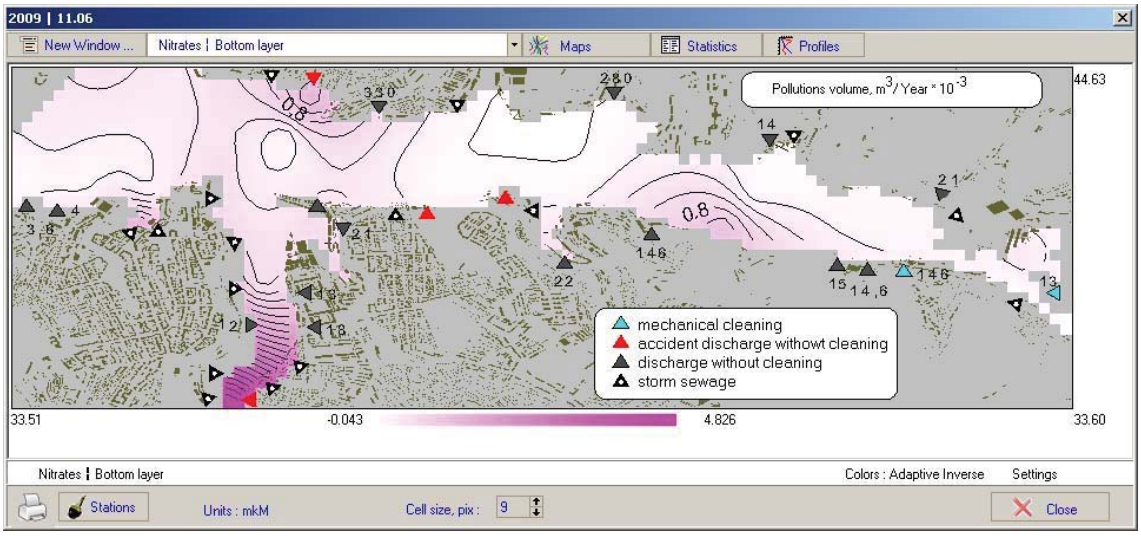


Fig. 3: The GIS-type tool for the Sevastopol Bay.

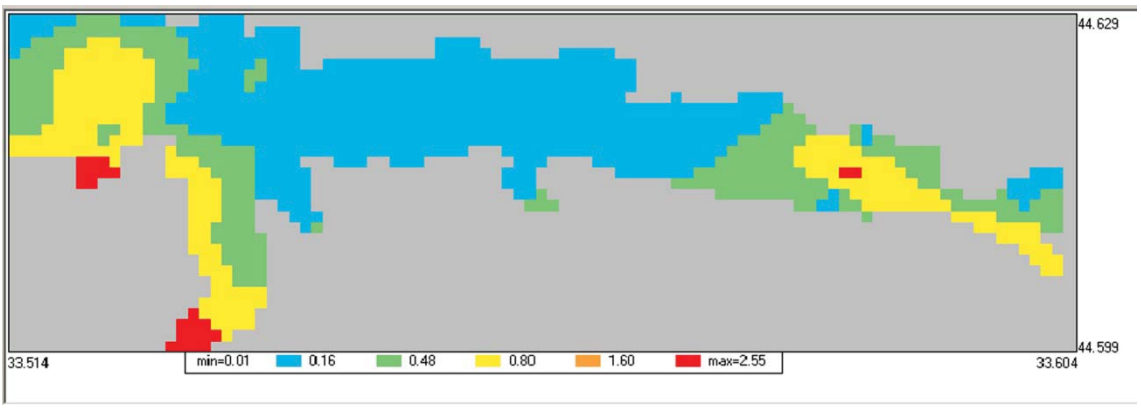


Fig. 4: The 5-grade "traffic light" index for the average summer concentration of ammonium in the Sevastopol Bay waters.

Yet, the most valuable part of the current version of the system incorporates a number of indexes chosen within the PEGASO project for environmental assessment (http://www.coastalwiki.org/w/images/b/b6/PEGASO_T4.1_Indicator_methodological_paper_V1.pdf). All indexes have been divided in 8 groups in line with the considered policies:

1. Preserve the wealth of natural capital in coastal zone
    1. Distributional pattern of certain marine and coastal habitats under the SPA Protocol
    2. State of the main species stocks by sea area
    3. Effective management of protected areas: share of coastal and marine habitats and

species listed under international agreements (SPA protocol) that are in good

2. To ensure appropriate governance allowing adequate and timely participation in a transparent decision-making process of all relevant social actors
3. To ensure cross-sectorial coordination among competent authorities
4. To formulate land-use strategies, plans, and programmes covering all coastal and marine uses
    1. A governance system and legal instrument in support of Marine Spatial Planning is in place
    2. There are spatial development plans which include the coastal zone but do not treat it as a distinct and separate entity
5. To give priority to public services and activities requiring the proximity to the sea, and to take into account the specific characteristics of the coastal zones when deciding about coastal uses
    1. Economic production per sector (turnover)
    2. Employment structure
    3. Percentage of economic activities area in the coastal area
    4. Value added per sector
6. To have a balanced use of coastal zone, and avoid urban sprawl
    1. Land use flows: The area of new developments and its share on previously developed and undeveloped land in the coastal zone
    2. Area of built-up space in the coastal zone (both the emerged and submerged area of the coastal zone)
    3. Water efficiency index (special reference to article 9.1c)
    4. Changes in size, density, and proportion of the population living on the coast
7. To perform Environmental Impact Assessment for human activities and infrastructures
    1. Bathing water quality
    2. Hydrochemical quality
    3. Concentration of nutrients
    4. Number of hypoxia events or extent of hypoxic areas
    5. Eutrophication index
    6. Water column stratification
    7. Pollution by hazardous substances in biota, sediment and water columns (PLI)
    8. Trends in the amount of litter washed ashore and/or deposited on coast
8. To prevent damage to coastal environment, and appropriate restoration if damage already occurred
    1. Areal extent of coastal erosion and coastal instability
    2. Areal extent of sandy areas subject to physical disturbance (beach cleaning by mechanical means, sand mining and beach sand nourishment)
    3. Risk assessment: economic assets at risk of storm surges and coastal flooding (considering sea level rise scenario's and return periods of storm surges)

4. Risk assessment: biological diversity (habitats/species) at risk of storm surges and coastal flooding (considering sea level rise scenario's and return periods of storm surges)

5. Risk assessment: Population living in the at risk area of storm surges and coastal flooding (considering sea level rise scenario's and return periods of storm surges)
6. Productive and protected areas lost due to siltation, saltwater intrusion
7. Sea surface temperature
8. Sea level rise

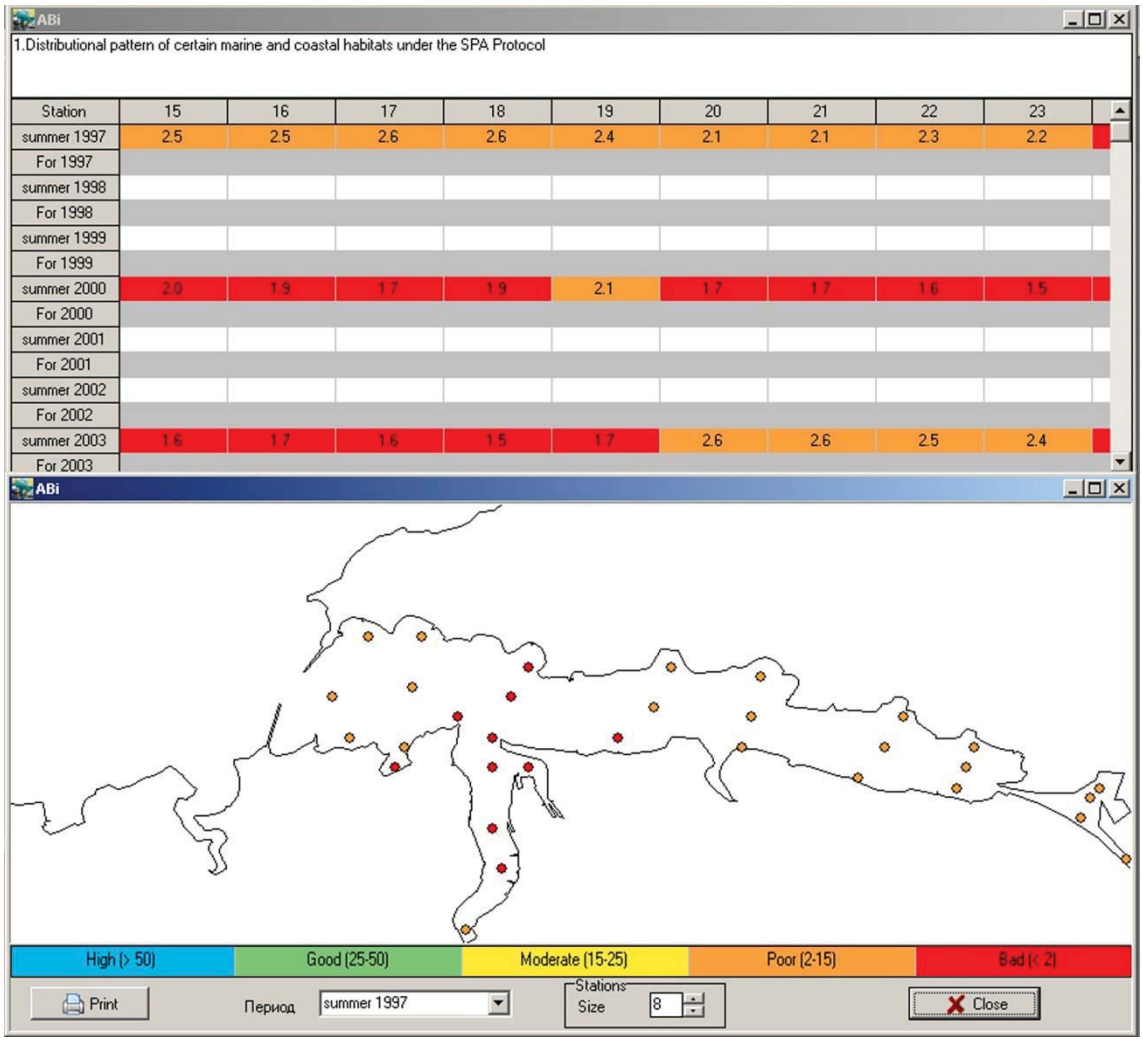
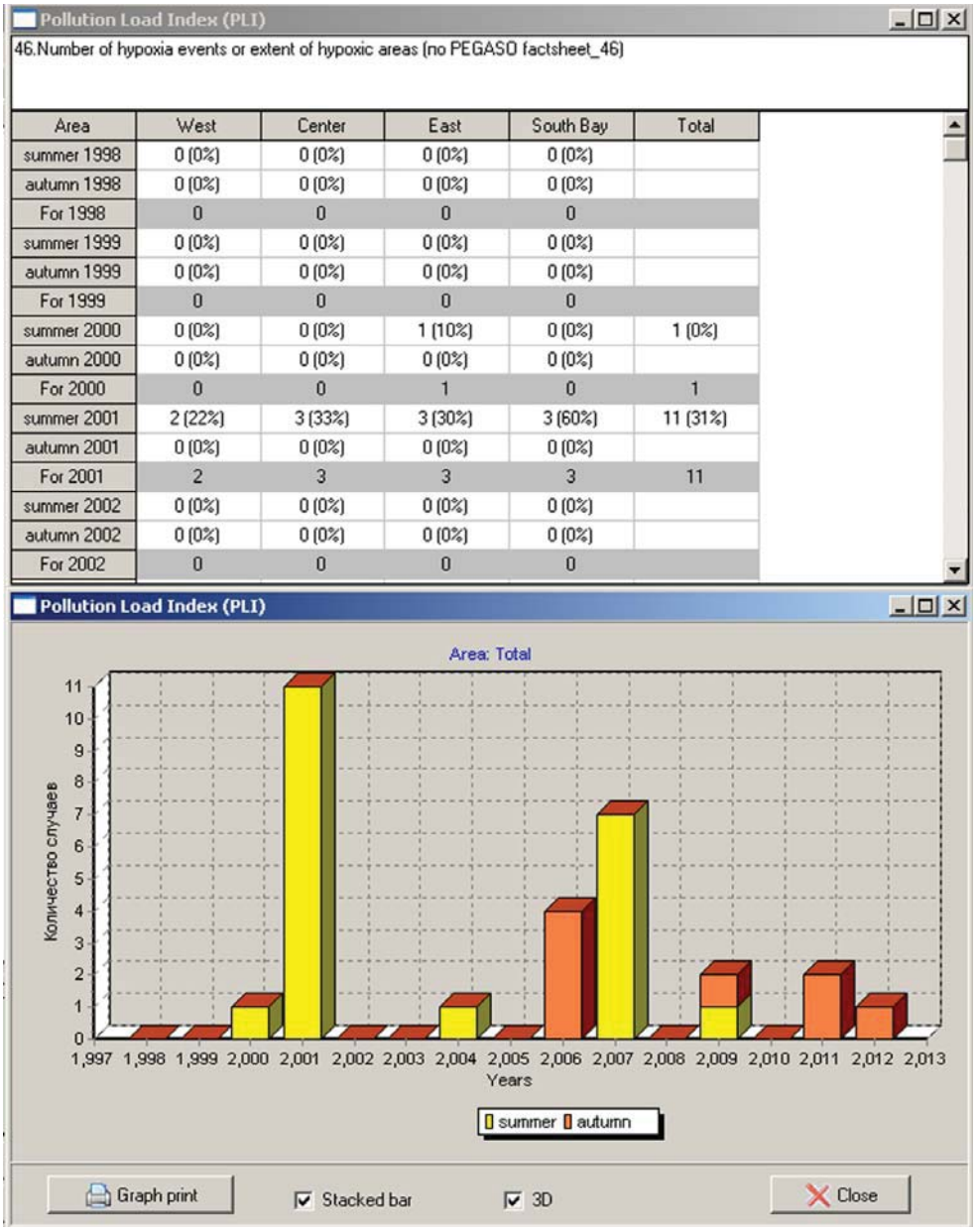


Fig. 5: An example of information in the form of tables and maps for ABi (distributional pattern of certain marine and coastal habitats under the SPA Protocol).

Information on indexes is generated in the form of tables and various maps and graphs (Fig. 5 and 6). The most important advantage is that all indexes are calculated "on demand" for needed stations, areas, and periods of time. This makes possible to actually provide an integrated regional assessment, to monitor spatial and temporal variations in the state of coastal environment, to trace negative and positive trends due to changes in anthropogenic pressures or/and climate changes.



Area	West	Center	East	South Bay	Total
summer 1998	0 (0%)	0 (0%)	0 (0%)	0 (0%)	
autumn 1998	0 (0%)	0 (0%)	0 (0%)	0 (0%)	
For 1998	0	0	0	0	
summer 1999	0 (0%)	0 (0%)	0 (0%)	0 (0%)	
autumn 1999	0 (0%)	0 (0%)	0 (0%)	0 (0%)	
For 1999	0	0	0	0	
summer 2000	0 (0%)	0 (0%)	1 (10%)	0 (0%)	1 (0%)
autumn 2000	0 (0%)	0 (0%)	0 (0%)	0 (0%)	
For 2000	0	0	1	0	1
summer 2001	2 (22%)	3 (33%)	3 (30%)	3 (60%)	11 (31%)
autumn 2001	0 (0%)	0 (0%)	0 (0%)	0 (0%)	
For 2001	2	3	3	3	11
summer 2002	0 (0%)	0 (0%)	0 (0%)	0 (0%)	
autumn 2002	0 (0%)	0 (0%)	0 (0%)	0 (0%)	
For 2002	0	0	0	0	

Fig. 6: An example of maps in the electronic version of the atlas of the Sevastopol Bay.

6.2 Which have been the main constraints faced during the application of the tools?
The absence of the Black Sea ICZM Protocol.

Section 7. Main results of CASES

7.1 Achievements

The FP7 PEGASO project has been launched to investigate different aspects of and local conditions for ICZM and application of the ICZM Protocol in the Mediterranean and Black Seas. The Bay of Sevastopol has been chosen as one of the sites for practical application of the project results, to assess local conditions and to provide practically useful end-products for the purpose of ICZM implementation.

Scientific support, which is one of the components of ICZM, assumes participation of various specialists and utilization of various data depending on a specific task. The major disadvantage of traditional sources of data (atlases and data base), is the need to address various specialists. We have designed the system (http://wiki.iczm.org.ua/en/index.php/Download_the_latest_version_of_the_atlas) incorporating digital atlas and GIS features, but also allowing interaction with data and application of different ICZM tools. The major of these tools are indexes. While interaction with data makes possible to construct different maps, which have not been preloaded, tools make possible to analyze data. The current version of the system incorporates a number of indexes chosen within the frame of the PEGASO project for environmental assessment.

The web-portal (http://wiki.iczm.org.ua/en/index.php/Main_Page) and a standalone CD version of a GIS-type tool for the Sevastopol Bay (http://wiki.iczm.org.ua/en/index.php/Download_the_latest_version_of_the_atlas) have been updated to incorporate additionally recovered information on the marine environment. Additional data in regard to local environmental assessment have been also achieved from our stakeholders.

The list of the suggested indicators, as well as other available indicators, have been evaluated for the purposes of local conditions and application. The selected indicators will be incorporated into the developed CD version of a GIS-type tool for the Sevastopol Bay over the next working period and presented to local stakeholders for evaluation.

We have also evaluated the ways to incorporate scenarios tool to our CD version of a GIS-type tool for the Sevastopol Bay. Additional information of currents in the Sevastopol Bay has been incorporated in the CD version of a GIS-type tool for the Sevastopol Bay in line with the software tool for its evaluation. Additionally, we have incorporated information on possible consequences of the sea level changes for the coastal zone of the Sevastopol Bay.

One of the most important parts of our work has been addressed to interaction with stakeholders in regard to evaluation of our results. As an outcome of our interaction, stakeholders (when they feel that our work and results are important) have issued letters of endorsement (http://wiki.iczm.org.ua/en/index.php/Dissemination). So far, we have got 4 such letters and 3 more are expected in the nearest future. Our results have been also published and acknowledged in two newspaper publications and presented in several scientific publications (http://wiki.iczm.org.ua/en/index.php/Scientific_publications).

We have taken part in the MedOpen Virtual Training Course on Integrated Coastal Zone Management organized by The Coastal Management Centre Priority Actions Programme/Regional Activity Centre (PAP/RAC) and successfully completed it (http://iczm.org.ua/en/index.php/Capacity_building_and_achievements).

We have also taken part in the PEGASO Hands-on Training workshop: Introduction and implementation of Spatial Data Infrastructures (SDI's), 22 - 25 October 2012, Oostende, Belgium, and participated in special on-line training on SDI led by Mr. Pablo Fernández Moniz, and successfully completed it. GeoServer and GeoNetwork software was installed on local servers and necessary settings applied. Grids for oceanographic atlas of Sevastopol Bay are converted to GeoTiFF and described as WMS layers to work as spatial data service. WMS developed on the base of open source web GIS software MapServer (http://193.42.157.77/ru/index.php?r=atlas/wms/view&id=19).

We have contributed to the development of SDI. We have initiated a local geonode to make available our information, which is not accessible from other online sources:

GeoNetwork catalog

http://geonetwork.ibss.org.ua:8080/geonetwork/srv/eng/main.home

GeoServer WMS

http://geonetwork.ibss.org.ua:8080/geoserver/pegaso/wms

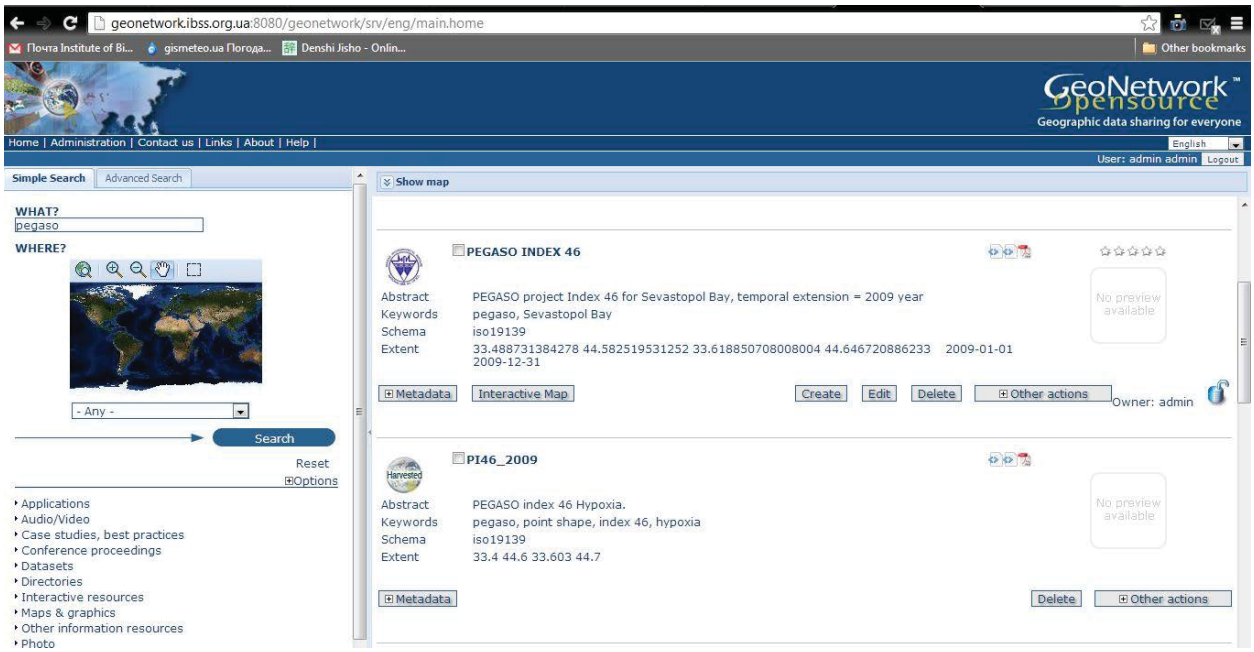
Institute web-site

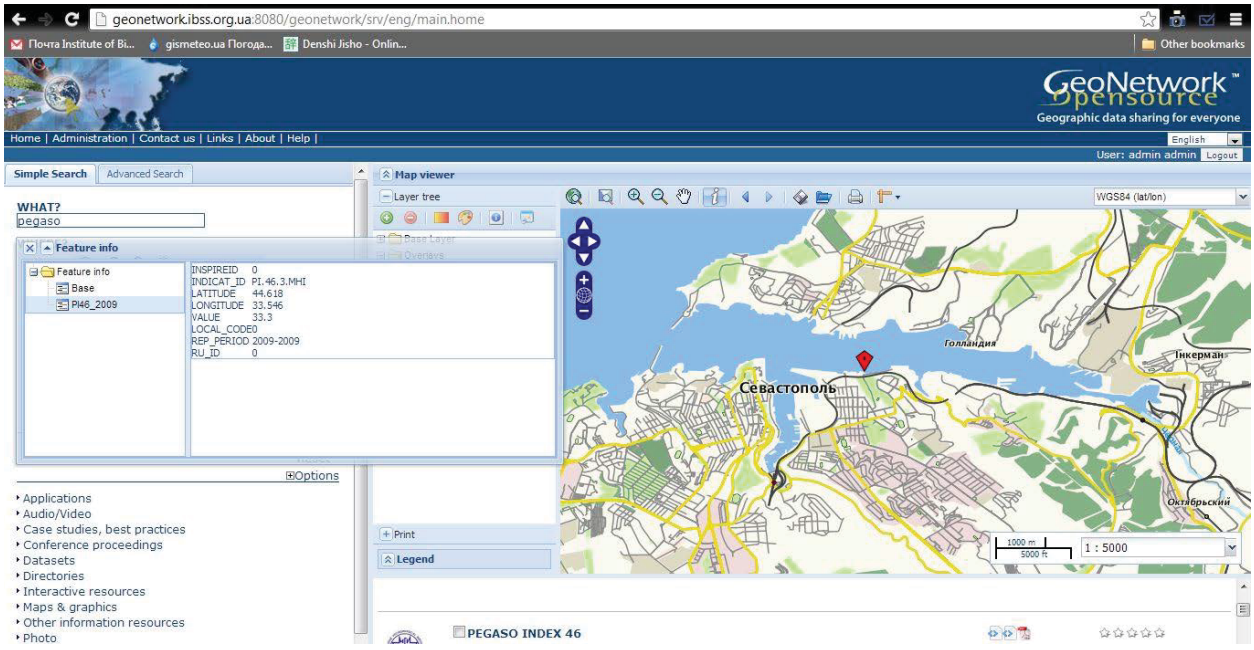
http://mhi.nas.gov.ua/eng/

We have installed and configured one of the latest versions of GeoServer application and GeoNetwork to serve as a metadata catalogue.

Our GeoNetwork will provide data and metadata for local stakeholders under different group from PEGASO. Data and metadata will be available through our GeoNetwork interface to local stakeholders.

We have restricted available coordinate reference systems advised by the PEGASO community with few more for the local usage.





We have distributed information on PEGASO project and available PEGASO tools to local stakeholders. We have presented our results from the project in forms of scientific publications, presentations at scientific meetings, newspaper articles, information on local TV programs. The local ICZM PEGASO website will remain operational and active for years after the PEGASO project is completed.

7.2 Lesson learnt

Results of our work demonstrate the very possibility to apply scientific tools for ICZM issues, but the Black Sea Protocol must be invented and adopted to make it possible.

“Tools” means a system that makes possible to choose, apply, and get new maps or indicators from existing data (ready-to-go results rarely fit the needs of stakeholders and soon become outdated).

The system depends on the data flow, data management, interactive atlas, and indicators calculation and presentation engines. This is the only way to fit various needs of stakeholders and keep generated result up-to-date.

15. Danube Delta (Romania)

Section 1. Coastal Issues

Why did you select the identified coastal issues?

The identified coastal issues were selected due the fact that these are the more often encountered and have the main impact in the management of the costal zones.

After a thorough analysis on the coastal issues afferent to Sulina Case (field research), and based on a basic stakeholder analysis (interviews, meetings), at the beginning of the analysis, DDNI team decided to sum up the main coastal problems, as follows:

ANTHROPOGENIC PRESURES done by the accentuated development of different socio-economic activities within natural space of the coastal zone	**ENVIRONMENTAL PROBLEMS** induced by anthropogenic factor, identified in the Romanian coastal zone,
Agriculture and food industry Marine Fishing Constructions/holiday houses Ports/Navigation Touristic Ports Extension: dredging,… Shipyards Manufacture Industry Extractive Industry: sand mining in coastal areas Tourism and recreation Military and Defence Activities (inland/marine): seaward shuting	Coastal Erosion/Sediment's dynamic Natural resources extraction/beach sand Water pollution /air (hydrocarbons, greenhouse effect gases, s.a.) Transport Over-Exploitation of fish stocks Habitats losing/Endangered species Population growth Urban expansion: Sulina, St. Gheorghe touristic resorts Fresh water intrusion Uncontrolled development of touristic and recreation activities over the tourism carrying capacity (inefficient solid waste management)

Other activities with coastal and marine ecosystem impact:

- Urban development
- Navigation constructions
- Oil platforms

What is the social, political and economic relevance of the identified coastal issues?

The social identified costal issues in the PEGASO Romanian Case Study Sulina are as follows:

- Lack of jobs in the area;
- Migration of skilled labor;
- Population decrease. Over time, the number of population in Sulina registered numerical variations, depending on socio-economic context of the region. If in the interwar period, the population reached 15,000 inhabitants, this number began to decline considerably reaching 5,256 in 1997 and less than 4,569 inhabitants respectively for 2011, due to lower birth, specific isolation of the Danube Delta, poor economic resources and uncertain job prospects, especially for young people;

- If in 1992, a very small percentage (4%) of population was involved in agricultural activities, at present, the weight of this sector is nonexistent according Tulcea County Department of Statistics;
- Lowering of living standards;
- Lack of interest in maintaining traditional cultural values;
- Lack of medical services in the area, the hospital being closed.

There are a lot of missing conditions for a good life status in studied area for example a main service (medical one), job opportunity etc. All these lead to a major social problem for the area namely the decrease of total inhabitants of the studied area. The very bad face of this issue is the fact that most of the people that leave the town are the active ones or young ones. The migration of the people from the town has bad influences to the area, despite the fact that the pressure seems to be less. But this is just a false less pressure because the tourism is increasing and the human pressure, too.

The political issues are more related to the laws and rules that should stipulate the form and the direction of the management of the studied area and its components. The main political issues are as follows:

- Legislation on waste (misunderstanding of the European Directive on Waste);
- No delineation of the coastal zone;
- Lack of rules for implementation of coastal zone legislation;
- Interests in changing the utilities of the beach.

The first issue is very important in order to have a “clean” environment and to have a good management of the coastal zone (including the waste management). The Coastal zone delineation is one of the most important issues; this one is the basis of the management in general and management of the coast in special. The missing legislation regarding coastal zone is the result of low interest in former periods (communism regime) for those regions. This situation makes even harder the management of the coastal zones. There are some stakeholders that follow only their own interest and want to change the way of use of the beach in order to produce a higher income for their own. This could be contradictory with the sustainable development of the studied area.

The economy of a region is like the air for the living beings, for the coastal zones is too. If in a region are economical difficulties that region suffers. For the studied area there were identified the following main economical issues:

- Inexistence of a fish stock market;
- Closing the Sulina Shipyard;
- Lack of local investments.

The absence of a fish stock market could lead to an alteration of the merchandise in the way to a market from another place, different from the one of production. In these conditions the price of the fish could increase and the money could be blocked. Closing the shipyard made a lot people to lose their jobs and to have a lower buying force noticeable in financial circulation within the studied area. In relation with the shipyard activity were other activities that involved a lot of people that lost their jobs, too. The investments are very important for an area in sense of improving the management considering also the natural and artificial environment.

- Have you developed selected or calculated indicators in order to depict the situation and the problems you planned to consider?

For the Romanian case study within the PEGASO Project there were not developed, calculated indicator in order to depict the situation and mentioned issues that were taking into account.

Section 2. Relations between coastal issues and ICZM Protocol and Principles.

2.1 How do the selected coastal issues relate to the ICZM principles and protocol?

The Integrated Coastal Zone Management principles and Protocol ideas converge to the same desiderate to have a better management of the coastal zones taking into account as much as it can components and parameters.

There are eight ICZM principles as follows:

- A broad 'holistic' perspective (thematic and geographic);
- A long term perspective (ensure that decisions taken today do not foreclose options for the future);
- Adaptive management during a gradual process (integrated planning and management is a process that develops and evolves – good information provision is basis);
- Reflect local specificity;
- Work with natural processes;
- Participatory planning;
- Support & involvement of all relevant administrative bodies;
- Use of a combination of instruments.

The 'holistic' perspective is kept also for the case study that is about in the sense that we took into account the fact that the studied area is an integrated part of Danube Delta Biosphere Reserve. We tried to integrate one of the main objectives of a Biosphere Reserve (preserve the biodiversity) into the studied area as principal scope. The long term perspective is ensured by using and having in mind the management in a sustainable way. The sustainable development supposes a balanced development in order to have access to actual resources for future generation of humans. The sustainable development is based on a precise and rigorous spatial planning where there are all the processes included and analyzed for all kind of periods (short, medium and long periods). It is well-known that some processes are suitable for long terms, others for short terms, from these resulted an adaptive management in the spatial planning

process. One of the issue resulted in the Sketch Match meeting was that the studied area is in the way of losing the traditions and specificity. Thus in this project it is mentioned the problem of keeping the specificity of the area and more to adapt the solutions which should solve the issues to the local specificity. For having a good biological diversity it is necessary to preserve and 'encourage' natural process to remain unaltered and to be linked between them.

The Sketch Match is a participatory rural appraisal, and by its definition it involves the knowledge, the experience and the will of the local stakeholders (including local inhabitants) in the process of rising the issues and in the attempt to solve them or to try to find some direction to diminish their influence into their area (studied area). As identified stakeholders there were invited local authorities (e.g. Mayor, County Council, Danube Delta Biosphere Reserve Administration) and there was requested their support, involvement to establish the main issues of the area and also the possible solutions. For this case study there were numerous tools such as: Geographical Information System (GIS), Participatory Rural Appraisal (PRA), ConsideoModeller, Cross Impact Balance analysis (CIB) etc.

The activities done within the PEGASO Project Case Study Sulina were formulated in such manner to promote, to revere and to recommend the ideas and objectives of the Integrated Coastal Zones Management Protocol in a way that every stakeholder on the coastal zones and also limitrophe to these to be aware of this Protocol and its main direction. For a good spatial planning there is need that most of the stakeholders from an area to have meetings where should be discussed the issues and their solutions regarding the coastal zones and others zones that could influence these.

Section 3. Policy issues and ICZM principles and approaches.

3.1 So far, how have been the coastal issues addressed by the local/regional government?

3.2 At which spatial scale?

The Government of Romania sets a high value on the development and implementation of an Integrated Coastal Zone Management system. The main challenges to the development of the coastal zone are caused by the following factors:

- Unsustainable use of the coastal resources,
- Increase in population in the CZ area and
- The envisaged long term impacts of Global Climate Change.

The first two factors are amongst others leading to (i) coastal erosion, (ii) pollution caused by non point sources (as a result of agricultural development and increase use of fertilizers, insecticides and pesticides) and point sources (industrial waste and municipal waste water) (iii) depletion in fish stocks due to over harvesting and (iv) problems with land use planning as a result of conflicting claims to land for urban, industrial and recreational purposes (including tourism). Also, the global change in climate that will lead to a sea level rise and possible changes in storm regimes and river discharges will have an impact on the Romanian coastal zone.

As a consequence of the above, the legal basis for ICZM was created through the adoption of the Emergency Ordinance (EO/2002) and the formulation and vetting of the ICZM Law/2003.

Further, an Outline ICZM Strategy was developed through the Netherlands funded project "Implementation of WFD and ICZM in Coastal and Transition Waters" (MATO/2/RM/9/1: 2003-2005).

Despite these developments it is felt that several issues of the legal framework, the institutional structure relating to ICZM as well as some of the coastal issues remain unsolved. This specifically relates to the following matters: The National ICZM Law, more than 40 pages, is a very comprehensive Law and is a good attempt to base a Romanian ICZM Programme along the lines of the EU-WFD and ICZM Recommendations. However, it might hamper implementation through too many details concerning sectorial obligations and providing too small amount of sectorial incentives for sustainable development of the Romanian coastal zone.

The National ICZM Committee was established in June 2004 by Government Decree 1015/2004. As prescribed by the ICZM Law, about 50 departments, institutions and organizations from the national, county and local level are represented in the National Committee (NC). Although forming a good representation and a good cross section of the national and local coastal communities, it seems to be too large a committee to be an effective body for policy preparation and preparing political decisions. (Coman, Alexandrov, Dumitru, & Lucius)

Because the coastal system is complex and multidisciplinary, it needs an integrated approach, as mentioned in the ICZM Protocol, at national level, but with a good coordination at local level. The approaches of the Regional and Local government reveal a sectorial approach in the coastal issues.

In its broadest conception, a "system" may be described as a complex of interacting components together with the relationships among them that permit the identification of a boundary-maintaining entity or process. The line that separates the aspects of a system from those of its environment tends to blur as the unit of observation moves from natural and designed physical systems to human and conceptual social systems. (Laszlo & Krippner, 1997)

In Sulina Case, at local level, socio-economic and cultural problems, in the context of environment protection request alternative methods for the systemic approach. One of these approaches refers to spatial system modeling.

Since at national level there is a high interest in the commitments related to the coastal zone management, the concern at regional and local level increases in a sectorial approach. Having a solid legal basis and an integrated approach stated by the ICZM Protocol, the local authorities can follow the guidelines for an integrated management towards sustainable development and an improved coastal zone management.

3.3 Can you assess the results of the implemented policies? Which are the main results achieved?

To achieve the purpose of planning, activities should be operated with an acceptable and workable system that defines the type of change for which planning is needed. Spatial planning presumes the obligation to prepare plans and policies decision making, the need for a consensus on implementing the change, the obligation to support preparations for a consensus and the right to be consulted, in order to object to a plan or a decision.

After the analysis of the spatial planning system, using the participatory approach proposed in our CASE (the Sketch Match sessions), DDNI specialists developed a model of the actual system, using CONSIDEO software (see Section 6 Tools). In Fig. 1a,b the graph shows the system's evolution, taking into account the impact between its components.

From this exercise on modeling the spatial planning system, we had the next observations:

- Each major factor impacts the system differently
- On long term, Economic factor impacts the system stronger, while on short term, the most important factor is 'Social'
- The proportion of the major components impact tends to be very close to the spatial planning definition (a positive impact of the coastal zone policy implementation).

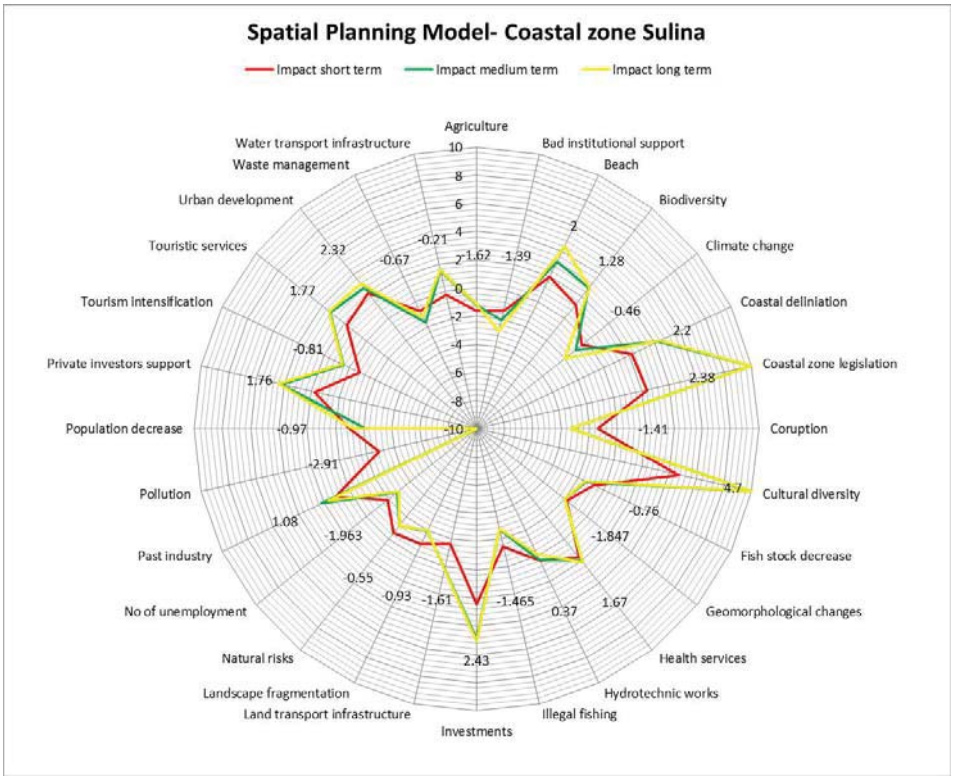


Fig. 1a – Spatial planning Model – Coastal zone Sulina

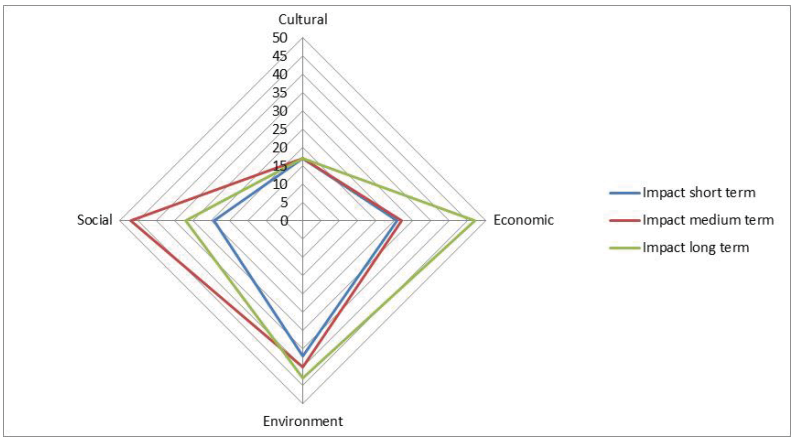


Fig. 1b – Spatial planning Model – Coastal zone Sulina

Using the stakeholders' involvement and policy makers contributions, DDNI specialists designed a unique graphic of the impacts within the spatial planning system in the coastal area of Sulina. Following this graph, decision makers can follow the most important steps in the decisional process (conducted until now, but applicable also from now on) and what are the components that need first approaches.

3.4. On the basis of the ICZM principles (as they are expressed by the Protocol), do you think that the coastal issues were addressed with an integrated approach (in terms of organization, politics, tools, etc)?

Nowadays, a new important issue is the inter-sectorial approach of management policies and spatial planning. During the nineties the paradigm in the 'water challenge' shifted again. The attention then focused on development and restoration of landscape, and nature development.

Still, for the coastal zone of Sulina there is no decisional structure for an integrated management, forward plan for the sea. Neither is there a system whereby plans have to fit into a marine planning strategy. However, there is a variety of regulatory processes by which licenses, permits and other authorizations have to be obtained for specific proposals or activities such as transport, fisheries, or off shore drilling. Some regulators can impose restrictions on activities e.g. in the Danube Delta Biosphere Reserve marine area or the Marine Protected Area 2 Mai - Vama Veche. These regulatory regimes are changing over time due to the developments of the activities in the marine environment and status of marine ecosystem (e.g. diminishing of fish stocks due to over-fishing imply restrictions on fishery activities, exploration for and extraction of oil, the building or extensions of ports, other infrastructure measures). Some of these regulatory processes have a spatial dimension in the sense that there are defined areas of sea where particular activities are promoted or restrained.

Section 4. Relevance with National ICZM process

4.1 Do you think that your work is relevant for the ICZM process of your country? Why and how?

Our work based on **Sketch-Match(SM) method** follow the procedure which permit extension of the experience to the entire Danube Delta Coastal Zone, from the **Identifying Problems and Opportunities to the ICZM Plan Formulation - Management measures**, based on Conceptual and Empirical Models.

Also, Coastal Zone management Landscape Variables identified through several indicators, are essential for answers to questions as:

How will the project's resistance and resilience change over time? Is this acceptable?

What are the likely landscape changes over time? How will they affect the site?

In the Danube Delta, there had been developed and applied, especially in the second part of the XX century, a lot of management plans and policies which were grounded exclusively on neoclassical economy principles. These principles had a large class of economical and social objectives from which some were identified as driven forces for this wetland-coastal zone System, in structural and functional changes, such as:

1. economical objective translated as arable surface extension and increase agricultural production;
2. urban and industrial development;
3. protection against floods;
4. to maintain and develop the navigation conditions and infrastructure.

Achieving these strategic and political objectives required the development and implementation of management plans and programs, each consisting of a wide range of human activities and that means to exercise pressure on the Danube Delta coastal zone.

As is well known, the productivity and stability of ecosystems depends directly on their viability, to provide physical support for the use of natural resources and to provide socio-economic system services. Analysis of ecosystems as dynamic systems, nonlinear and as production units consists in lengthy processes of which variability and diversity are essential for unit stability and productivity. This analysis does not overlook the social and economic implications, taking into account the relationship between Natural Assets of the unit and the existing Socio-Economic System, following the same principles.

For a coherent understanding and interpretation due to the spatio-temporal dynamics of interactions complexity between human population and environment it is needed to tackle by a theoretical transdisciplinary integrating model framework that allows changes, transformations, trends and adjustments identification/understanding in the system, regarding:

1. Ecological integrity. Because of strong interference from human activities, it is not possible to restore coastal zone ecosystems to the pristine state. The health of the ecosystem may not be as the original ecosystem, but it must be self-sustaining system.

2. Objective integrity. Danube Delta is a complex of ecosystems, and should meet the flood control objectives, landscape function, and achieve a harmonious water–human relationship.

3. Spatial distribution. Within the context of integrated coastal management theory, the evaluation of the ecological status should consider the characteristics of the different spatial components and the differences of environmental problems in the area, including differences

between components and different ecosystem service function.

4. Ecological improvement. ICZM projects developed under SM creates hydrological, geomorphologic and ecological conditions that allow the revitalization of Coastal Zone to be a resilient self-sustainable system and for recovery from rapid change and stress.

5. Ecological assessment - pre and post project assessment

The circumstances that we seek to address in ICZM are often very challenging. The areas of degraded land, nowadays present in various parts of the coastal zones are large. Some systems are severely degraded and will be costly to repair. Further, people are still using many of these degraded systems and many of these people are poor. We may not succeed in fully eradicating the causes of degradation in these circumstances but there is sufficient evidence for us to be optimistic. This evidence makes it clear that ICZM policy agreed by local people will be a key element not only of nature conservation but also for sustainable development.

4.2 On the basis of the work that you have done, which are in your opinion, the main constraints in implementing ICZM principles and tools? What is missing? Where are the main gaps? Where we should put more energy and resources in the future?

Strengthening in implementing ICZM principles the Danube Delta Coastal Zone

The dramatic changes since 1989 transformed society. Particular attention is needed to the m**ain issues:**

- Institutional capacity and cooperation
- Structures and capacity for private and public sector decision-making need to improve, including good planning and international cooperation, and supported by the macro-regional approach.
- The optimal use of resources is essential.

Targets as examples could be:

- Establishing benchmarks for local ICZM bureaus and reducing excessive bureaucracy;
- Efficient exchange of information between relevant laws and law enforcement actors with the aim of improving ICZM sustainability.

To address these issues, we need a good base to work together for:

- A **sustainable framework for cooperation**

All stakeholders must take responsibility. Working together with international and cross-border organizations across the Coastal Zone Region will encourage synergies and avoid duplication. A reinforced territorial dimension will provide an integrated approach, and encourage better coordination of sectorial policies.

- **Coordination**

Several proposal - measures are needed.

Policy-level coordination which is the responsibility of the ICZM Commission, assisted by a

National Secretariat **must be completed by Level Group of Local ICZM** which can be organized at local administrative level. The Commission would consult the Group on modifications to Strategy and Action Plan, reports and on monitoring. The Group addresses policy orientation, dissemination and prioritization. The coordination of each Priority Area from ICZM law is the task of the Commission together with Level Group of Local ICZM, except for topics which addresses at Black Sea level.

The facilitation role of the Commission is assisted by National Secretariat. These ensure co-ordination in each administrative unit from the Group, identify the relevant contacts, and above all advance practical aspects of the work.

- **Links with EU policies – like Europa 2020**

It has five headline targets. These are: promoting employment; improving the conditions for innovation, research and development; meeting climate change and energy objectives; improving education levels; and promoting social inclusion in particular through the reduction of poverty, and addressing the challenges of ageing. The ICZM, with its vision for the Coastal Zone Regions in 2020, reinforces this. It supports sustainable growth, aiming to reduce energy consumption, increase the use of renewable energies, modernize the transport sector by making it more environmentally friendly and more efficient, and to promote 'green' tourism. It helps remove internal market bottlenecks and improves the business environment.

Section 5. Stakeholders involvement

5.1 Have you involved the main stakeholders?

For the participatory process was chosen a wide variety of national, regional and local stakeholders with expertise in the Sulina coastal area. Participants were representatives of a wide range of stakeholders varying from local population, fishermen and NGO's to representatives of Local and County Council, Danube Delta Biosphere Reserve Authority, as shown in the table below:

Nb.	Stakeholder	Sector/level	Competency
1	**Danube Delta Biosphere Reserve Authority**	Public / national	• administrates the natural heritage of national interest from the Danube Delta Biosphere Reserve (D.D.B.R.); • protects and conserves geographical units & life quality of the DDBR territory; • regulation and licensing of economic activities taking place in D.D.B.R.;
2	**Tulcea County Council**	Public / regional	• provides the necessary funds for implementation the hydro construction, building and expanding stocks of materials and means of defense at the town halls, for operational actions such as flood protection and maintenance and repair of hydraulic engineering and maintenance of watercourses beds in the DDBR localities;
3	**Tulcea Prefecture**	Public / regional	• is organized and operates as a public institution with legal powers designed to meet the prefect acts. Prefecture Tulcea county contributes to achieving the strategy and objectives of the government program.

4	**Sulina City Hall**	Public / local	• aims to accomplish environmental protection measures and improving the appearance of the city and participate together with other specialized local bodies to prevent pollution in the city and coastal area;
5	**Dobogea Regional Water Branch**	Public / regional	• unitary and long lasting water resources management both for the surface and for the underground waters, and their protection against exhaustion and degradation like rational and balanced sharing of these resources;
6	**Environmental Guard**	Public / regional	• controls activities with environmental impact and apply sanctions provided by the law on environmental protection in DDBR; • controls how are respected the provisions of the regulation on environmental protection;
7	**Administration of the Lower Danube**	Public / regional	• assurance of navigation conditions on Danube by means of dredging works coast and floating signalization, piloting on the maritime Danube sector between Sulina roadstead and Braila;
8	**Romania Naval Authority - Sulina harbour**	Public / local	• inspecting foreign ships in maritime ports in national waters or on compliance with relevant provisions of international conventions to which Romania is a party on the ship and navigation safety, prevention of marine pollution from ships and working and living conditions on board;
9	**Sulina Border Police**	Public / local	• participate, along with local environmental authorities and bodies of the border of neighboring states, as appropriate, to take the necessary measures to prevent environmental risks and damage occurrence and, in accidents affecting the environment, to eliminate the effects; • assures surveillance of fluvial and maritime border ;
10	**Sulina Free Zone Administration**	Public / local	• Sulina Free Zone Administration is streaming its efforts towards these two latter topics: manufacturing and services. In this way, the possibility of goods' storage in the Free Zone is very well completed by processing, sorting, marking, assembling and many other operations which a raw material or good may support;
11	**Danube Delta Friends Foundation**	Non-Profit / regional	• is a non-governmental organization established in 2004 to protect the Danube Delta Biosphere Reserve;
12	**Theoretic Lyceum "Jean Bart"**	Public / local	• Awareness and educating young people about environmental issues and sustainable development in their area;
13	**S.C. Thalasa S.R.L.**	Private /local	• Freshwater aquaculture
14	**Local people**	Community group / local	• Local people

5.2 How have you involved them (e.g. focus group, interviews, questionnaire)?

In order to assure sufficient and correct representation of local concerns and wishes in the

participatory process, a small-scale survey was conducted prior to the public workshop.

✓ The 1st step in involving the stakeholders included 3 types of activities in the field: 13 semi-structured interviews, 10 surveys based on questionnaires and field observations. Questions used for semi-structured interviews were adapted to the Sulina study area and the questionnaire followed the issues below:

1) Ecological/economic importance/significance of Cat's Bend area;
2) Identifying the significance and contribution of the activities in Sulina coastal area for the regional economy/stakeholder – identifying the formal and informal groups that affect the management of the area;
3) Potential economic value (current/future);
4) Ranking of their coastal area issues in comparison to other problems
5) Personal wishes and concerns for design of future measures
6) Development perspectives/posibilities.

✓ The 2nd step of our research consisted in organizing the stakeholder public participation workshop, entitled the "Sketch Match", which took place in Sulina locality during 2 days of work in November 2012. In the beginning of the 2 days' work session the participants were asked to express their expectations related to the application of this participatory approach for Sulina pilot case, expectations which are as follows:

- *Reliable information on coastal are management, awareness of local people and stakeholders;*
- *Results' Integration in Danube Delta Biosphere Reserve Management Plan ;*
- *Results which will help improving the quality of life for local community ;*
- *Practical solutions, lessons learned on how to be able to implement solutions identified for Sulina coastal area;*
- *Coastal area delimitation in Sulina;*
- *Preservation of cultural heritage in Sulina;*
- *Involvement of local people of area;*
- *Collaboration between institutions present at the session after the project is ended; institutional collaboration for integrated coastal zone management;*
- *Solutions for land issues (public vs. private);*
- *Further socio-economic development of the area.*

Further, was presented the work methodology and divided the participants in 2 (two) groups with

following topics: spatial planning & socio-economic development. The members for each group were chosen taking into consideration their field activity and expertise (which was asked to be fulfilled in the confirmation of participation form) and split in 2 (two) separate rooms, assisted by the experts from DDNI. Each group focused on problems and potentials of the area from their topic point of view. For all groups the participants were invited to familiarize themselves with Sulina thematic maps realized by DDNI team. Further, the participants together with the DDNI experts draw their ideas on overlays for every thematic map.

During the workshop, the stakeholders contributed specific substantive expertise on the 2 topic chosen within the participatory process, including changed land use, the consequences of various land use, socio-economic issues (e.g. unemployment, population decline, poverty and isolation) and infrastructure (e.g. roads, irrigation channels or pumping stations). Stakeholders also contributed political expertise, especially during the stakeholder meeting in the completion phase.

The result of this 2 days' workshop, the final sketch, took into consideration all the possible solutions draw by stakeholders according to their point of view and interest, giving in this way, the possibility of a better future coastal area management. It is important that the awareness rose among the participants during the 2 days planning sessions to continue beyond the project for a better inter-institutional collaboration in Sulina.

5.3 Which kind of constraints have you faced?

If in the beginning of the design workshop, participants were generally skeptical about their role in the participatory process, at the end of the session they have expressed their enthusiasm and appreciation that they had the chance to express their ideas and opinions openly, working together for the same purpose.

Section 6. Tools

6.1 Which tools (indicators, LEAC, scenario, participation, economic assessment and social valuation or others) have you used during the activities of the CASES?

The experience from previous projects, as well as the analysis, revealed the need of integration between the local population knowledge, governmental inputs and scientific coordination. In order to deal with this challenge, to gather the most important information about the real situation at local level, was chosen the participatory approach of 'Sketch Match'. The analysis and scenarios tools were chosen after the analysis described above (section 3). With the purpose of using all the information and integrating it in a unitary methodology, the combination of this methods was found the most efficient.

For the coastal system analysis in PEGASO case study Sulina, was used an approach that combines the participatory approaches and scenario development (system modeling using causal loop diagrams and the cross impact balance analysis).

A causal loop diagram (CLD) is a causal diagram that aids in visualizing how interrelated variables affect one another. The diagram consists of a set of nodes representing the variables connected together. The relationships between these variables, represented by arrows, can be labeled as positive or negative.

Causal loop diagrams provide a language for articulating our understanding of the dynamic, interconnected nature of our world. We can think of them as sentences which are constructed by linking together key variables and indicating the causal relationships between them. By stringing together several loops, we can create a coherent story about a particular problem or issue (Kim, 1992).

The CONSIDEO MODELER is a tool that can be used to visualize and analyze the cause and effect relationships that exist in any complex situation within business, politics, and science and even in your own private life. It can create a new culture of better planning, better decision-making and better communication. (Neumann, 2009)

We can opt to do the following:

- Qualitative modeling-to quickly weights the connections for factors using the values "weak," middle" and "strong." Already rough weighting allows us to identify the positive factors (e.g. measures) and the negative factors (e.g. risks) that are involved in a challenge for both the short-term and the long-term.
- Or Quantitative modeling-to use data and formulas in order to run scenarios in simulation cockpits to foresee the likely development effects of both risks and specific measures.

Cause and effect models go beyond mind maps: arrows are used to indicate relationships that exist between factors and the effects that they have on each other. It can be used to represent the arguments through a rough weighting of these effects (systems thinking). Or, alternatively, it can describe the relations mathematically by integrating data for what-if scenarios (system dynamics). The analysis of the model show counterintuitive cause and effect chains as well as nonlinear developments that are a result of feedback loops. It can then identify possible risks and promising measures to take- which perhaps no expert would have come up with. (Neumann, 2009)

6.2 Which have been the main constraints faced during the application of the tools?

The main constraints faced during the application of the tools are related to the uncertainties. As mentioned before, the information was collected in a participatory way from all the stakeholders identified previously, but the analysis revealed a lot of uncertainties and assumptions. As all the existing scientific data was combined with the information collected from people and decision makers, the results opened a lot of discussions and future solutions, with a high rate of assumptions on the future developments. Even though the results showed the solutions for integration of coastal management and future thinking, the present conditions constrained in thinking sectorial and short term.

Section 7. Main results of CASES

7.1 Achievements

The main achievement of Sulina Sketch Match was the successful outcome of this “focus group” allowing surveyors to study the interrelations of stakeholders, their knowledge, their awareness of actual issues concerning their impact on the area and the needs to sustainable

development.

- Enthusiasm and motivation of participants
- Excellent cooperation between the organizing team and stakeholders
- The attendants were open for discussions and contributed with relevant arguments
- Availability of good thematic maps with relevant and up to date data
- Important preparation before the workshop (2 months before and a previous non-formal meeting with stakeholders)
- Well-considered selection of participants based upon insight in the stakeholder-network
- Good feedback and satisfaction that was able to address to issues as a team of authorities.
- Final map of integrated issues highlighting all the problems and solutions debated during the Sketch Match
- System analysis on the coastal zone management, as follows:

Using Consideo program we can model spatial planning system. As shown, the elements that define this system are: environmental, socio-economic and cultural elements. Through analysis and thorough research of the spatial planning system in the context of coastal zone system, spatial planning can be summarized in the Fig. 2. Analysis of the structure and functions of spatial planning system leads to the observation of system behavior in detail.

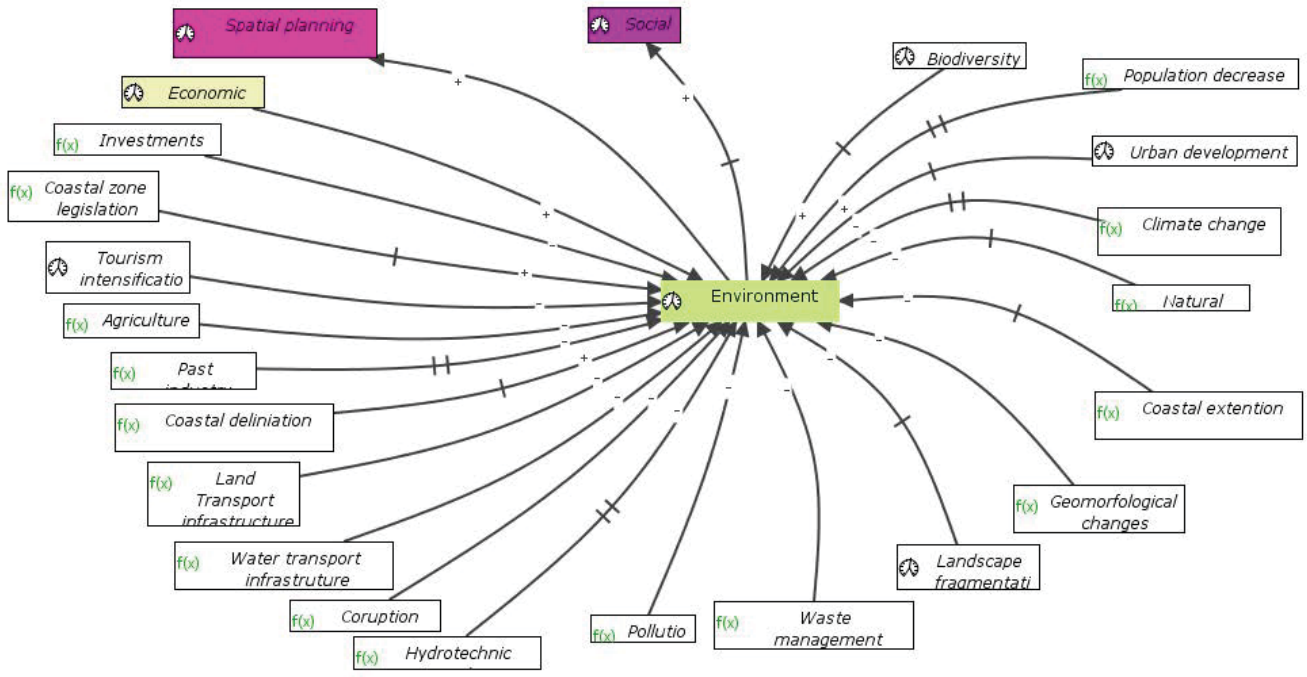


Fig. 2: Submodel of the Causal Loop Diagrams for Spatial Planning System Modeling in coastal zone Sulina

Cross Impact Balance Analysis

To complete the spatial planning analysis, the next step in our approach is to address the strategic policy development and the use of scenario to improve the coastal management.

The cross-impact balance analysis (CIB) is a method for analyzing impact networks. The method uses qualitative insights into the relations between the factors of an impact network in order to construct consistent images of the network behavior. The CIB method is based on:

- a discipline independent, qualitatively oriented concept of analysis which promotes the application of the method in interdisciplinary problems;
- an expert discourse approach which allows to collect, organize and to judge broad (as well as dissenting) expert knowledge to complex, multidisciplinary topics in a structured way;
- a proven algorithm for the evaluation of the collected information and for conducting a qualitative system analysis.

A typical application field of CIB is scenario analysis. The construction of scenarios frequently requires the examination of developments in many different fields (e.g. economic, political, social or techno-logical developments). Within different fields well established ideas about the possible developments often exist (e.g. in the form of a favorable, middle and unfavorable forecast variant). However, the development of holistic scenarios requires identifying which combinations of these variants are promoted by the net of their interrelations. This systemic synthesis of isolated information to an overall picture in the context of a scenario analysis can be carried out with the help of CIB. (Weimer-Jehle, 2013)

Cross-impact analysis is a group of methods designed to provide a rough analysis of cross-impacting social, political, technological, environmental and economic events (multi-disciplinary systems). The basic concept was developed within the context of technology fore-sight back in the nineteen sixties. Common to all CI method is a systematic approach, which bases on assessments of the interdependencies of key system variables in pairs, thus producing a cross-impact matrix as the system description. Depending on the method used, different types of expert judgments are used and different algorithms applied in the analysis. (Weimer-Jehle, 2010)

The process starts from an interdependency- oriented viewpoint on systems. First it is necessary to define a set of system variables (“descriptors”) with which the system can be adequately described for the purpose of obtaining a qualitative understanding. Relations between the descriptors are described by a network of influences (Fig. 3).

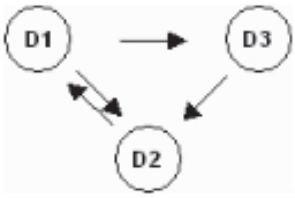
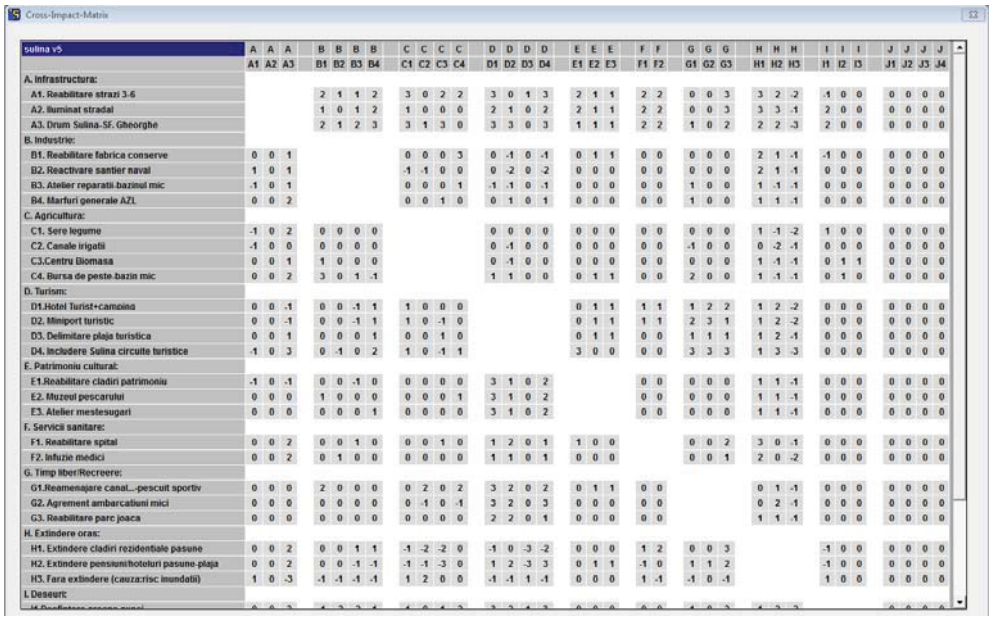


Fig. 3: The impact network of a simple system.

An impact arrow from descriptor 1 to descriptor 2 indicates that descriptor 1 impacts on descriptor 2, i.e. under otherwise identical conditions a change in the state of descriptor 1 causes a change in the state of descriptor 2. The system as a whole tends towards states which reflect the double role of each descriptor as both impact source and impact target. (Weimer-Jehle, 2010).

The result of your qualitative modeling is the MODELER's unique Insight-Matrix that you get through the context menu for each factor (Table 2). It compares the impact that the other factors have on the chosen factor. The matrix shows on the horizontal x-axis the sum of direct and indirect influences. On the vertical y-axis it shows the effect of reinforcing (R) and balancing (B) feedback-loops. A positive x value and a positive y value point to an increasing effect that is escalating. A positive x and negative y value means the increasing effect gets diminished over time. A negative x and y value point to an escalating decreasing effect of factors while a negative x and positive y value mean that the decreasing effect gets reduced over time. By this you can compare the short, medium and long term influences of factors



sulina v5	A A A	B B B B	C C C C	D D D D	E E E	F F	G G G	H H H	I I I	J J J J
	A1 A2 A3	B1 B2 B3 B4	C1 C2 C3 C4	D1 D2 D3 D4	E1 E2 E3	F1 F2	G1 G2 G3	H1 H2 H3	I1 I2 I3	J1 J2 J3 J4
A. Infrastructura:										
A1. Reabilitare strazi 3-6		2 1 1 2	3 0 2 2	3 0 1 3	2 1 1	2 2	0 0 3	3 2 -2	-1 0 0	0 0 0 0
A2. Iluminat stradal		1 0 1 2	1 0 0 0	2 1 0 2	2 1 1	2 2	0 0 3	3 3 -1	2 0 0	0 0 0 0
A3. Drum Sulina-SF. Gheorghe		2 1 2 3	3 1 3 0	3 3 0 3	1 1 1	2 2	1 0 2	2 2 -3	2 0 0	0 0 0 0
B. Industrie:										
B1. Reabilitare fabrica conserve	0 0 1		0 0 0 3	0 -1 0 -1	0 1 1	0 0	0 0 0	2 1 -1	-1 0 0	0 0 0 0
B2. Reactivare santier naval	1 0 1		-1 -1 0 0	0 -2 0 -2	0 0 0	0 0	0 0 0	2 1 -1	0 0 0	0 0 0 0
B3. Atelier reparatii-bazinul mic	-1 0 1		0 0 0 1	-1 -1 0 -1	0 0 0	0 0	1 0 0	1 -1 -1	0 0 0	0 0 0 0
B4. Marfuri generale AZL	0 0 2		0 0 1 0	0 1 0 1	0 0 0	0 0	1 0 0	1 1 -1	0 0 0	0 0 0 0
C. Agricultura:										
C1. Sere legume	-1 0 2	0 0 0 0		0 0 0 0	0 0 0	0 0	0 0 0	1 -1 -2	1 0 0	0 0 0 0
C2. Canale irigatii	-1 0 0	0 0 0 0		0 -1 0 0	0 0 0	0 0	-1 0 0	0 -2 -1	0 0 0	0 0 0 0
C3.Centru Biomasa	0 0 1	1 0 0 0		0 -1 0 0	0 0 0	0 0	0 0 0	1 -1 -1	0 1 1	0 0 0 0
C4. Bursa de peste-bazin mic	0 0 2	3 0 1 -1		1 1 0 0	0 1 1	0 0	2 0 0	1 -1 -1	0 1 0	0 0 0 0
D. Turism:										
D1.Hotel Turist+camping	0 0 -1	0 0 -1 1	1 0 0 0		0 1 1	1 1	1 2 2	1 2 -2	0 0 0	0 0 0 0
D2. Miniport turistic	0 0 -1	0 0 -1 1	1 0 -1 0		0 1 1	1 1	2 3 1	1 2 -2	0 0 0	0 0 0 0
D3. Delimitare plaja turistica	0 0 1	0 0 0 1	0 0 1 0		0 1 1	0 0	1 1 1	1 2 -1	0 0 0	0 0 0 0
D4. Includere Sulina circuite turistice	-1 0 3	0 -1 0 2	1 0 -1 1		3 0 0	0 0	3 3 3	1 3 -3	0 0 0	0 0 0 0
E. Patrimoniu cultural:										
E1.Reabilitare cladiri patrimoniu	-1 0 -1	0 0 -1 0	0 0 0 0	3 1 0 2		0 0	0 0 0	1 1 -1	0 0 0	0 0 0 0
E2. Muzeul pescarului	0 0 0	1 0 0 0	0 0 0 1	3 1 0 2		0 0	0 0 0	1 1 -1	0 0 0	0 0 0 0
E3. Atelier mestesugari	0 0 0	0 0 0 1	0 0 0 0	3 1 0 2		0 0	0 0 0	1 1 -1	0 0 0	0 0 0 0
F. Servicii sanitare:										
F1. Reabilitare spital	0 0 2	0 0 1 0	0 0 1 0	1 2 0 1	1 0 0		0 0 2	3 0 -1	0 0 0	0 0 0 0
F2. Infuzie medici	0 0 2	0 1 0 0	0 0 0 0	1 1 0 1	0 0 0		0 0 1	2 0 -2	0 0 0	0 0 0 0
G. Timp liber/Recreere:										
G1.Reamenajare canal...-pescuit sportiv	0 0 0	2 0 0 0	0 2 0 2	3 2 0 2	0 1 1	0 0		0 1 -1	0 0 0	0 0 0 0
G2. Agrement ambarcatiuni mici	0 0 0	0 0 0 0	0 -1 0 -1	3 2 0 3	0 0 0	0 0		0 2 -1	0 0 0	0 0 0 0
G3. Reabilitare parc joaca	0 0 0	0 0 0 0	0 0 0 0	2 2 0 1	0 0 0	0 0		1 1 -1	0 0 0	0 0 0 0
H. Extindere oras:										
H1. Extindere cladiri rezidentiale pasune	0 0 2	0 0 1 1	-1 -2 -2 0	-1 0 -3 -2	0 0 0	1 2	0 0 3		-1 0 0	0 0 0 0
H2. Extindere pensiuni/hoteluri pasune-plaja	0 0 2	0 0 -1 -1	-1 -1 -3 0	1 2 -3 3	0 1 1	-1 0	1 1 2		-1 0 0	0 0 0 0
H3. Fara extindere (cauza:risc inundatii)	1 0 -3	-1 -1 -1 -1	1 2 0 0	-1 -1 1 -1	0 0 0	1 -1	-1 0 -1		1 0 0	0 0 0 0
I. Deseuri:										

Table. 2: Cross-Impact Balance Matrix used in the strategic policy development

The image of the insight matrix for spatial planning system (Figure 4) shows how this factor is influenced by other factors, in various stages of analysis.

One of the most important observations is that spatial planning in the coastal zone is influenced in the same way by its entire four components, but the one that has the most important impact is the ‚Economic' factor.

Fig. 4 – Zoom on Insight Matrix for spatial planning system in Coastal Zone- Short Term

Thus, there can be seen that the factors that influence the system always in an accelerated and positive way are (analyzing the impact of short-term)and will be(for long-term analysis) 'private investors support', 'investments', the existence of the 'beach', the well-developed 'coastal zone legislation' and the initiatives for 'urban development'. An important increasing impact has also the existence of the hydro-technical works for the coastal zone (in the Sketch Match session were named the Sulina hydro-technical jetties, Danube's embankments, and the basin near the coastal zone). With a small increasing impact we also find the 'past industry' factor (referring here to Sulina's shipyard and Fish Factory).

On the other side, there are the 'decreasing escalated' factors. The big number of unemployment, pollution, bad institutional coordination and illegal fishing or fish stock decrease will always have a bad impact on spatial planning system in Sulina coastal zone. Considering the problems of the study area, the insight matrix reveals also the fact that the population decrease, geo-morphological changes, coastal extension, natural risks and landscape fragmentation will always prevent spatial planning system to develop in coastal zone Sulina.

The CIB analysis leads to a list of 13 consistent combinations of strategic options. One of these thirteen combinations could be seen in the next table (Table 3). These 13 combinations are the most consistent ones from a possibility of more than 1000 combinations.

A. Infrastructure	A3. Rehabilitation the road from Sulina to Sf. Gheorghe
B. Industry	B4. General goods market – AZL
C. Agriculture	C1. Green house for vegetables
D. Tourism	D2. Touristic small harbour
E. Cultural patrimony	E1.Reabilitate patrimony buildings
F. Health services	F2. Facilities for doctors
G. Leisure	G3. Rehabilitate the playground park
H. Town development	H1. Building new residential places, change the land cover/use to pasture
I. Waste management	I1. Abolition of garbage dump
J. Biodiversity conservation	J2. Integrated Management for DDBR

Table 3 – Example of one list of one consistent combination of strategic options

7.2 Lesson learnt

One of the main lesson learnt consist in the productive and more natural conversations pattern within the sessions compared to interviews with one citizen at a time. Addressing issues with several citizens at once gets results more quickly and more accurately.

- Also a good moderator is the key to a constructive discussion especially when addressing to issues concerning a certain authority. Discussions can easily derail when it comes to responsibility of authorities and that's when the moderator intervenes.
- Thematic maps are the ground base of the discussions. Interactive planning determines the authorities to share knowledge and strengthen the community pride and cohesion. Also, these maps should have a more simplistic yet comprehensive design and their preparation must be a collective task.
- Good drawing skills for a methodic and clean representation of the discussed issues
- Should have return periods as a constant reminder for the authorities to take actions deal with the matters at hand discussed and agreed within the interactive sessions.
- Keeping in contact with stakeholders and avoid political debates.