8. Cyclades Archipelago (Greece)

1. Brief introduction of the Greek CASE

Cyclades Islands entered Greek sovereignty in 1833. The Cyclades is an island group in the Aegean Sea, southeast of mainland Greece and constitutes one of the administrative entities of Greece. In terms of administration they are divided in 9 provinces, 20 municipalities and 11 communities. They form one of the island groups which constitute the Aegean archipelago. The Cyclades comprise about 220 islands, the major ones being Amorgos, Anafi, Andros, Antiparos, Ios, Kea, Kimolos, Kythnos, Milos, Mykonos, Naxos, Paros, Folegandros, Serifos, Sifnos, Sikinos, Syros, Tinos, and Thera or Santorini. Most of the smaller islands are uninhabited. Ermoupolis city (37°27N 24°54E), on Syros, is the capital and administrative center of the prefecture (Fig. 1). The islands are peaks of a submerged mountainous terrain, with the exception of two volcanic islands, Milos and Santorini (Thera). The total area of the islands is 2572 km² with 120000 inhabitants.

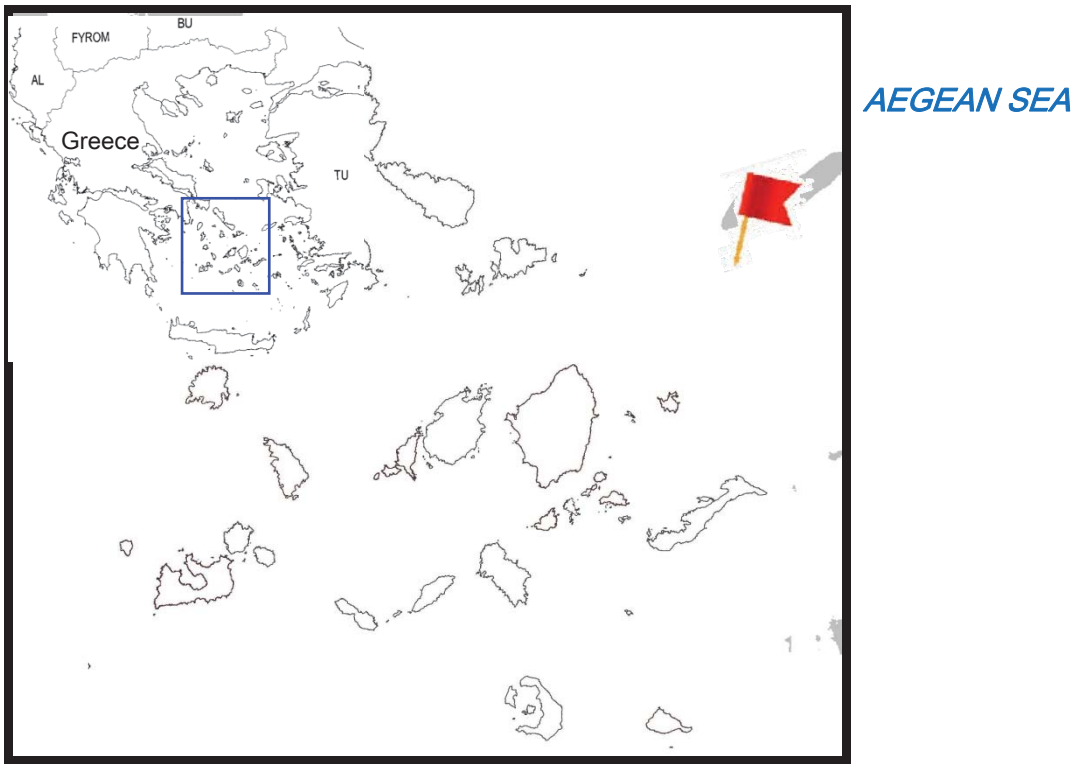


Figure 1.1. Map showing Cyclades region with capital

The Greek coastal zone is of particular importance, both on economic - development, as well as on environmental - cultural terms. The value of the Greek coastal zone is proven, among others, by statistics, e.g. its area of some 132,000 km² and coastline length of 15,000 km, with 40% thereof belonging to islands. Every 1 km² corresponds to 113 m of shore, when the global average does not exceed 5 m.

However, the situation is as follows (adopted from TEE, 2009):

- Greece does not have a comprehensive legal framework in place for integrated/sustainable coastal zone management. These issues are currently addressed in a fragmented manner through regulations mainly on land development and environmental policy level and individual space and sectoral policies (tourism, urban development, industry, environment, etc.).
- The development and implementation of coastal policy in Greece is still weak.
- Coastal environment management plans are not effectively implemented, while a large number of regulations has not been implemented or has been displaced after a short implementation period.
- On the administrative level, there is no mechanism responsible for the co-ordination and arbitration of initiatives and actions regarding coastal management. The coastal planning system is fragmented between national, regional and local bodies. It is characterized by many gaps and duplication, resulting in conflicts of jurisdiction in decision making. It is often oriented to addressing problems of the past and cannot foresee future needs and problems. The achievement of governance and inter-sectoral co-ordination in all levels constitutes a condition for the rational management of Greek coastal life.
- Local communities, research bodies, environmental and social organisations and professional associations do not participate systematically and jointly, together with the central government, in the development of a policy for sustainable sea and coastal resources management.
- The lack of information and effective information collection and exchange systems, the insufficiencies in environmental awareness and the low public participation in almost all decision making levels constitute additional obstacles to resolving the problems and to anticipating and preventing serious conditions in the future.

The preparation of Greek authorities for the drawing up of a national programme on the sustainable development of coastal areas and islands (Ministry of Environment, Physical, 2008) includes the following main objectives (adopted from TEE, 2009):

- Setting of general and special targets for coastal areas sustainable development.
- Demarcation of the coastline and the critical coast area as an area of national responsibility for the protection of natural ecosystems and the securing of free and unimpeded access.
- Identification and demarcation in all coastal areas of a wider zone in order to exercise coastal management policy.
- In areas under significant pressure for development, the purpose of development must identify the application rules of development plans, ensuring preservation of natural resources and ecosystems.
- In areas facing environmental degradation problems due to extensive development, the management purpose must be environmental upgrading through the improvement of natural resources, the protection of ecosystems' operation and the upgrading of human activities.
- In areas free of severe impact due to human activity, the purpose of management must be to secure their protection as national reserves.
- For every type of coastal area, the desired and permitted uses must be determined,

on condition that sufficient public access to the coast is ensured.

- Preparation of a certain procedure for the approval and licensing of all significant projects and activities sited in coastal zones.

2. Coastal Issue Selection Process

2.1. Selected Issues

The selected issues for the Greek CASE were:

- fisheries
- tourism
- maritime transportation

The selected issues in this case are the core of the economic activity and development objectives for the islands and they exhibit a strong relationship between them. The main economic activity for the islands since ancient times by tradition is primary production (agriculture, livestock and fisheries) while later, tourism became the primary objective for development. Tourism development is based solely on the exploitation of local resources In order to satisfy the needs of the visitors (one of which is the production of food given also the relative isolation of the Cyclades islands from the mainland) and also transportation infrastructure suitable to cover the moving needs of the visitors and raw materials both qualitatively and with safety. Finally maritime transportation is the basis of any development for the islands because it is practically the only platform for the transportation of people and goods interconnecting all the economic activities (those related to the coast and others) creating also a negative externality (risk) related to maritime accidents.

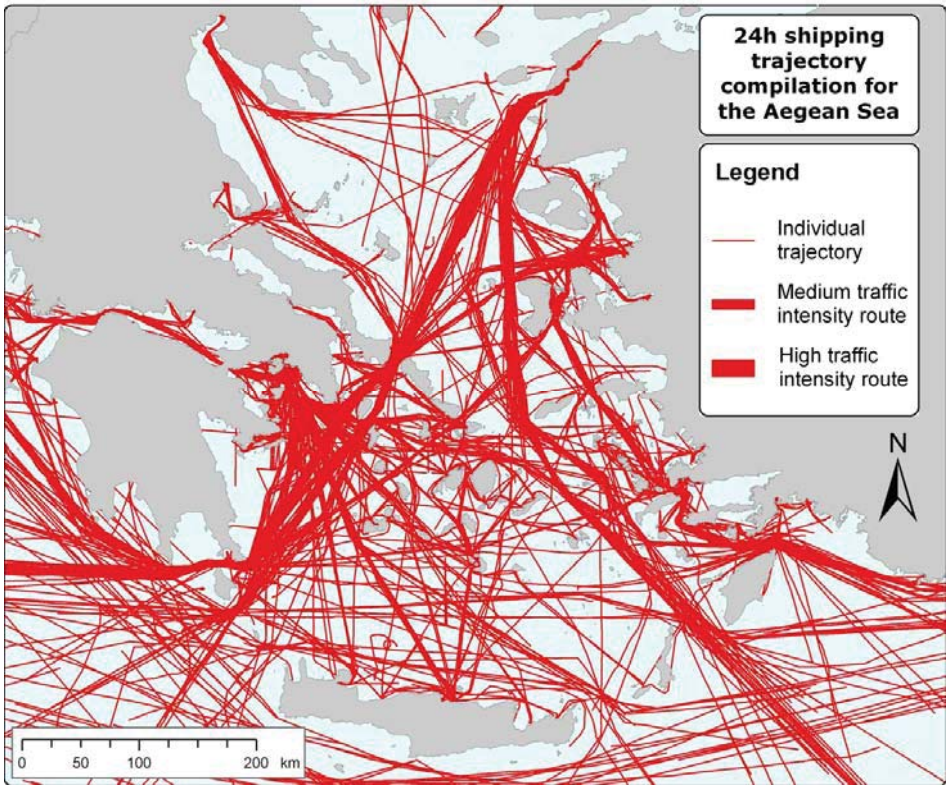


Figure 2.1. 24h shipping density in Central Aegean Sea

In terms of facts and figures, we can have the following:

- **fisheries**: mainly important for job and income security of the islands and the small rural communities dependent on fisheries that exist here. In terms of users, we may estimate that professional fishermen and the dependent persons (family members and fish workers on board or on dock) are 891 fishing vessels with 1337 fishermen working on board and 3564 dependent persons on average summing up to 4901 people dependent from fisheries (=4.15% of total population). The value of their production (based on national average, National Program for Fisheries Data Collection) for vessels < 13 m (LOA) is 39,383,982.00 € (2011).
- **tourism**: a 'trendy' economic activity much preferred by the locals in relation to agriculture. Tourism is the main objective for development for the islands. In terms of facts and figures, in 2011 almost 570,000 tourists (nationals and internationals) arrived to Cyclades islands[28]. With an average of 4 days per person and an average expenditure of 79 €/day, the value of tourism for the region is 180,120,000.00 € per year (2011).
- **transportation**: transportation is a declining sector lately due to the financial crisis and the decommissioning of many vessels (ferries) due to their age (according to the law, a ferry vessel has a useful and safe life span of 35 years before scraping). In terms of facts and figures, arrivals to Cyclades region by ferries in 2006 were 4,039,983 persons and 2,347,665 tn of merchandise giving an estimated value of minimum 941,616,090.00 € (average cost of online booking per passenger with 1 normal car, no cabin, economy=230 €) only from the passengers while from the merchandise can be up to 24,000,000.00 € (appx. 8-10 € per m^3).

[28] National Statistical Survey of Greece 2011 database

2.2. Context

ICZM is an extremely complicated localized process with several common characteristics (guidelines) as described in the protocol. Within the Cyclades CASE, six (6) interacting modules of issues have been identified:

- social
- environmental
- population
- business
- infrastructure
- planning

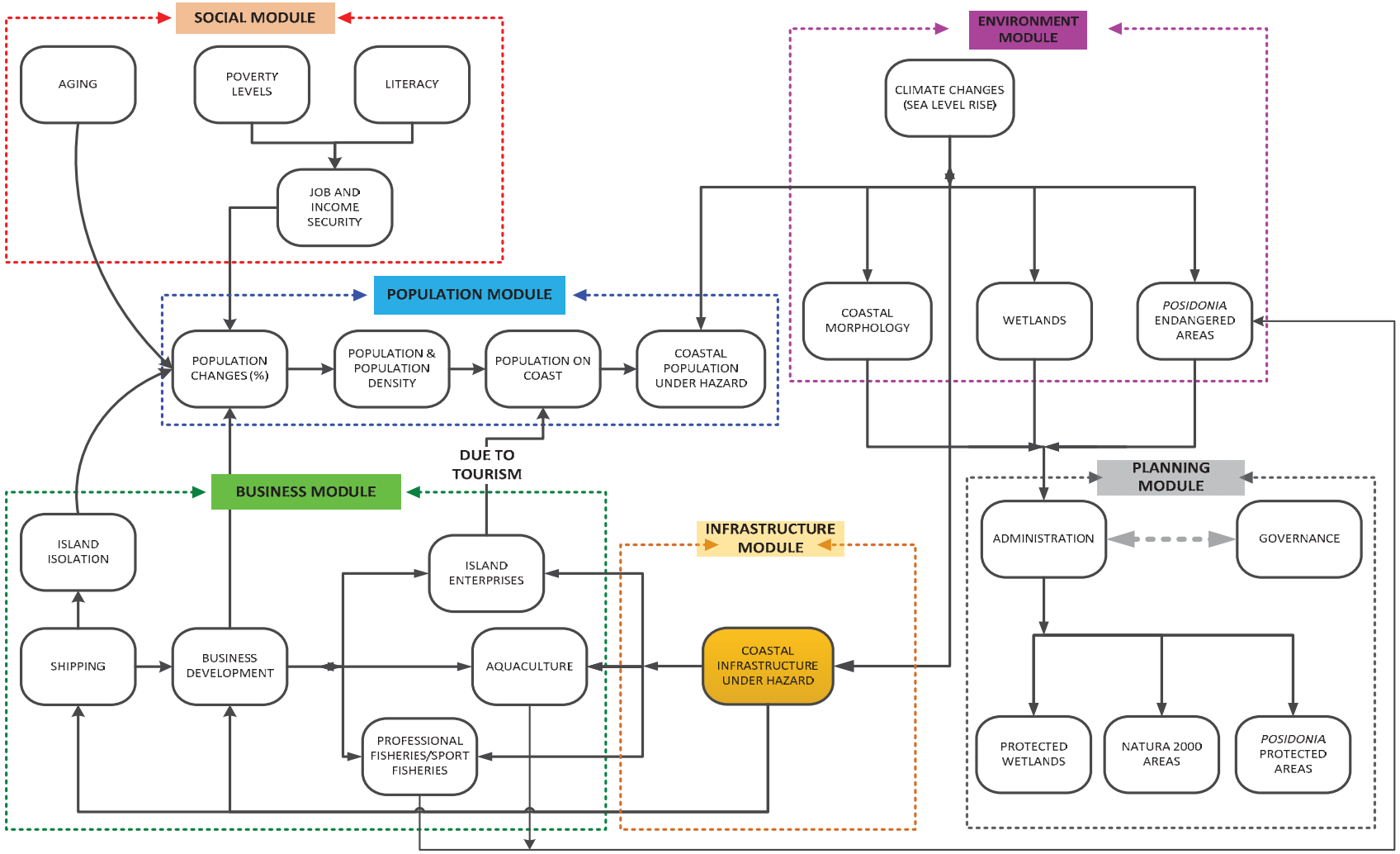
All modules include drivers, pressures, impacts, responses and states and in some cases the same issue can be more than 1 (pressure/state or driver/pressure) at the same time.

In the specific terms that are expected for the regional assessment, there are 2 important modules: (a) the population module and (b) the environmental module. The population module is affected primarily by the social state (aging, labour, poverty and literacy indicators) and the business module (enterprise, shipping, aquaculture and fisheries indicators) creating pressure along the coastline in terms of increased number of coastal inhabitants and urban sprawl (for tourism mainly). At the same time, the coastal habitation and infrastructure building increases (a) the probabilities of hazard from climate changes (sea level rise mainly) to the population, the ecosystem and the infrastructure and (b) the development of coast related business such as fisheries[29] and aquaculture. Infrastructure hazards feedback and affect the development of businesses while the economic sectors as fisheries and aquaculture have a negative effect on coastal sensitive ecosystems. Finally, administration module interferes in the process providing (a) urban plans and (b) designating protected areas for NATURA 2000 / Birds / Habitats/ Posidonia beds. Of course administration is a major constituent of the network since it affects all issues with (a) the planning, (b) the legislation, (c) the policies/priorities and (b) its capacity to mitigate negative effects of internal or external drivers of the system.

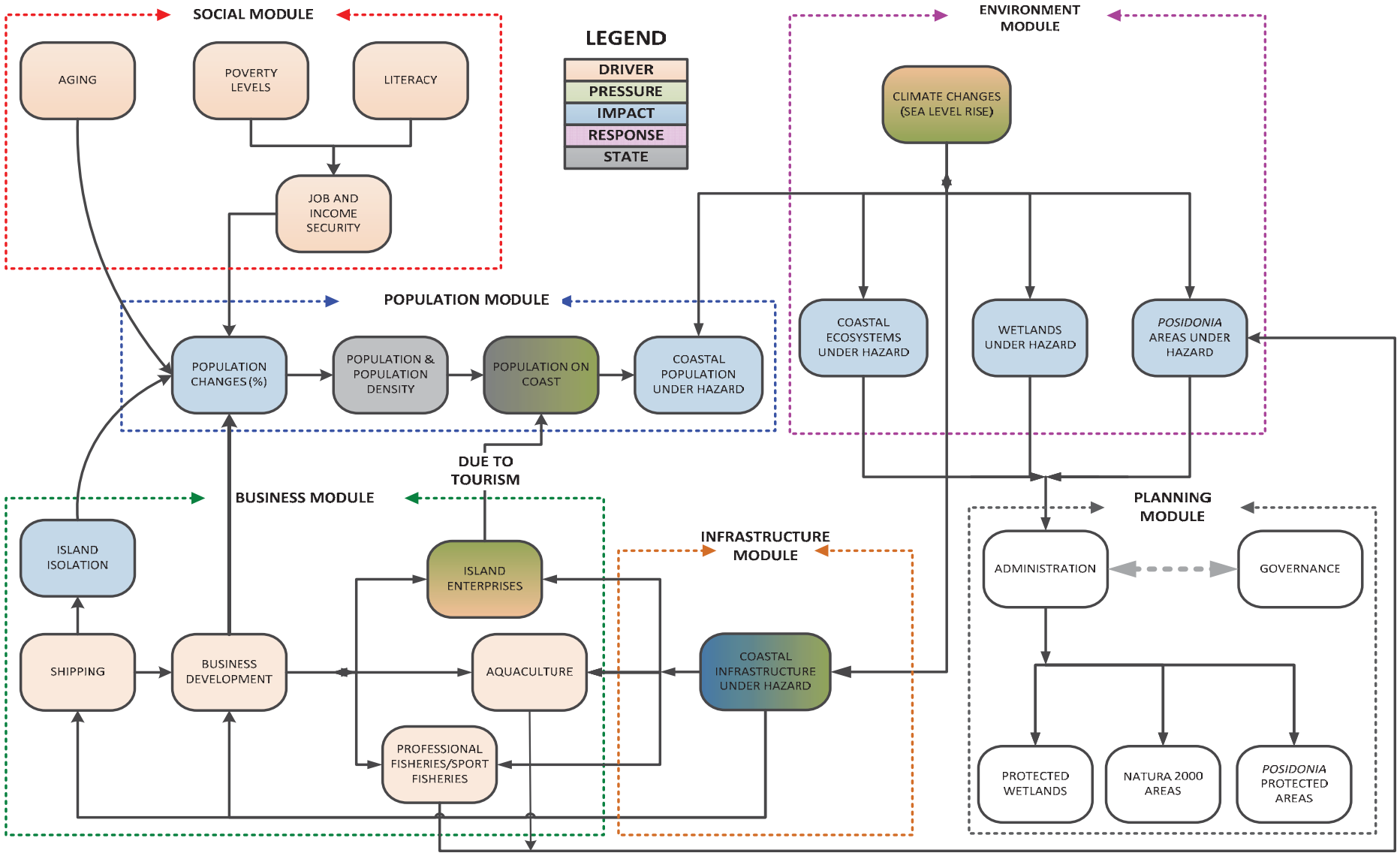
Both illustrations regarding the network of interactions of the Cyclades system and the DPSIR network of these issues is illustrated below (see 2.2.1. and 2.2.2.).

[29] for the purpose of this study, fisheries include professional capture fisheries and sport fisheries

2.2.1. Cause-effect network



2.2.2. DPSIR network



2.3. Indicators

The approach to integrated coastal zone management in Cyclades regions was based on the following indicators in detail:

1. Population

Origin:	local development plans and studies National Statistical Survey of Greece
Period:	1971-today
Method:	data analysis; spreadsheets
Availability:	free through Internet
Restrictions:	none
Scale:	municipality (= per island)
Number of products:	12 maps

2. Land data (area, coastline)

Origin:	local development plans and studies National Statistical Survey of Greece HCMR Fisheries Data Centre GIS
Period:	N/A[30]
Method:	GIS[31]
Availability:	free through Internet
Restrictions:	none
Scale:	municipality (= per island)
Number of products:	N/A

3. Sea level rise effects on coast

Origin:	Fisheries Data Centre GIS Geographical Survey of Greek Army
Period:	N/A[32]
Method:	data analysis; spreadsheets
Availability:	published in conference
Restrictions:	none
Scale:	municipality (= per island)
Number of products:	3 maps

4. Wetlands and protected areas

Origin:	Greek Government Official Journal Ministry of Environment, Energy and Climate Change sources

[30] Not applicable
[31] ESRI ArcView/ArcInfo
[32] Not applicable

	HCMR Fisheries Data Centre GIS Island coastline maps NATURA 2000 maps
Period:	N/A[33]
Method:	GIS; spreadsheets
Availability:	free through Internet
Restrictions:	none
Scale:	municipality (= per island)
Number of products:	12 maps

5. Fishing fleet

Origin:	HCMR Fisheries Data Centre GIS National Statistical Survey of Greece EU fleet register
Period:	N/A
Method:	GIS
Availability:	free through Internet
Restrictions:	none
Scale:	municipality (= per island)
Number of products:	1

6. Entrepreneurship indicators

6.1. Island attractiveness
6.2. Island accessibility = index of isolation
6.3. Number of enterprises
6.4 Ratio of enterprises

Origin:	PhD study National Statistical Survey of Greece Cyclades Chamber of Commerce
Period:	2002-2005
Method:	GIS;
Availability:	free through Internet
Restrictions:	none
Scale:	municipality (= per island)
Number of products:	4

7. Social Indicators

7.1. Aging indicator (>65)
7.2. Youth indicator (<24)
7.3. Level of illiteracy

[33] Not applicable

Origin:	National Statistical Survey of Greece
Period:	2000-2013
Method:	GIS
Availability:	free through Internet
Restrictions:	none
Scale:	municipality (= per island)
Number of products:	6 maps

8. Economic indicators

8.1. Level of unemployment (in total population)
8.2 Level of unemployment (in economically active population)
8.3 Income sufficiency indicator (population below poverty level)

Origin:	National Statistical Survey of Greece
Period:	2000-2013
Method:	GIS
Availability:	free through Internet
Restrictions:	none
Scale:	municipality (= per island)
Number of products:	6 maps

9. Renewable energy production

Origin:	Background (state study) study for Cyclades development
Period:	N/A
Method:	GIS
Availability:	free through Internet
Restrictions:	none
Scale:	municipality (= per island)
Number of products:	1 map

2.4. Relation of selected indicators to PEGASO indicators.

The above indicators correspond to the PEGASO indicator groups as following:

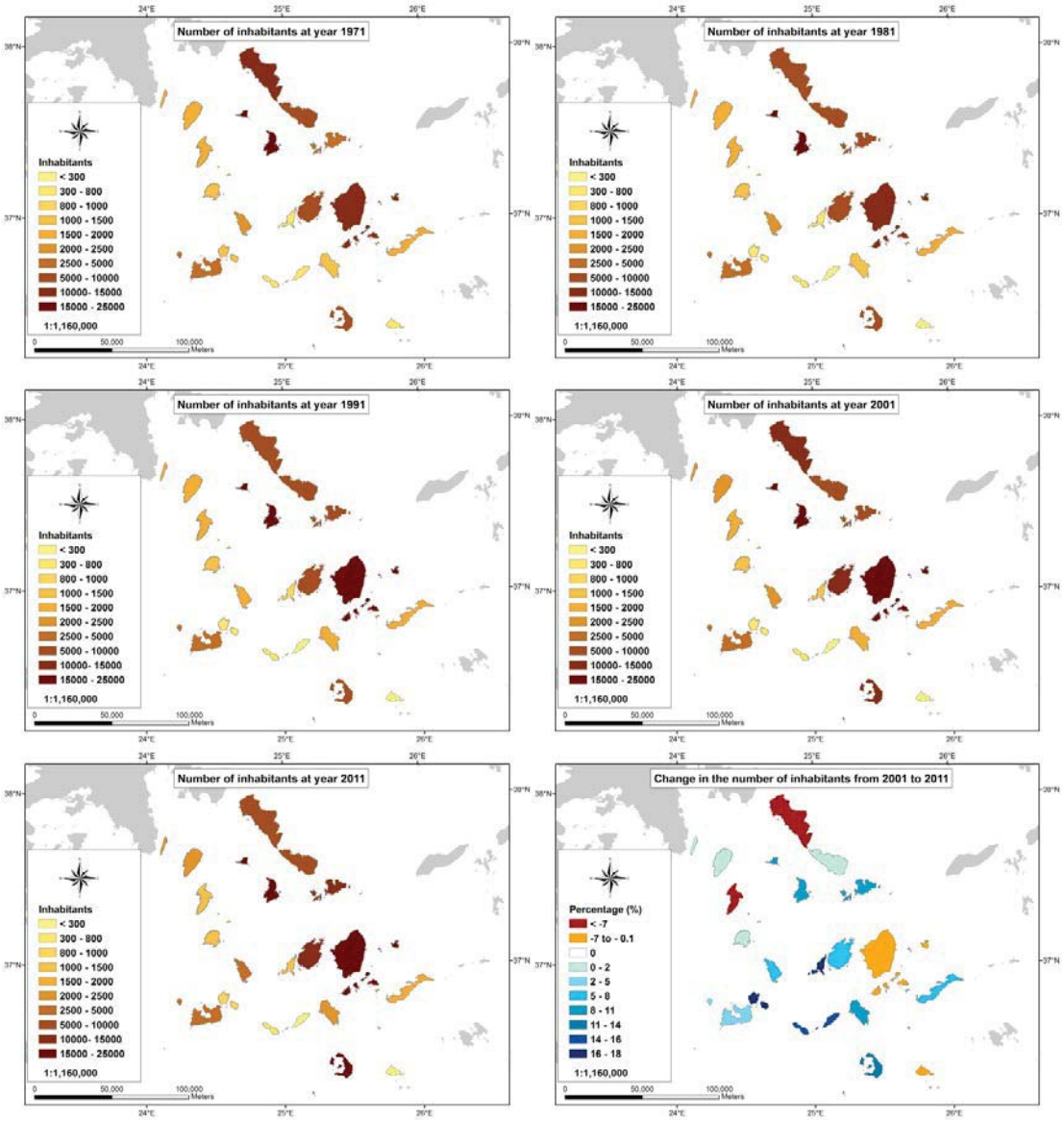
Natural Capital	3. Sea level rise
	4. Wetlands and protected areas
Public Service	6. Entrepreneurship indicators
	8. Economic indicators
	9. Renewable energy production
Balanced use	1. Population
	5. Fishing fleet
	7. Social Indicators

The sole purpose of and data (indicator 2) is to provide areas and lengths suitable to calculate spatial indicators

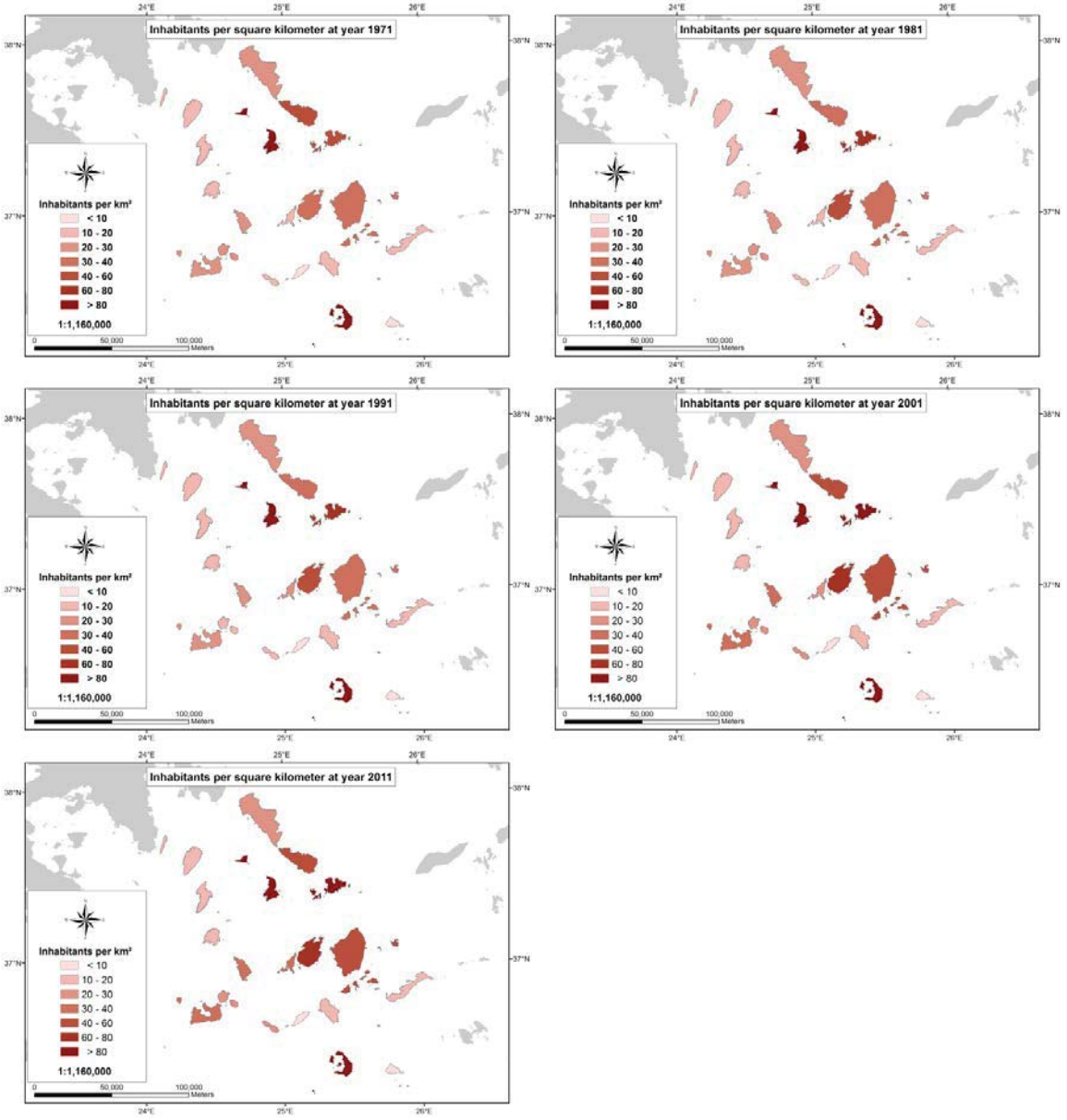
2.5. Indicators

2.5.1. Population indicators (1971-2011)

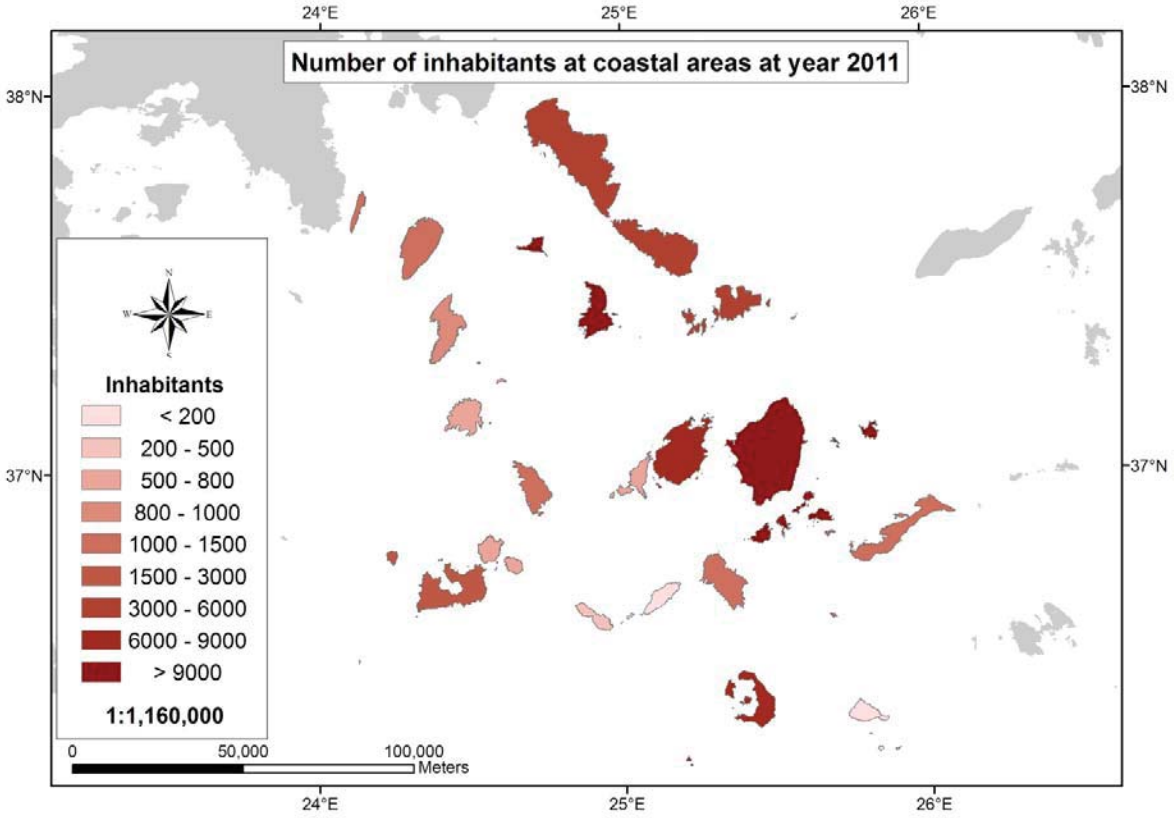
2.5.1.1. Population 1971-2011 and % change



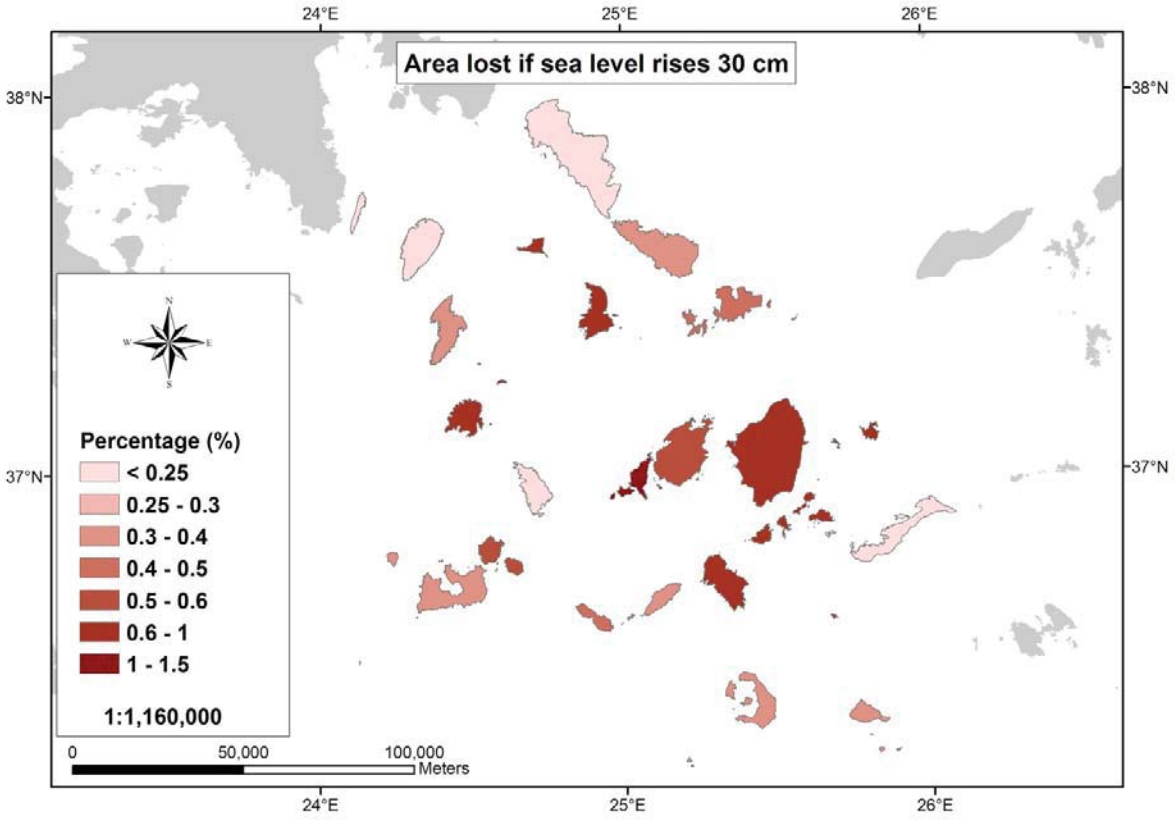
2.5.1.2. Population density 1971-2011

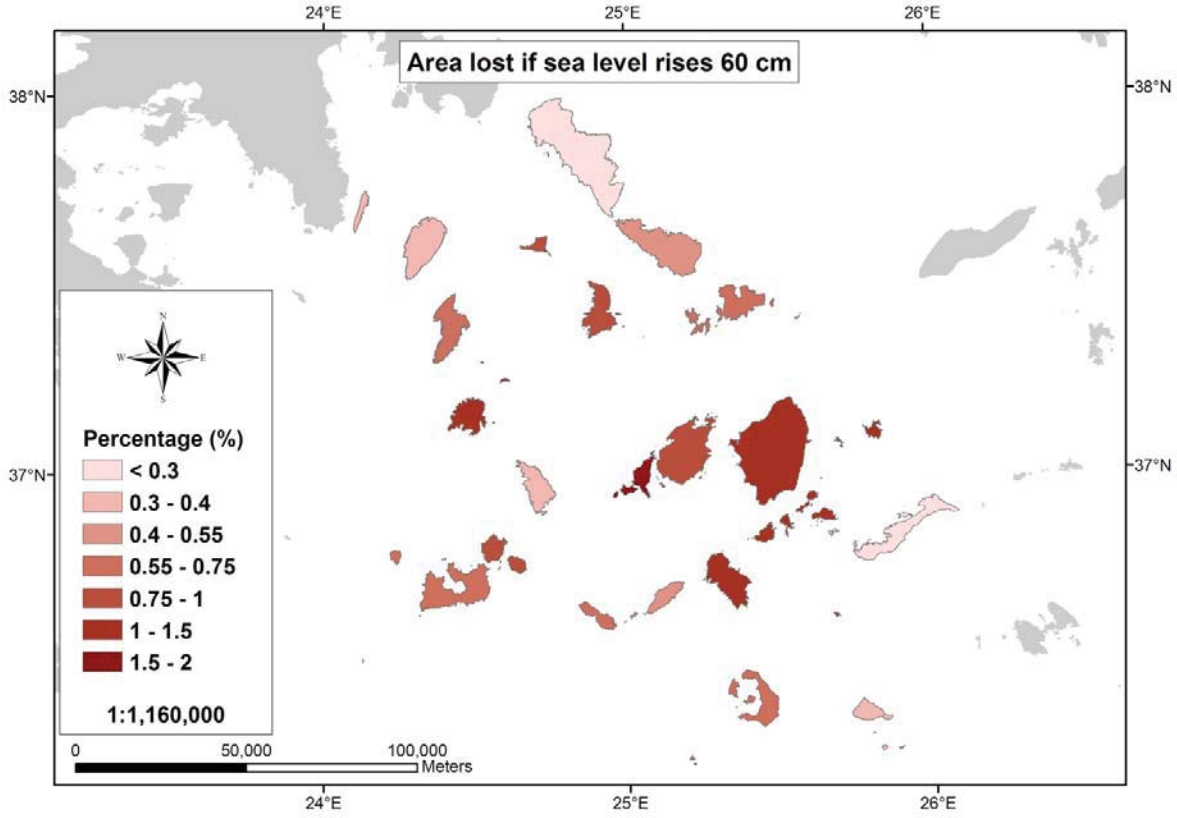


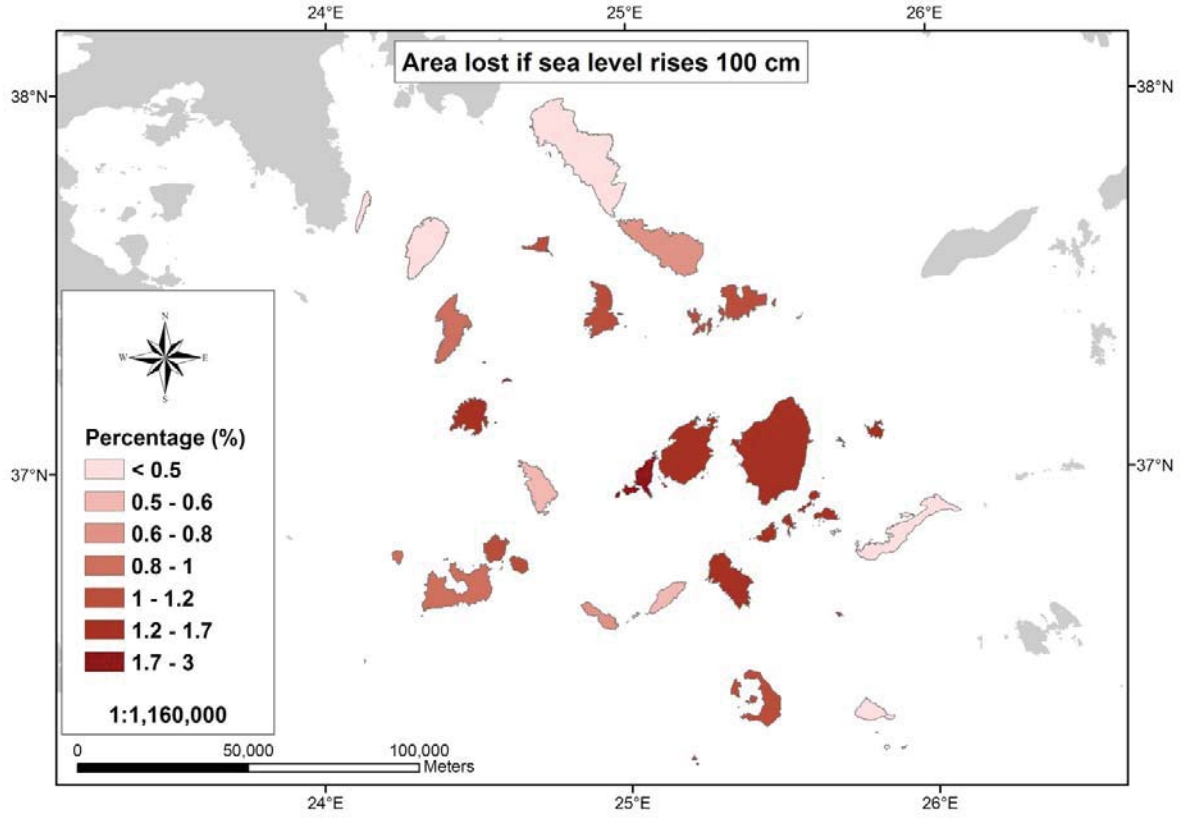
2.5.1.3. Population on coast, 2011



2.5.2. Hazard indicators

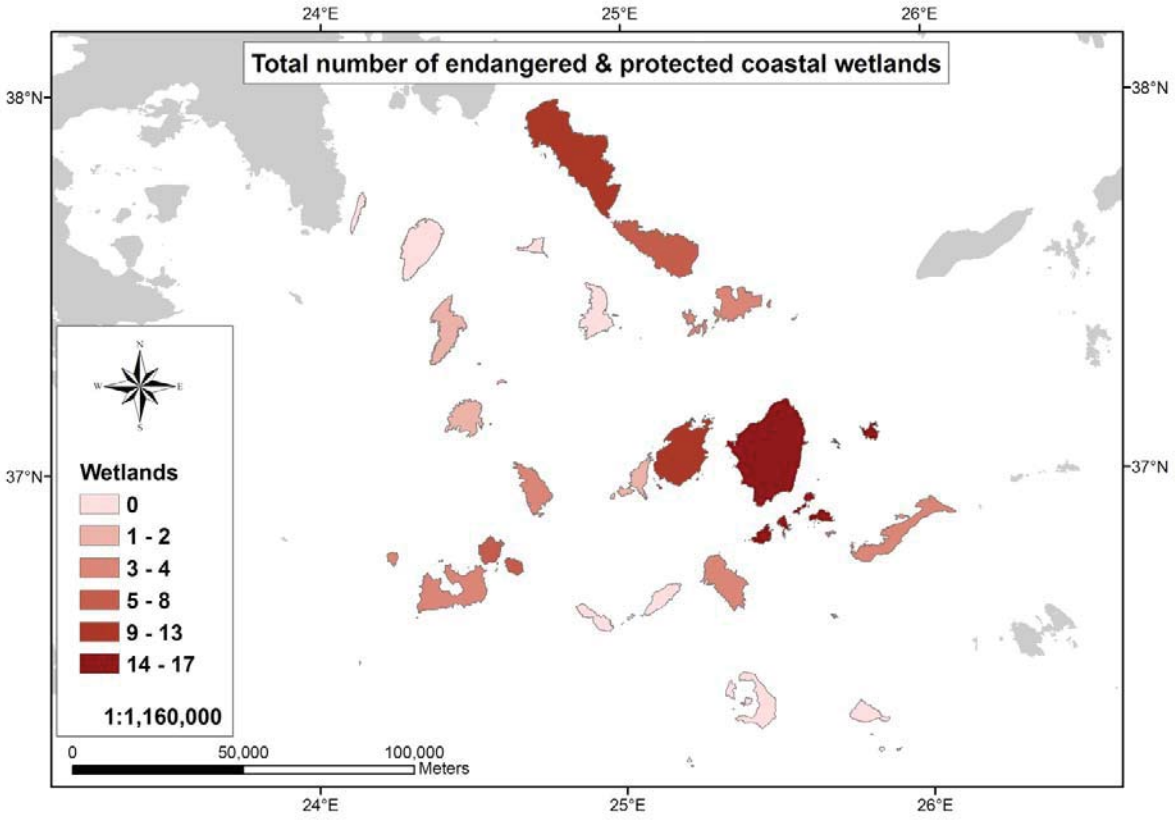



Area lost if sea level rises 60 cm
24°E
25°E
26°E
38°N
37°N
Percentage (%)
< 0.3
0.3 - 0.4
0.4 - 0.55
0.55 - 0.75
0.75 - 1
1 - 1.5
1.5 - 2
1:1,160,000
0
50,000
100,000
Meters

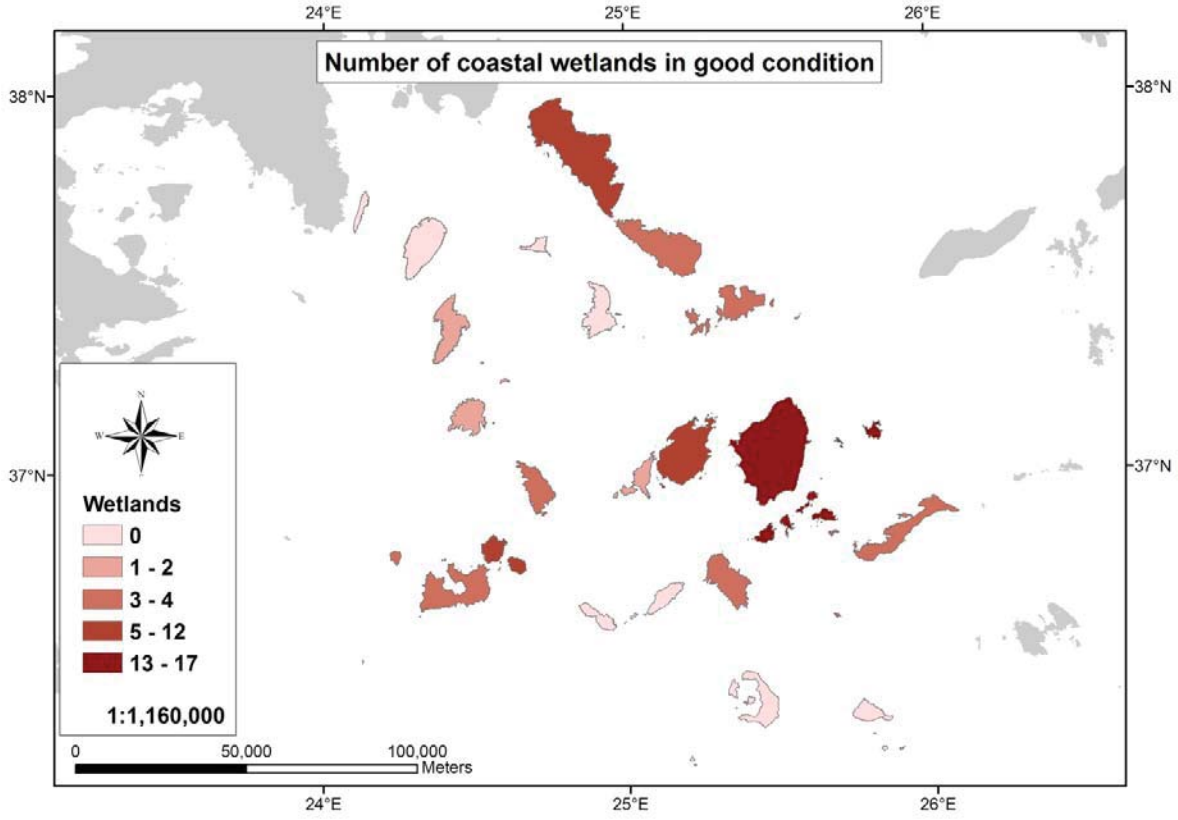

Area lost if sea level rises 100 cm
24°E
25°E
26°E
38°N
37°N
Percentage (%)
< 0.5
0.5 - 0.6
0.6 - 0.8
0.8 - 1
1 - 1.2
1.2 - 1.7
1.7 - 3
1:1,160,000
0
50,000
100,000
Meters

2.5.3. Protected habitat indicators

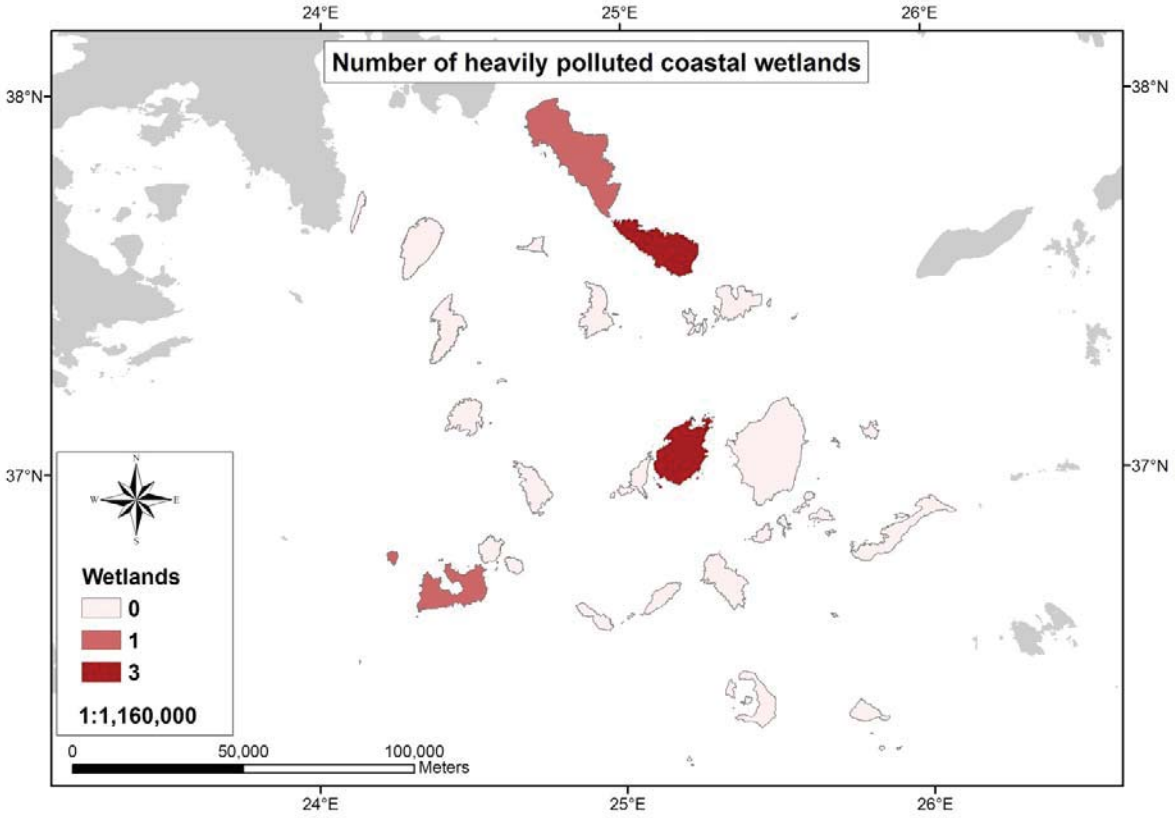
2.5.3.1. Endangered wetlands



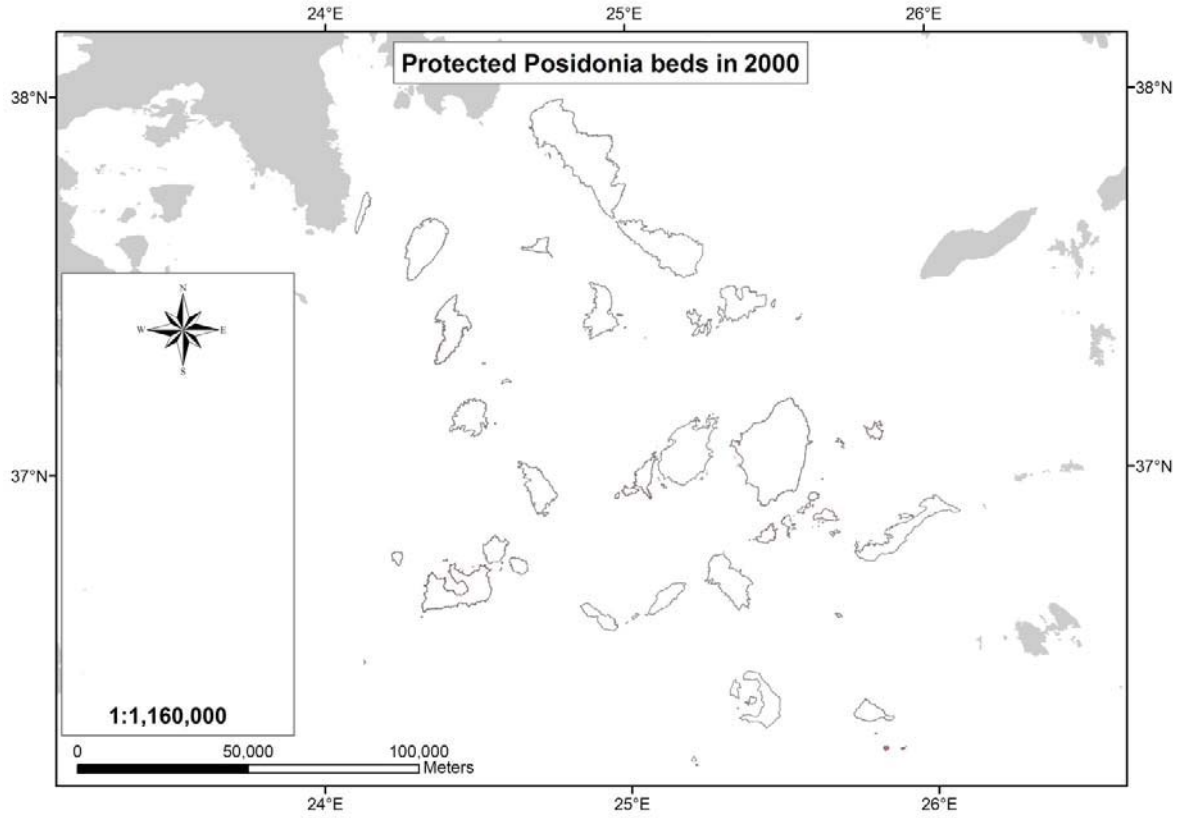
2.5.3.2. Wetlands in good condition

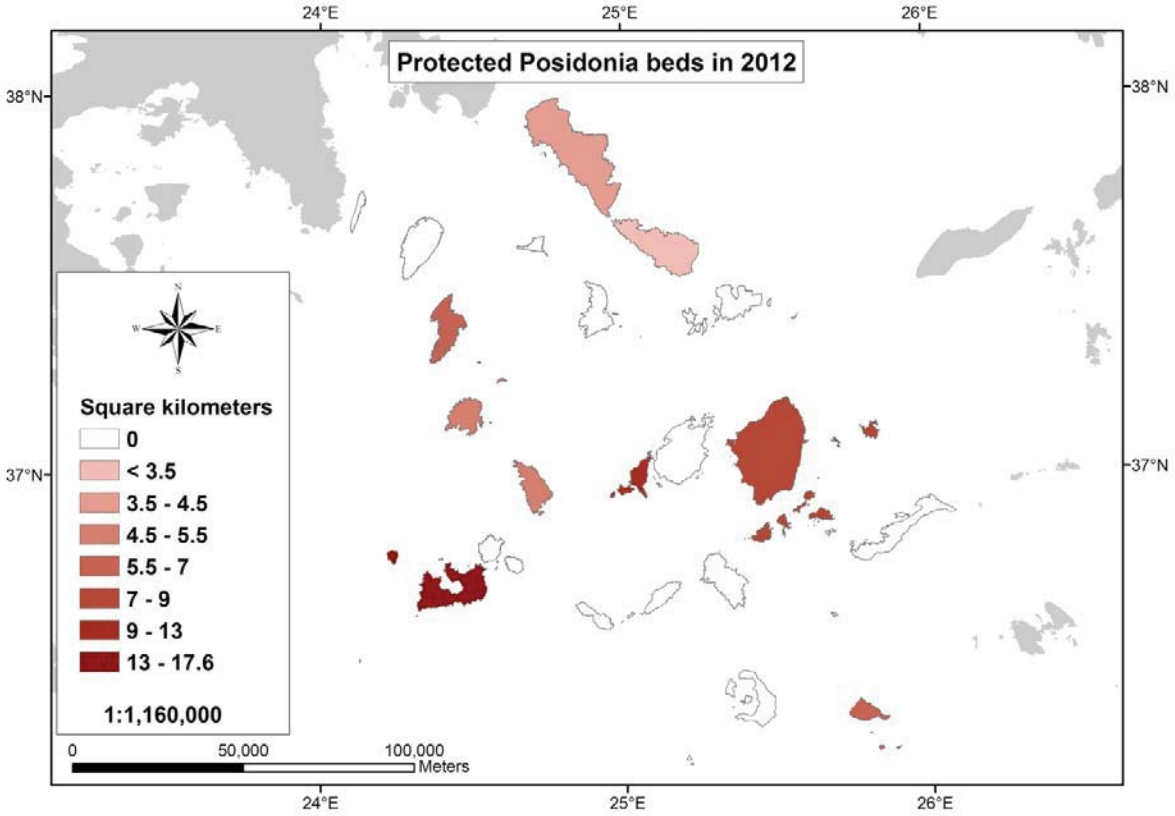


2.5.3.3. Wetlands polluted

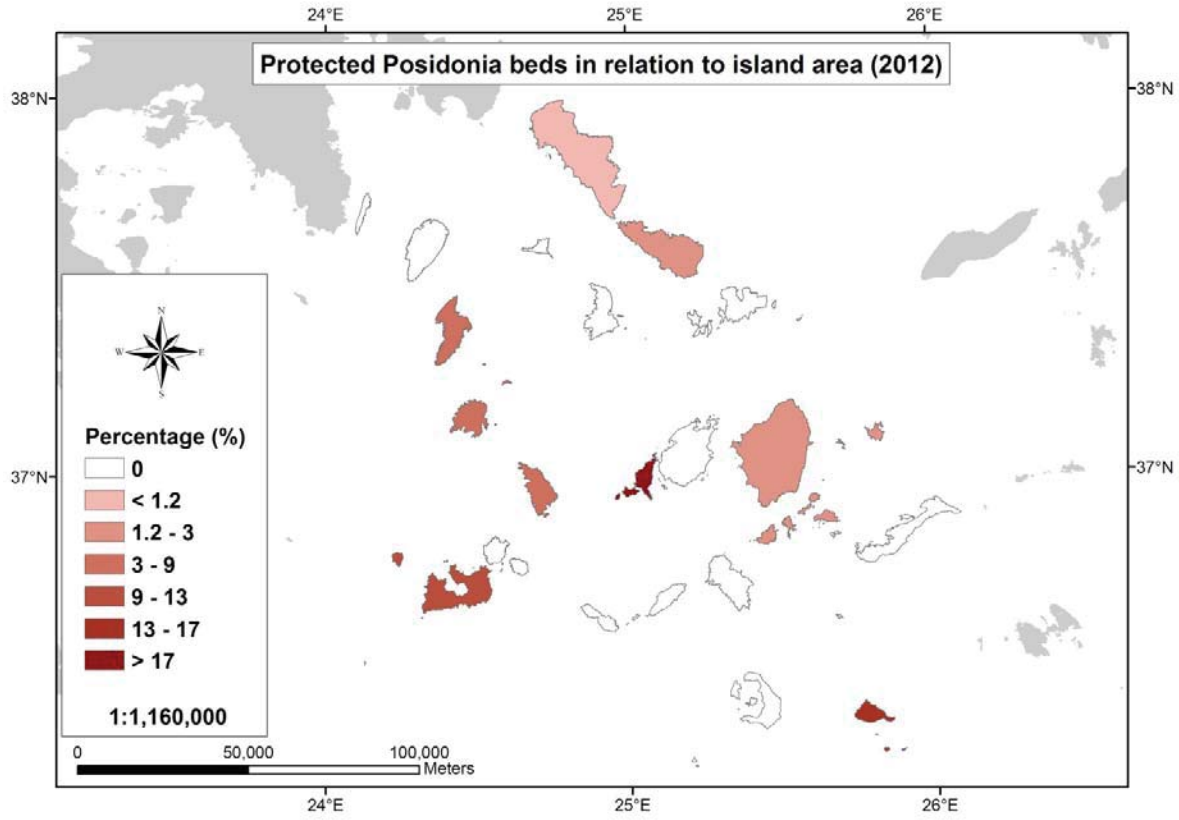


2.5.3.4. Protected Posidonia beds

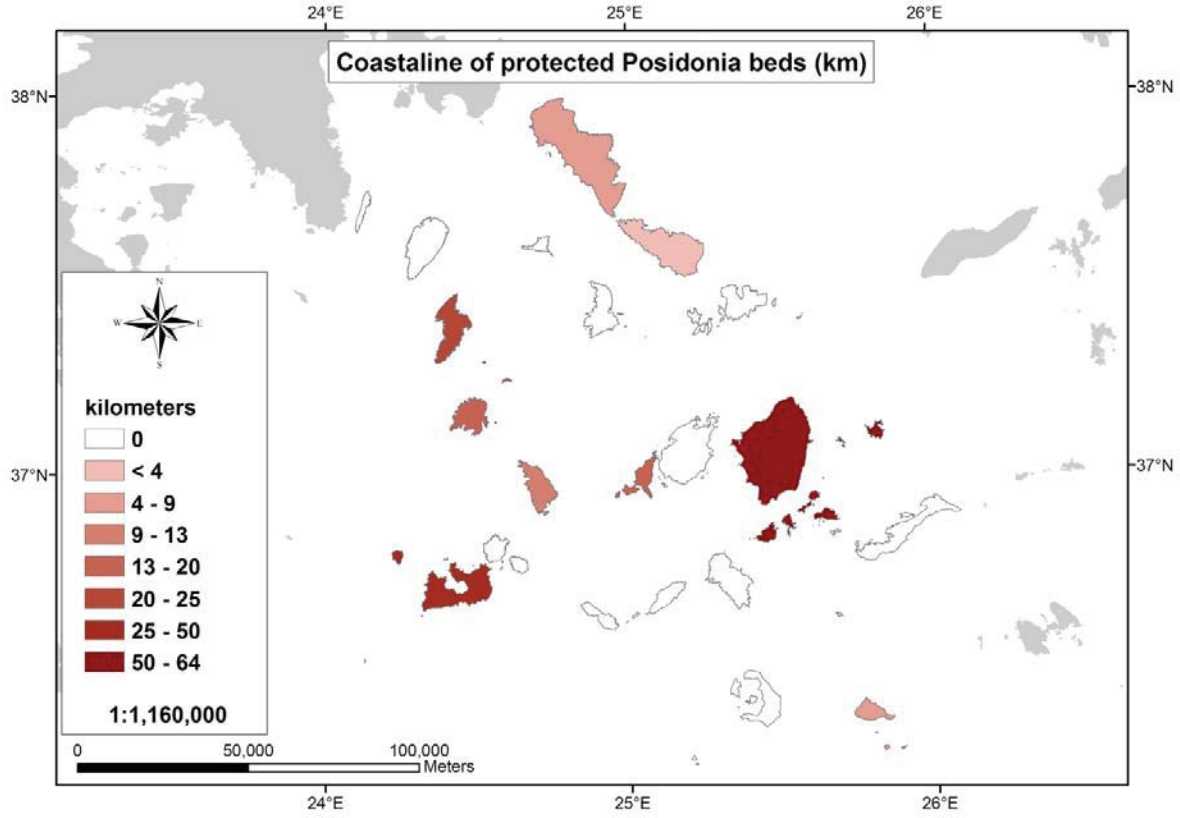




White polygons indicate no value



white polygons indicate no value



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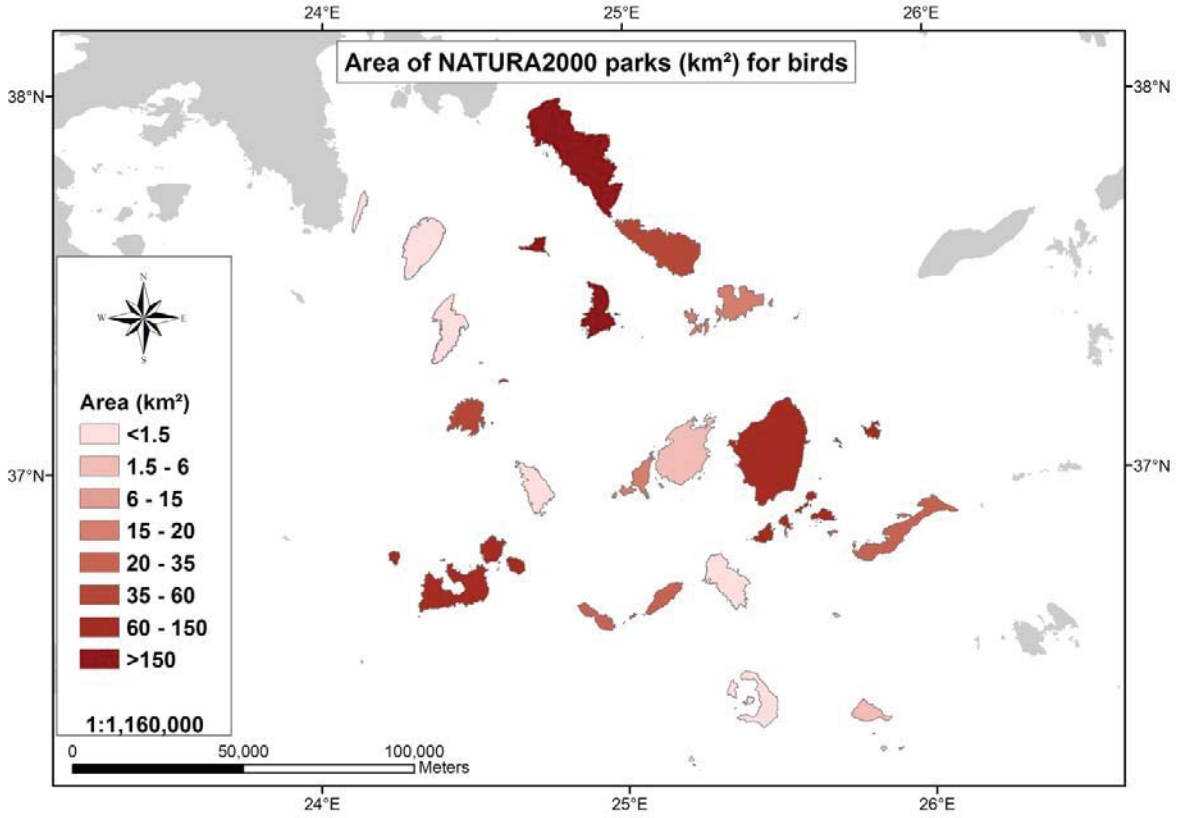
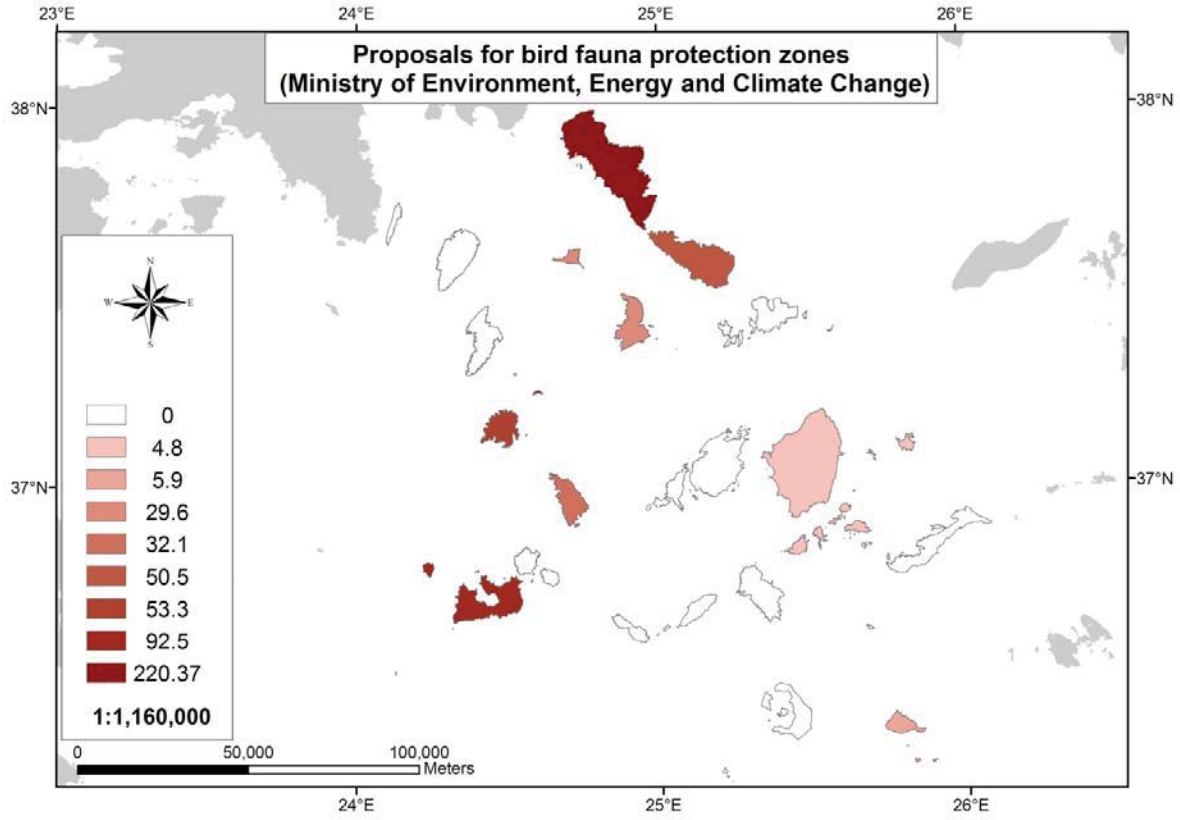
2.5.3.5. Bird fauna protected areas





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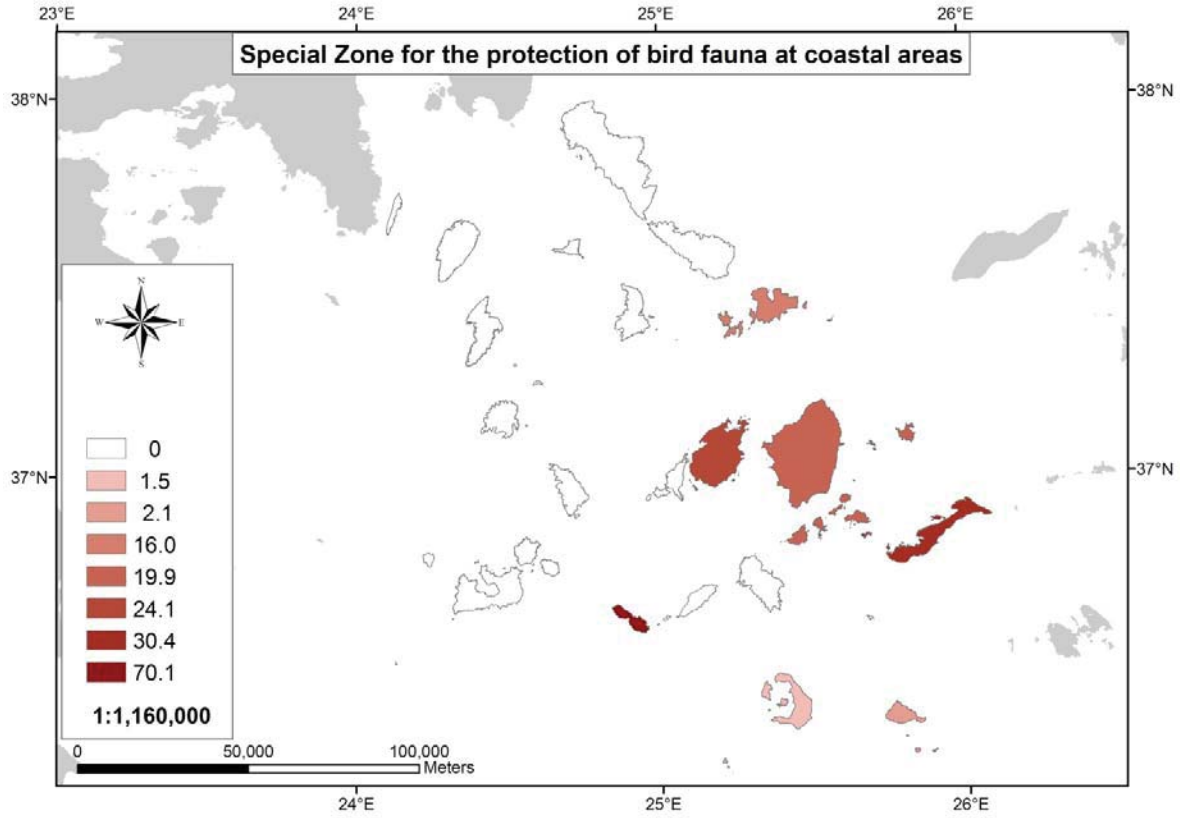

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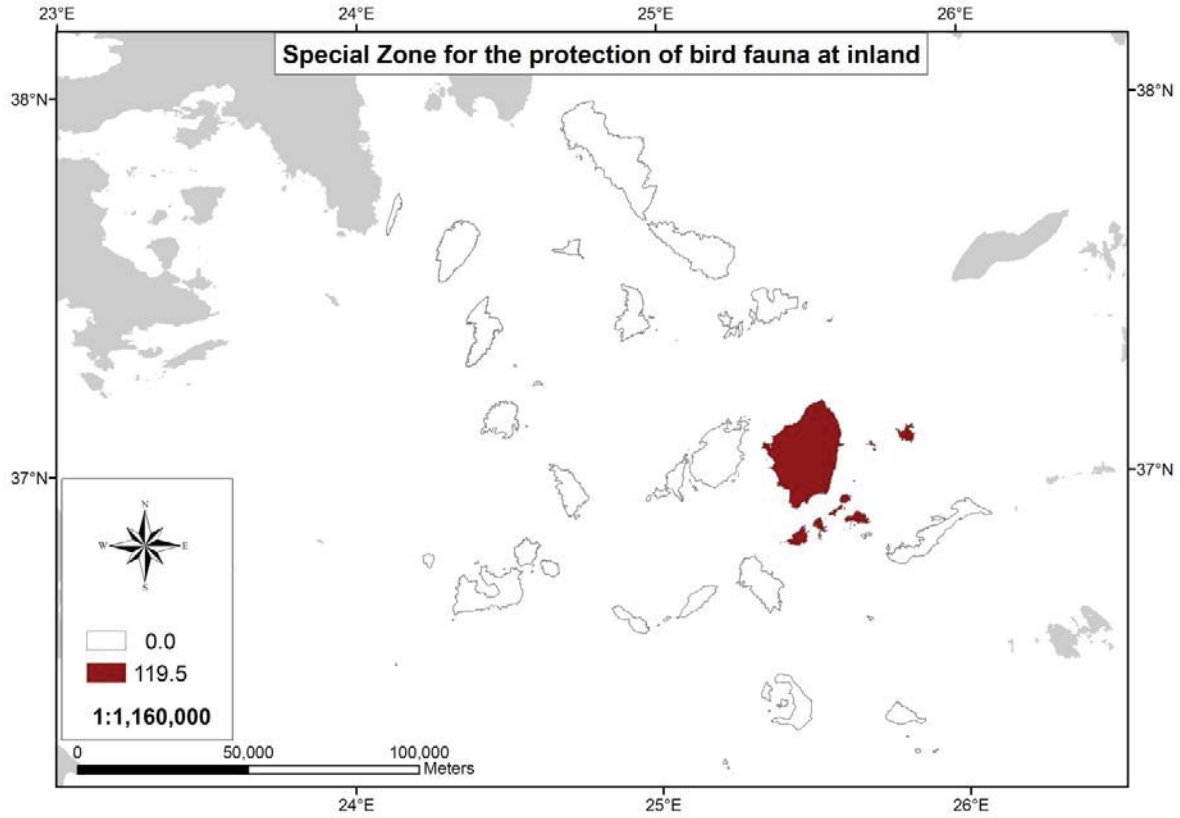
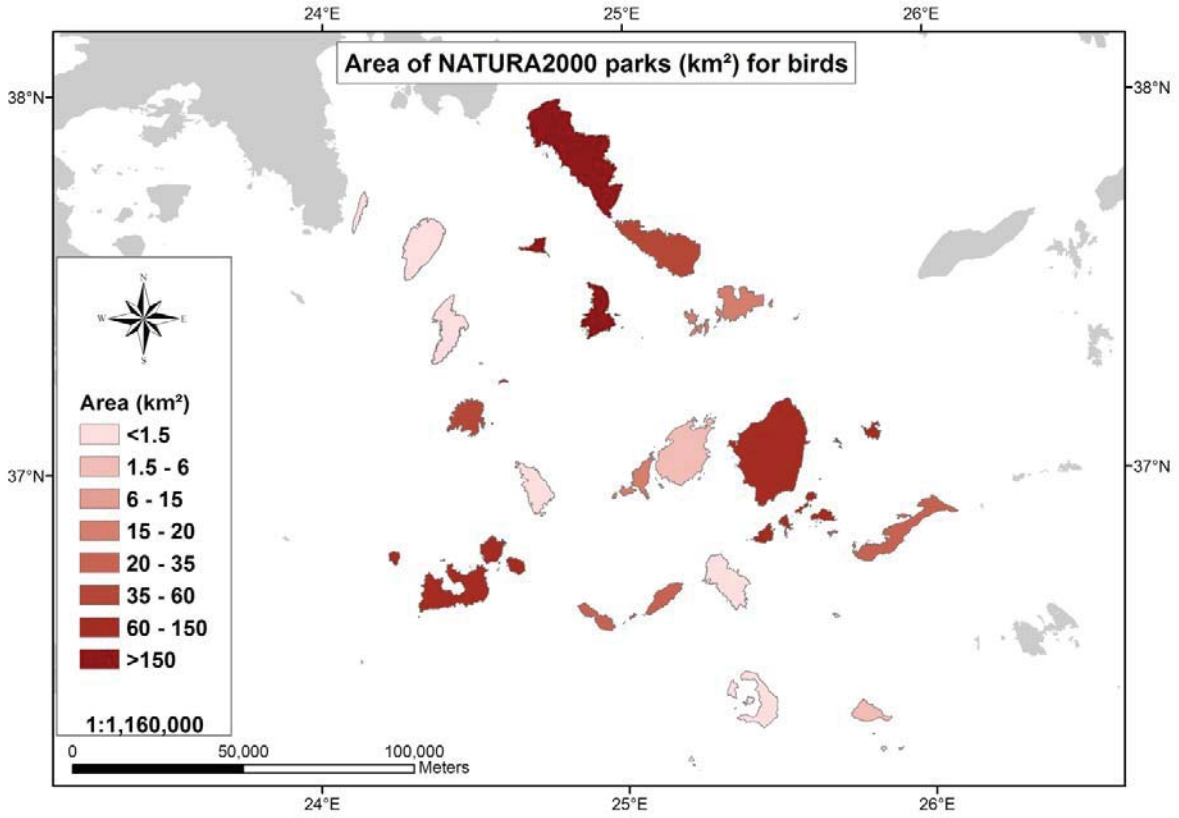
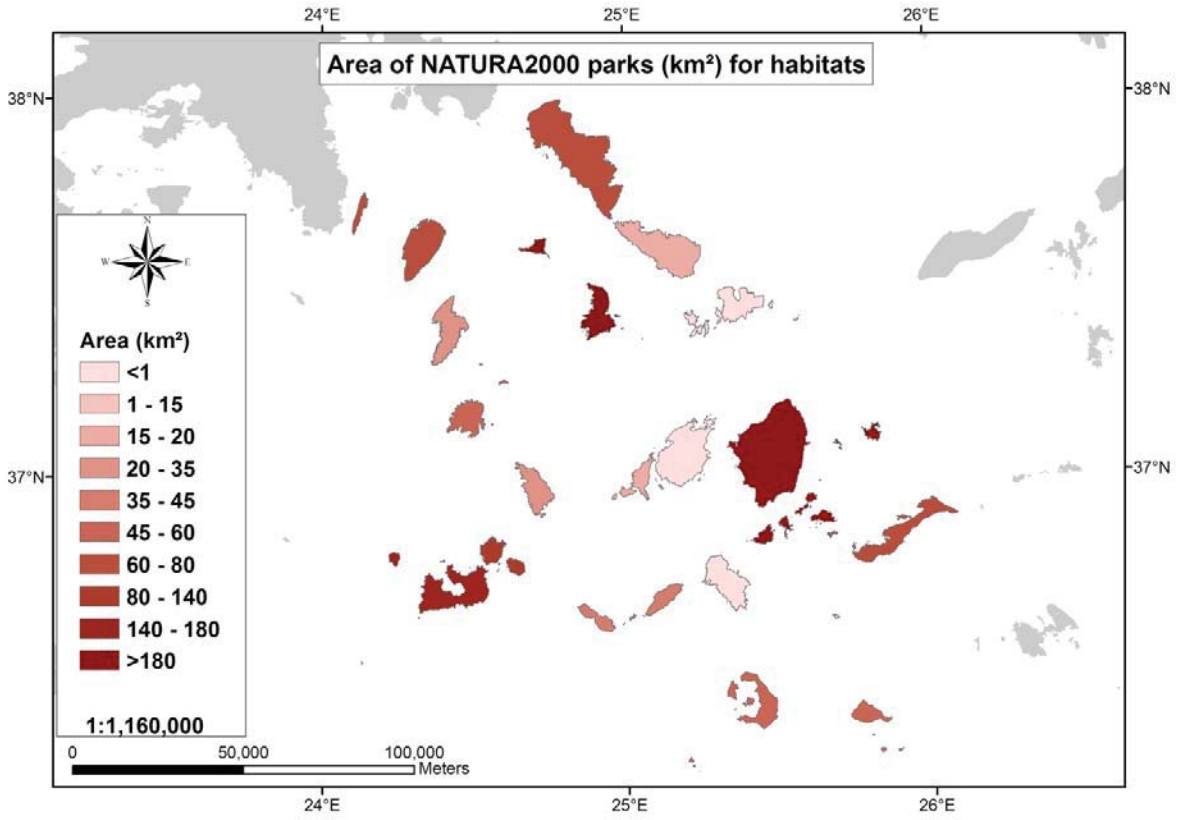


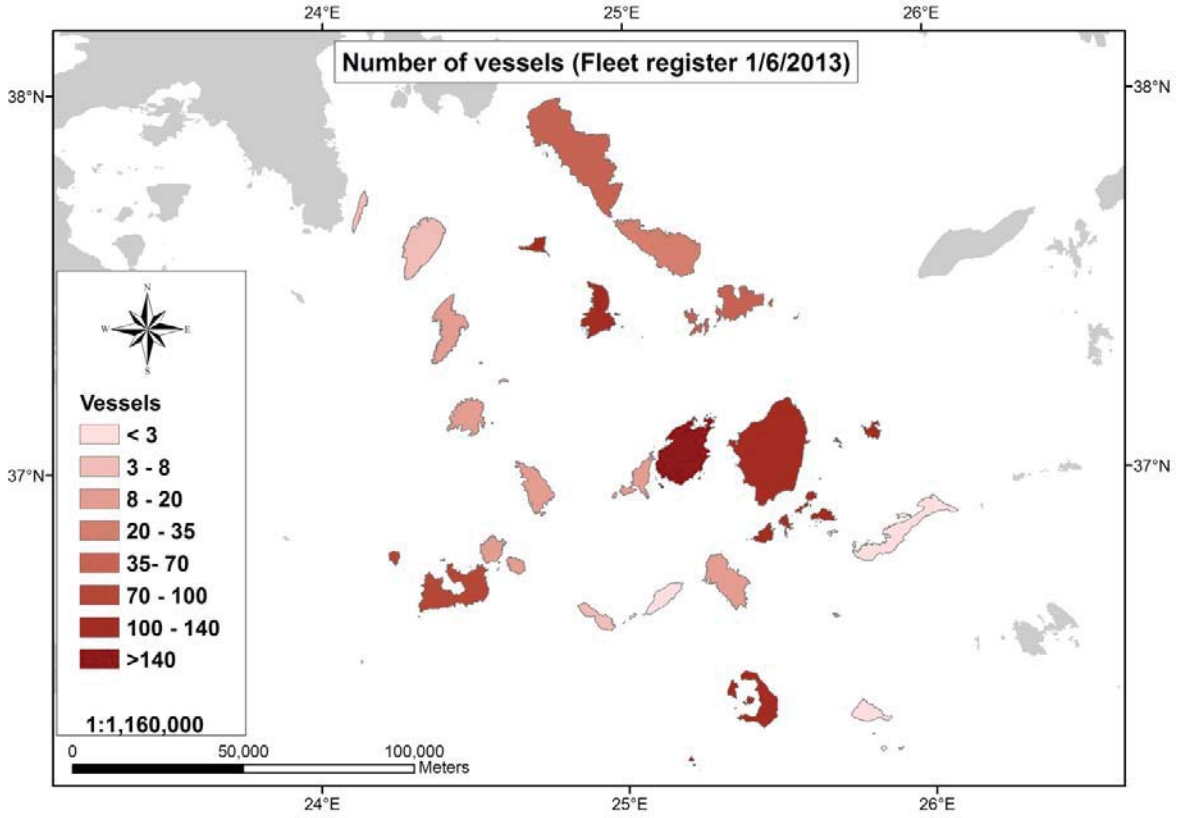
white polygons indicate no value

2.5.3.6. NATURA 2000 areas

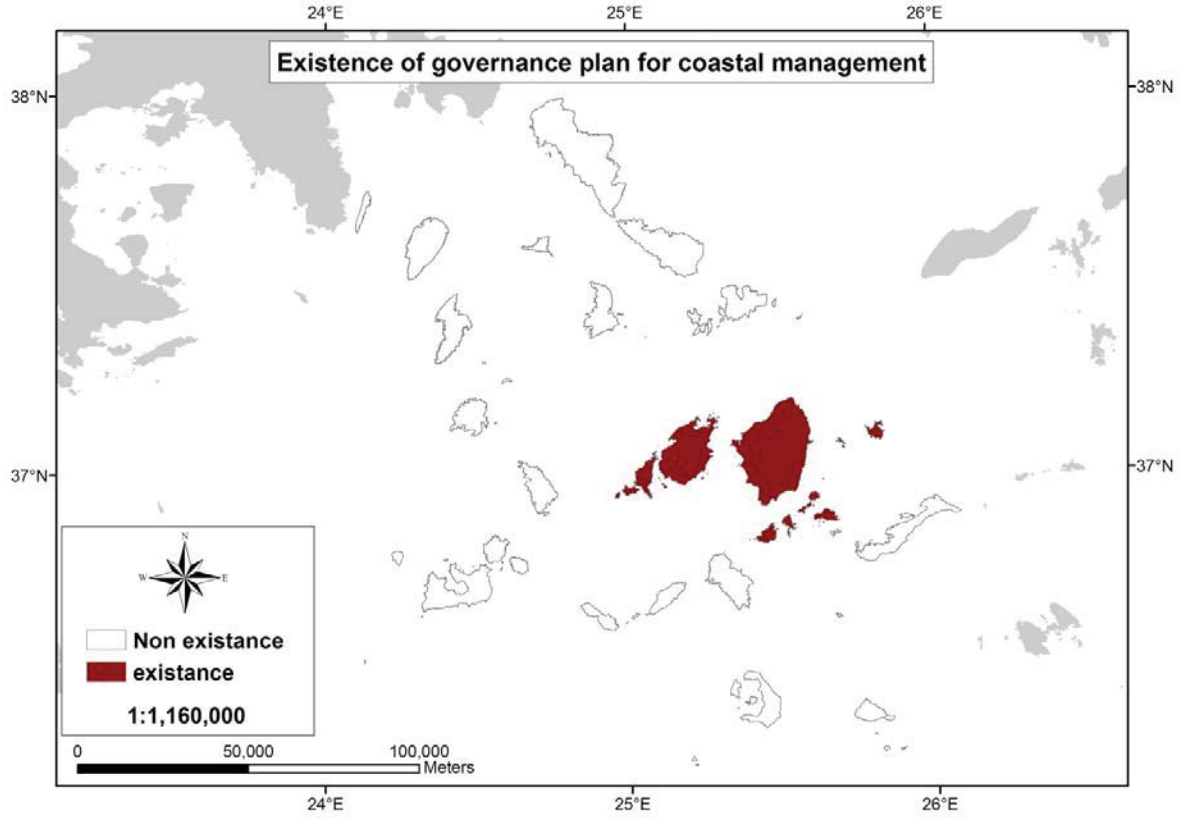



Area of NATURA2000 parks (km²) for habitats
24°E
25°E
26°E
38°N
37°N
Area (km²)
<1
1 - 15
15 - 20
20 - 35
35 - 45
45 - 60
60 - 80
80 - 140
140 - 180
>180
1:1,160,000
0
50,000
100,000
Meters

2.5.4. Fisheries indicators

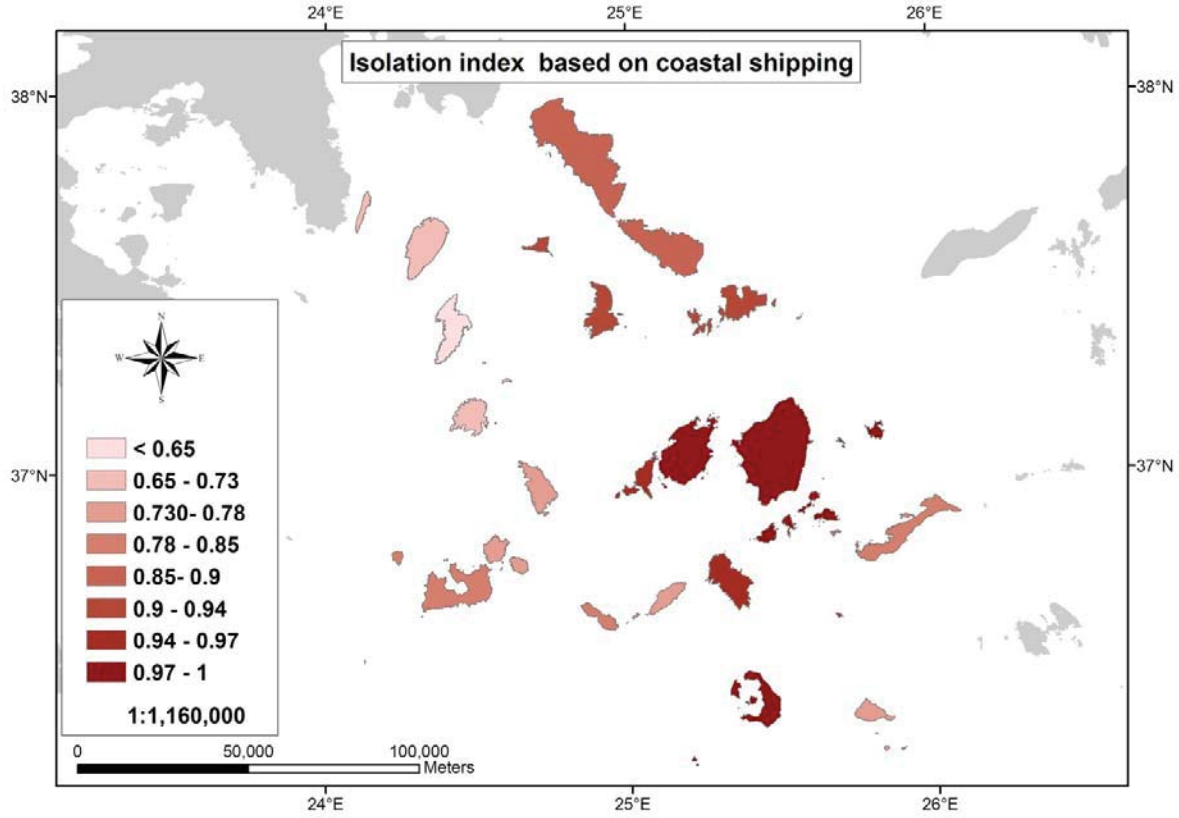


2.5.5. Governance indicators

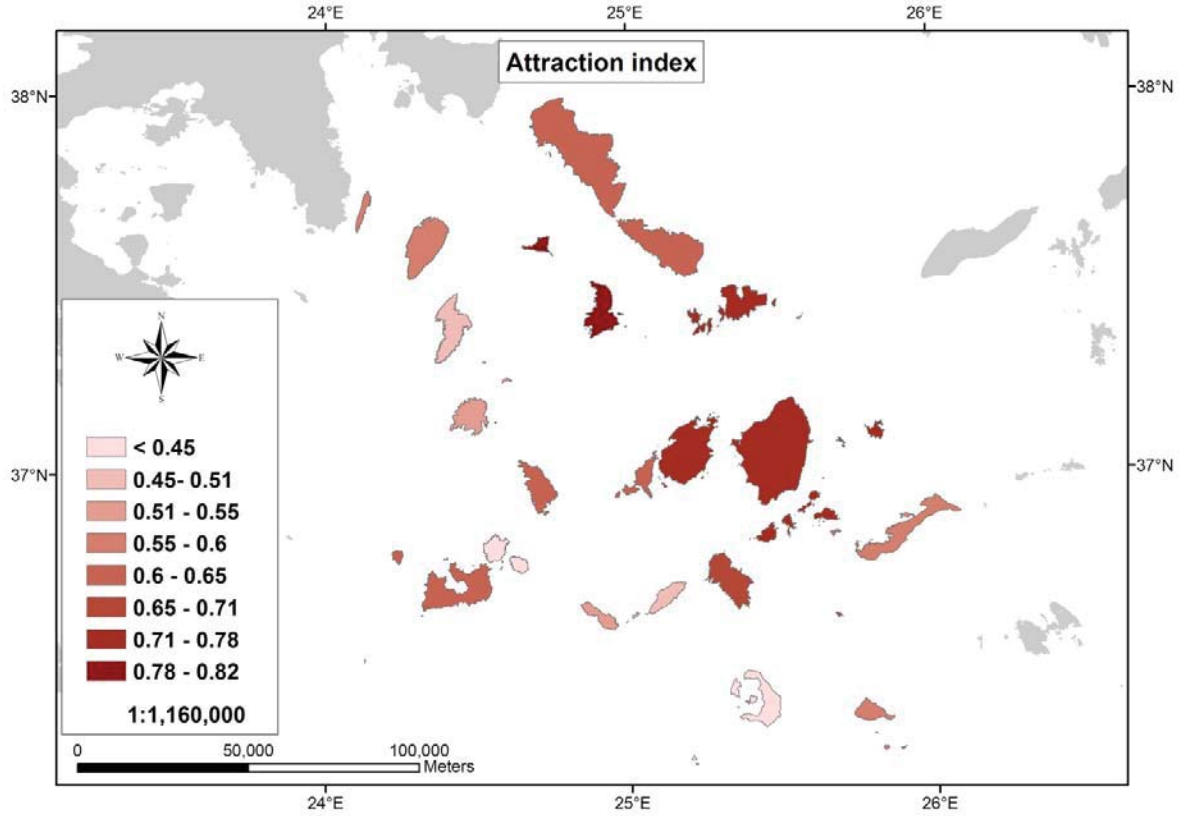


white polygons indicate no value

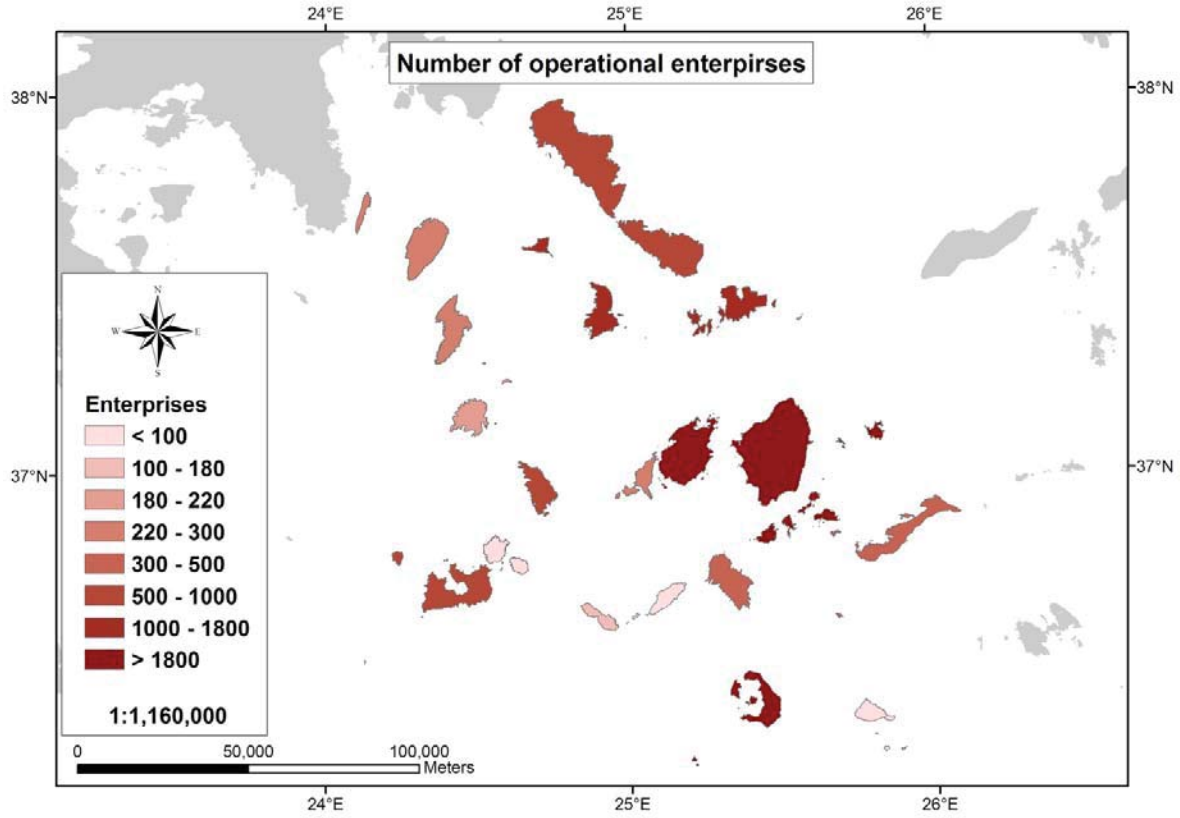
2.5.6. Economic environment indicators

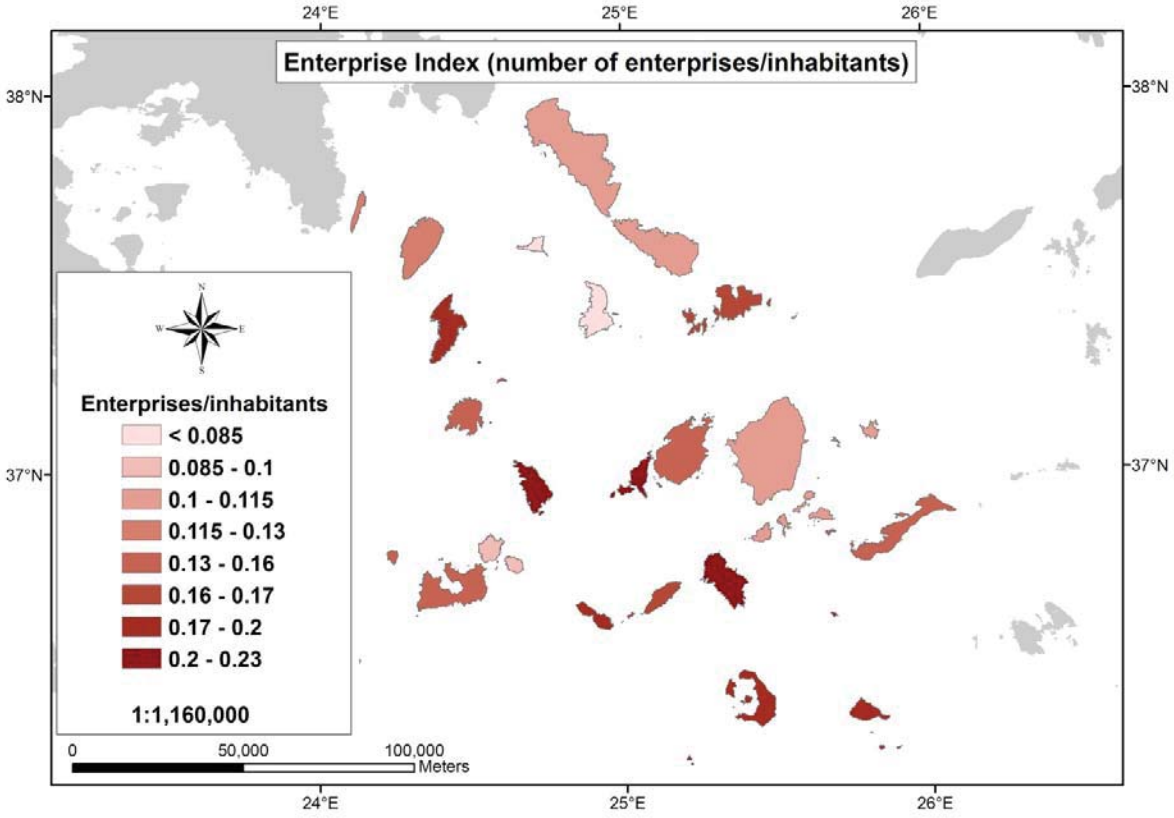


Index values 0-1, 0; high isolation, 1; low isolation



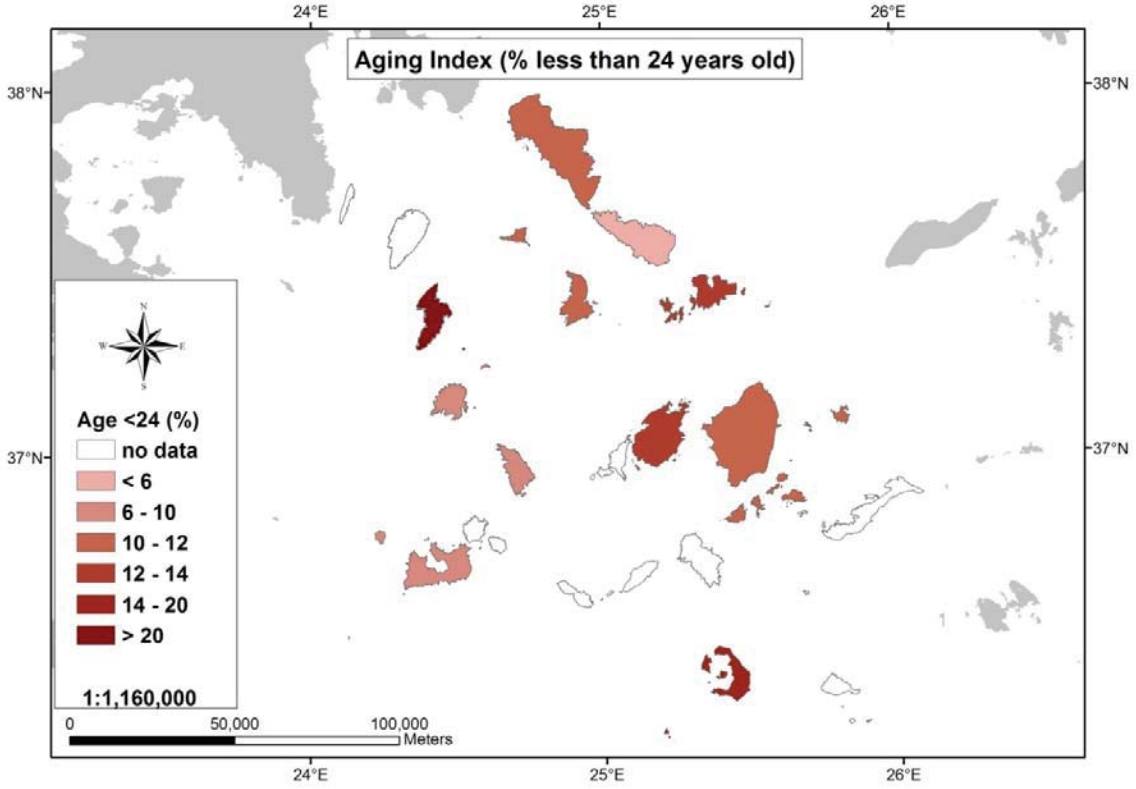
Index values 0-1, 0; low attraction, 1; high attraction


Number of operational enterpirses
24°E
25°E
26°E
38°N
37°N
Enterprises
< 100
100 - 180
180 - 220
220 - 300
300 - 500
500 - 1000
1000 - 1800
> 1800
1:1,160,000
0
50,000
100,000
Meters

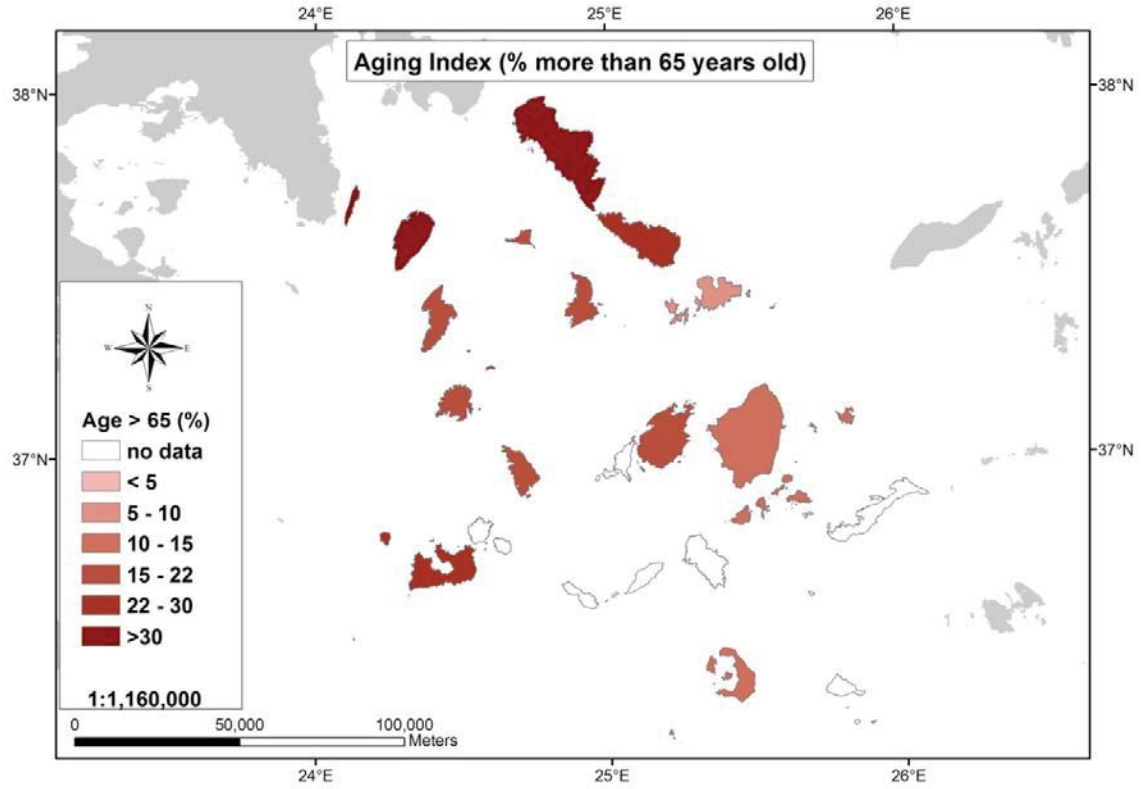

Enterprise Index (number of enterprises/inhabitants)
24°E
25°E
26°E
38°N
37°N
Enterprises/inhabitants
< 0.085
0.085 - 0.1
0.1 - 0.115
0.115 - 0.13
0.13 - 0.16
0.16 - 0.17
0.17 - 0.2
0.2 - 0.23
1:1,160,000
0
50,000
100,000
Meters

2.5.7. Social structure indicators

2.5.7.1. Aging/Youth indicators

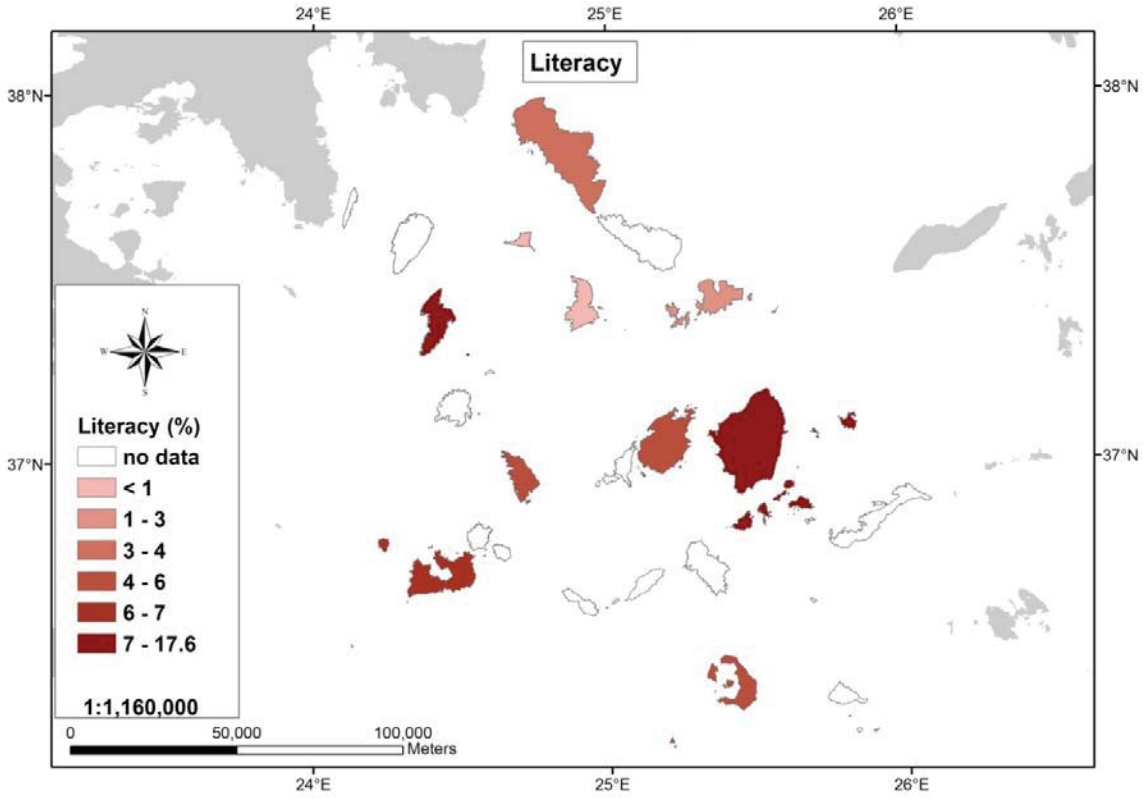


white polygons indicate no value



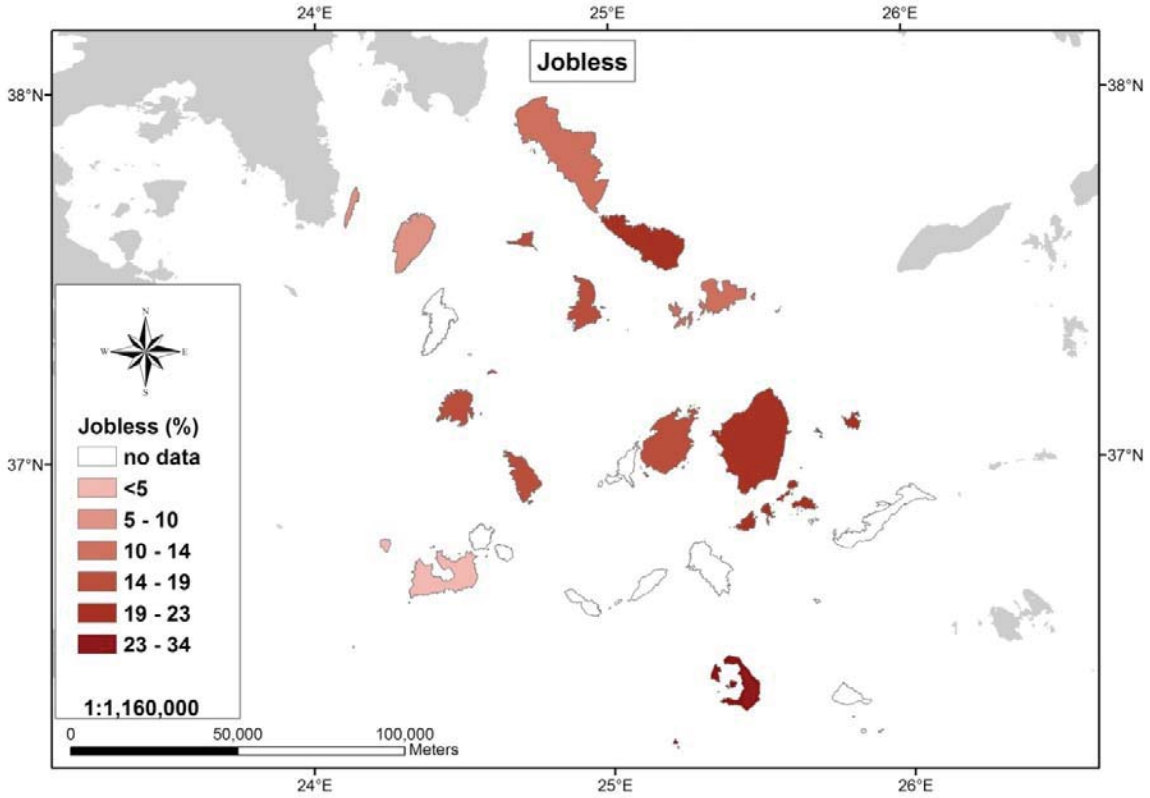
white polygons indicate no value

2.5.7.2. Literacy indicator



white polygons indicate no value

2.5.7.3. Employment indicators



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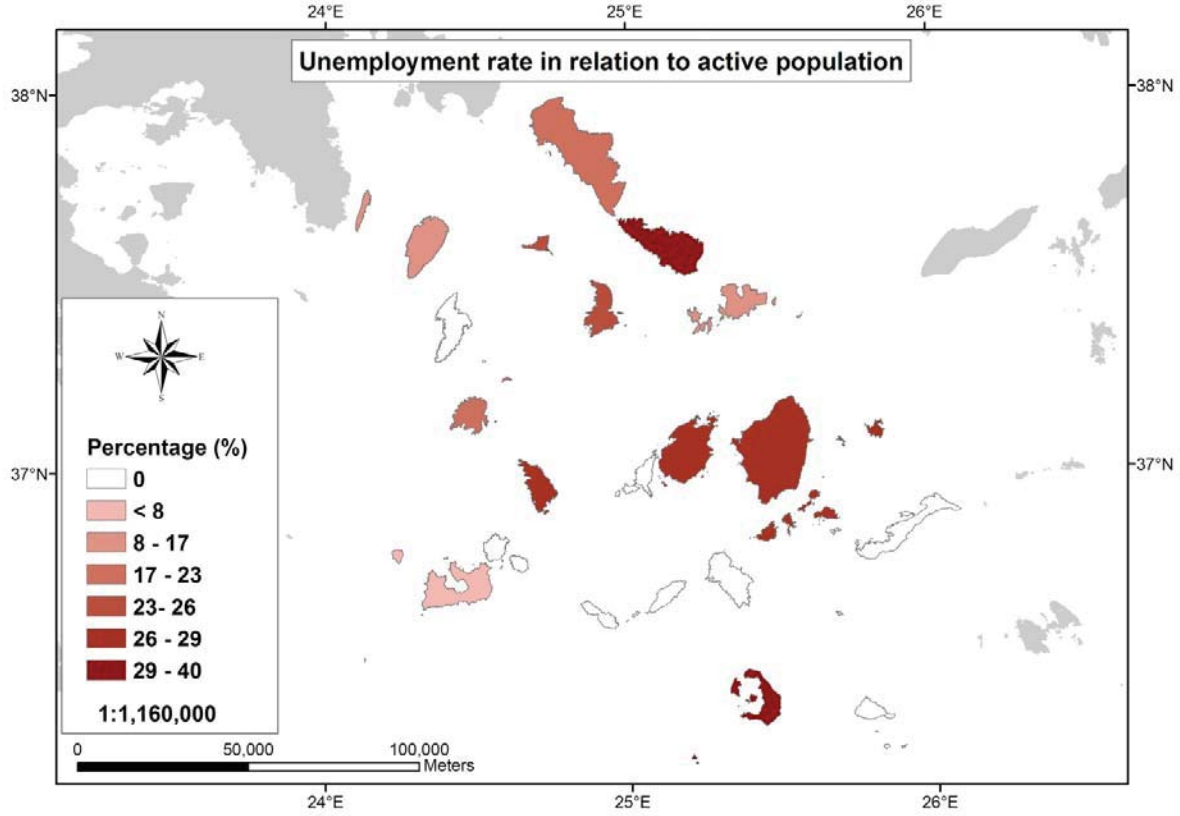

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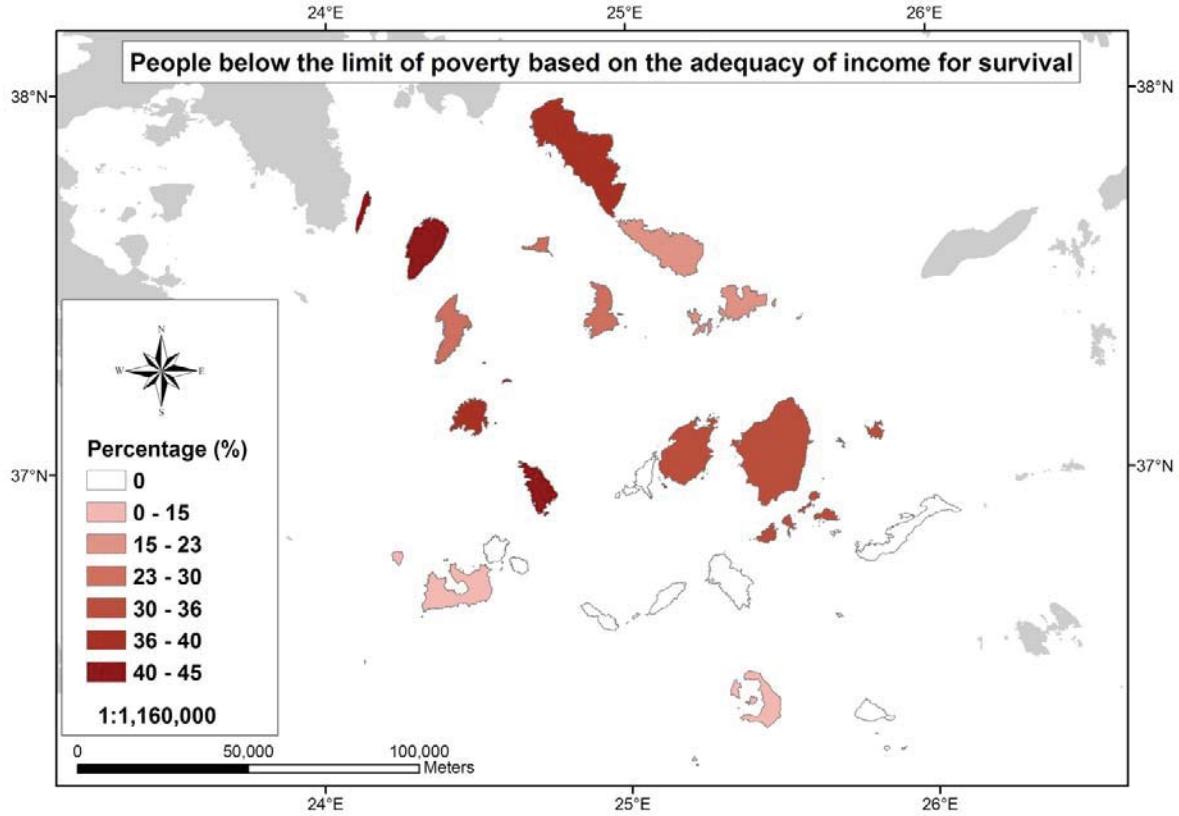
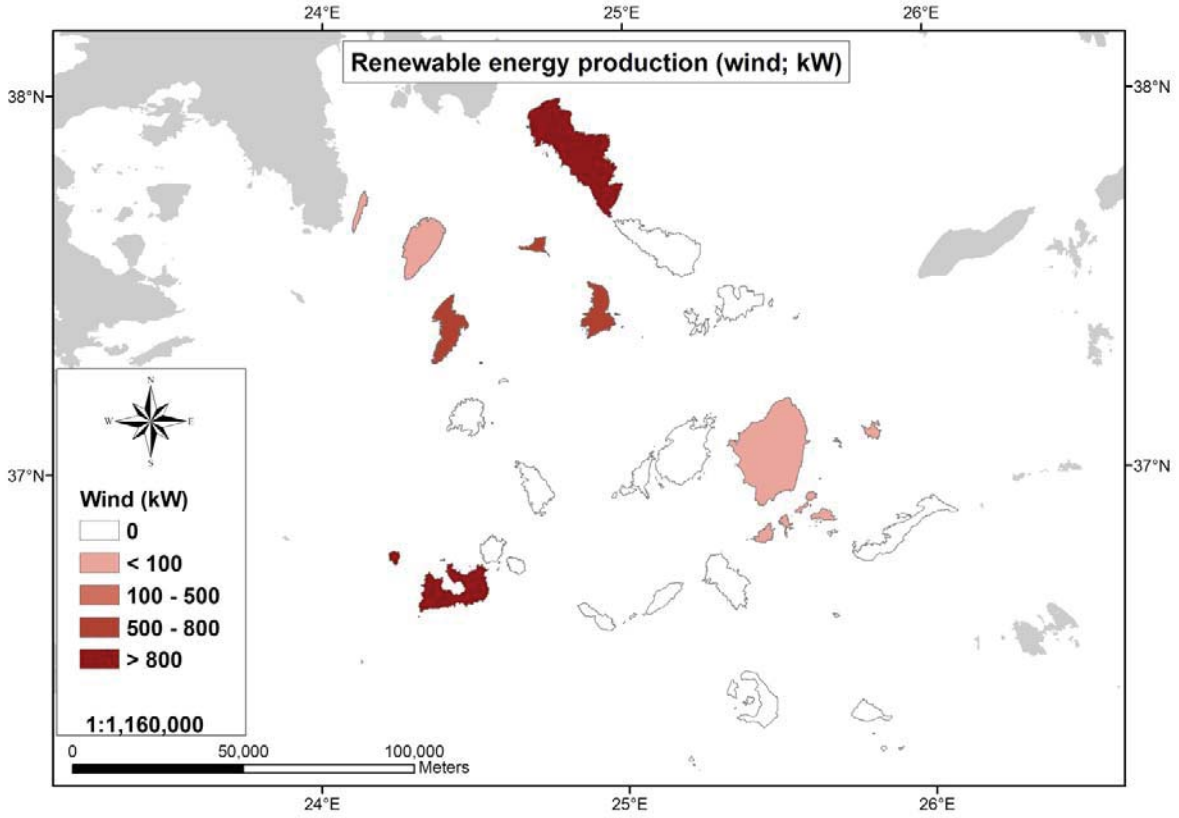
2.5.7.4. Poverty levels indicators



white polygons indicate no value

2.5.8. Renewable energy production indicators



3. Relation between Coastal Issues and ICZM Protocol

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

In relation to the provisions of the ICZM Protocol (2008) per article and per selected coastal issue (where it applies) we have:

3.1. To objectives, Art. 5

a. the process has just been initiated in the Cyclades region with the spatial plans of 2 islands out of the 33 inhabited islands: Naxos and Paros. The spatial planning already in effect is not clearly related to the protocol or influenced by the protocol and surely it was a product of 'top-down' process. Nevertheless it provides a basis for coastal management since these islands are highly touristic and therefore the temptations to deviate from legality are many.
b. the basis of spatial planning is to support and develop tourism; this based on the process, may or may not be a legacy for the future generations
c. the process so far provides for sustainability in the exploitation of natural resources. The islands due to isolation have great requirements for potable water (an amount of 110000 m^3 annually is required) while several public works have been done to manage and control freshwater (dams and collecting reservoirs)

Example of water reservoir and a dam (Naxos Island)

d. many steps towards the protection of coastal ecosystems are taken such as the NATURA areas and the Posidonia no-fishing beds already set. However it is unclear if this measures are effective or that they are enforced correctly and sufficiently by the authorities (for example coast guard)
e. the effects of climate change have just started to be considered following the input of Hellenic Centre for Marine Research team with the sea level rise effects on the islands report
f. public and private coherence can be found only in the tourism sector since this is considered so far as the main objective for the island development

3.2. To principles, Art. 6

a. the spatial plans already in effect for Naxos and Paros islands (more to follow) have considered the wealth, resources and dynamics of the coast within the context of development including the protected areas and the areas which are considered as sensitive
b. carrying capacity has not been evaluated. This is mainly because such an evaluation is extremely difficult to be carried out. In relation to **tourism**, since it is the main objective for economic development, practically there are no upper limits to the number of tourists that are acceptable at any moment except the lodging availability. Similar to this there is no limit to the **fishing effort** exerted to the marine and coastal areas especially if we consider the sport fishing (sport fishermen are 7-8 times more than professional fishermen in Greece) indicating that fishing effort especially during touristical periods can be extremely high and much higher than the capacity of the system
c. the true ecosystem approach is loosely considered in the spatial planning. It is not evident in **tourism** development al all while it is loosely related to **fisheries** management in terms of the legislation and policies of the Ministry of Agricultural Development and Food due to the Common Fishery Policy
d. the decision making system as has been described is 'top-down' and with main characteristic the marginalisation of stakeholders on a case basis. Fishermen report that they have never been asked to participate and tourism operators have made numerous application to the administration for tourism related infrastructure without any response (even though many public projects are on-going should someone would like to present the lack of funds as an excuse)
e. cross sectoral coordination is also lacking; key-positioned and competent officials have also complained for marginalisation by the top political administration of the region
f. the formulation of strategies is slow in relation to the speed with which various sectors (especially **tourism**) are developed creating time inconsistencies between spatial plans and actual sectoral management
g. most of the activities related to this clause and the objectives of the policy makers is related to **tourism** and we consider that adequate measures are taken either directly from the administration or following official complaints by NGOs
h. this clause is not followed in relation to **tourism** development as this is the primary (and only) objective for development and thus unnecessary concentration and urban sprawl are evident; the **port facilities** and the **fisheries** infrastructure are very limited and obsolete as it is reported by the users to enhance concentration and urban sprawl (see also clause f)
i. there have been several scarce studies on risks associated to human activities related to the selected **issues** as well several NGOs active in this field but it is unclear if all these deliverables and reports are used/affect policy making
j. the existing spatial plans and policies/legislation allow for the prevention of extensive coastal environment deterioration while restoration is always hindered by the lack of budget for such works; major exception is the illegal landfills existent in all islands for which there is a major political issue in relation to the EU

3.3. Coordination, Art. 7

a. unfortunately the institutional coordination is limited to the intentions of the administration on how to manage any specific issue; there are examples of marginalisation of stakeholders, selective

invitation of stakeholders in the process and even inter-administration marginalisation of key-officials creating gaps in the management of the **coastal issues**

b. the policy making and management system follows the 'to-down' principle regarding the selected **issues** (and others as well); until today there has not been a coastal forum established as in the example of other Mediterranean countries (for example Lebanon) eventhough it seems that Ministry of Environment, Energy and Climate Change is planning to propose such an institution within the national coastal zone management plan
c. close coordination between national authorities and regional/local bodies is not clear with evidence of the opposite

→ there seems to be a hesitation for broad participation because (a) the administration is afraid of the reaction of stakeholders to their plans, (b) there is bureaucracy which hinders transparency and (c) there is lack of training and education on stakeholder handling

3.4. Protection and sustainable use of coastal zone, Art. 8

8.2.

a. coastal zones are in the process to be re-established within the national coastal zone management plan under preparation by the Ministry of Environment, Energy and Climate Change and which will cover all coastal issues including **maritime transport**, **fisheries** and **tourism** as issues closely related to the coast. Previous legislation regarding the delimitation of coast utilized the principle of the upward limit reached by the 'winter waves' as the boundary between water and land. In addition, no climate change effects have been considered so far though the national plan may contain such provisions

8.3.

a. such provisions related to protected areas have been undertaken so far without any official evaluation of their success on national (NATURA) and local levels (Posidonia beds) affecting mainly the **fisheries** sector
b. limitation of coastal infrastructures for the time being is not a popular option since already the **tourism** sector has grown above its carrying capacity and all port/airport/hotel etc. infrastructure requires further development to accommodate the needs
c. provisions related to environmental concerns within the rules of coastal management exist though their influence when it comes to **tourism** development, is loose
d. the policy of 'open access' to the coast is national; however the theory of the 'tragedy of the commons' applies here as well; special example is the conflict between professional and sport fishing due to the very high number of sport fishers
e. in case of **tourism**, this does not apply as evidence shows


Photo evidence of installations and car parking on the sand dunes (Naxos Island)

3.5. Economic activities, Art. 9

9.1.

a. attention and consideration of **tourism** and **fisheries** within the local spatial plans as well as the national legislation is evident. Results of this are the local spatial plans, the designation of protected areas and the protected Posidonia beds
b. the minimization of the use of natural resources is not clear especially for tourism; further steps are required for more strict control of tourism activities. As far as our information allow, coastal fisheries is more or less uncontrolled (as is the case in the rest of the country)
c. the part about environmentally sound waste management is not at all considered since most of the landfills in the islands are illegal (22 out of the total of 27)

Photo of the main landfill of the city of Naxos, Naxos Island. During rainy days much of the waste end to the sea below

from
https://athens.indymedia.org/front.php3?lang=en&article_id=1272476

d. see all above
e. an indicator tool has not been yet used in spatial planning of the coast. However this has been an input from PEGASO so far
f. not clear

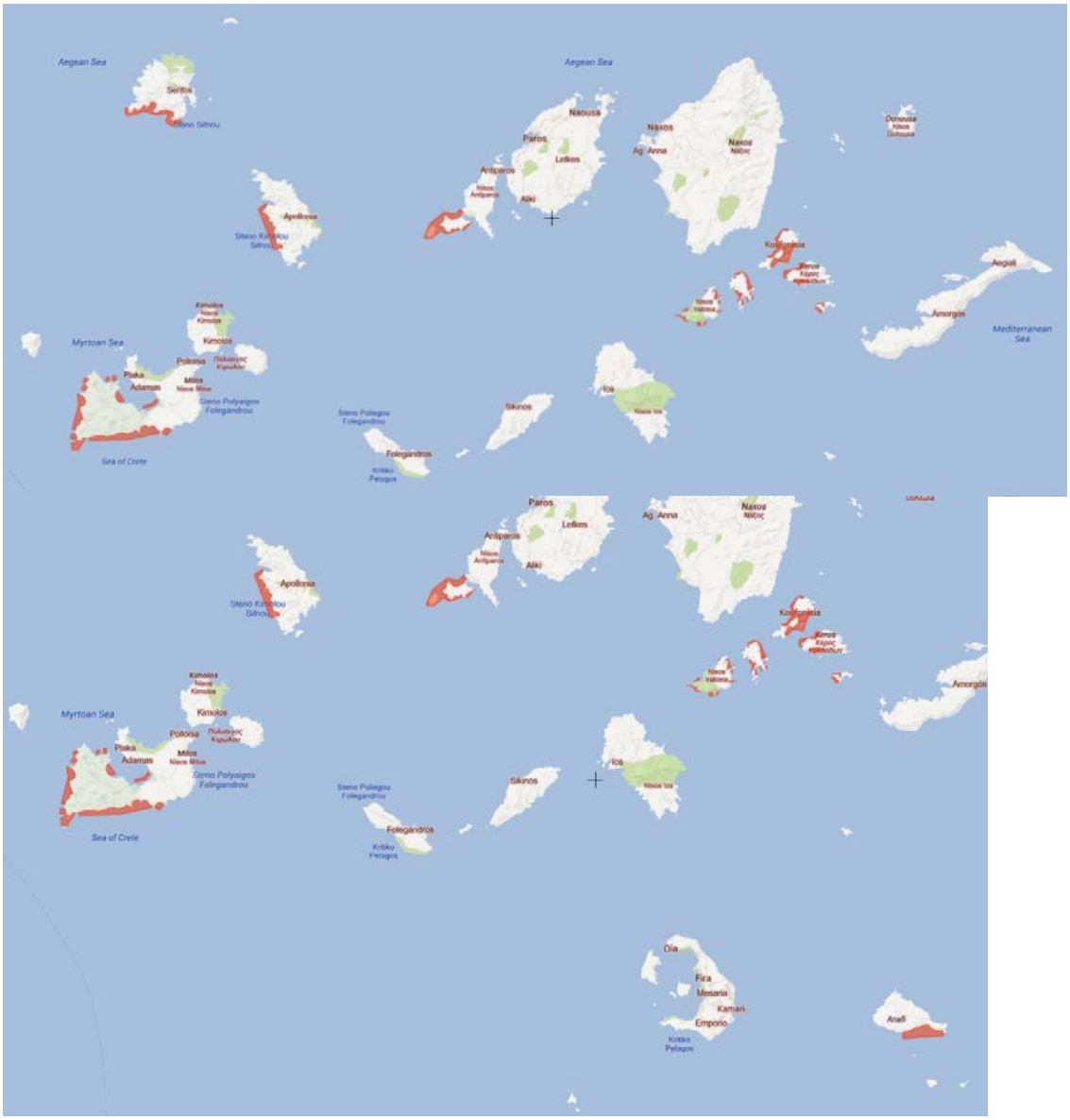
9.2.

a. agriculture is managed within national legislation and plans; limited local interference
b. **fishing** is also managed on a national scale; not local. Due to the 'open access' principle great conflicts exist between professional **fisheries** and sport fisheries. Sport fisheries are completely not regulated due to tourism eventhough there exist legislation which controls fishing effort; there are numerous examples of tourists who fish and sell the produce to gain money for their vacations. In addition, in the region of south Aegean (in which Cyclades belong), fishing with illegal methods is also evident (dynamite, illegal gears etc.). The designation of Posidonia protected beds is a positive step though very late (2008)
c. the establishment of **aquaculture** farms was centrally regulated in relation to their environmental licenses for many decades; today aquaculture does not play any role, positive or negative, since most of the farms in Cyclades region closed down due to the isolation of the islands from the mainland (for raw materials and exports)
d. **tourism** is the basis of development for the islands. The development of more forms of tourism is beneficial though until today, the triple S type of tourism is still offered (*Sea, Sun, Sand*)
e. the use of specific natural resources is managed on a national level
f. limited funds, bureaucracy and agendas of the administration bodies are limited and obsolete to cover the modern needs of the islands which also questions the capacity of the current infrastructure to have a small environmental footprint
g. maritime activities and especially shipping are managed centrally

3.6. Specific Coastal Ecosystems

- there exist many studies and reports from national and international RTD projects as well as the works of national and international NGOs. However the main question whether these reports are taken into account is not clearly answered and many complaints exist that they are not
- only one law regarding the protection of certain Posidonia areas around the Cyclades Islands exist today and unfortunately it was issued very late (2007); in addition very late are the individual spatial plans of the islands for which only 2 exist today since 2012


Karistos
Steno
Kafirea
Petalioi
Kolpos
Petalion
Aegean Sea
Gavrio
Mpatsi
Nisos
Andros
Andros
Ormos
Korthiou
Aegean Sea
Korissia
Ioulis
Kea
Steno
Kithnou
Gyaros
Γυάρος
Panormos
Τήνος
Tinos
Mediterranean
Sea
Loutra
Nisos
Kythnos
Mirtoo
Pelagos
Steno
Serifou
Ermoupoli
Galissas
Posidonia
Vari
Ag. Stefanos
Mikonos
Νησί
Μύκονος
Ornos
Rineia
Ρήνεια
Μυκόνου



Red polygons indicate the protected areas in accordance to Ministerial Decision No. 167378/2007 (O.J. D' 241/4-06-2007)

- according to NGOs, most of the coastal wetlands of the Aegean Sea are in bad shape though this is evident only for the 8 out of the 70 wetlands in Cyclades region
- the main problem again is the limited budget in order to construct public works that would protect the coastal ecosystems including the modernization of the existing infrastructure (ports etc.)

3.7. Coastal Landscapes, Art. 11

- the protection and management of the coastal landscapes is evident through the spatial plans of the islands (in progress). The process is very slow in relation to the speed of development of important economic activities that have significant effects on the coast like **tourism**

3.8. Islands, Art. 12

a. the promotion of environmentally friendly activities is unclear though there are legislations suitable to control this issue; inhabitants participation is not ensured at all
b. the Cyclades islands show a varying level of isolation between them and between them and the mainland due to the limitations of the maritime transportation sector (few vessels, too many islands)

3.9. Participation, Art. 14

- see all above; participation in limited in the region governance process. A 'top-down' management and policy making approach is utilized by the administration with selective participation on a case basis

3.10. Awareness, Art. 15

Such actions are not currently endorsed by the administration but are initiatives from local professional actors like the Chamber of Commerce, Universities/Research Centres through RTD projects (like PEGASO) and NGOs. However about 30 years ago there were a few attempts to centrally organise training seminars as a result of the initiative of individual officers (for example seminars on fisheries and aquaculture in Naxos Island) but did not last long due to bureaucracy and limited budget

3.11. Monitoring, Art. 16

There exist monitoring processes on a national level which keep records on fisheries, aquaculture, shipping and tourism. However, a monitoring system of environmental quality to connect the economic activities with the ecosystem is lacking though some snapshot data can be obtained from RRT project reports and scientific papers. The main question though regarding the use of these data for planning is still unclear. The relevant monitoring systems/actors are:

- national fisheries data collection program (since 2003) for fisheries, aquaculture and processing
- the National Statistical Survey of Greece
- the SETE organisation for tourism
- the Cyclades Chamber of Commerce, for all production and all businesses on the islands
- IOBE Institute for business, economic and employment national reports

3.12. National Coastal Strategies, Art.18

According to our information, the National Coastal Management Plan is an ongoing process of the Ministry of Environment, Energy and Climate Change until now. An important issue is considered to be the fact that today we have in Greece national sectoral spatial and development plans (for example the national cadastral plan of aquaculture) as well as local legislation on spatial planning of the

Cyclades islands (for no the Paros and Naxos islands plans) already enforced without the national coastal management plan being finished and enforced. So the main question to be answered is how all these existing plans (and future plans until the national plan is enforced) will be adopted and incorporated in the national plan when this is in the process of completion!

3.13. Environmental assessment, Art. 19

Project and public work EIA and national Strategic EIA assessments are enforced as part of the process to adopt EU legislation into Greek legislation since 1993.

3.14. Land Policy, Art. 20

As mentioned above, land policies are enforced lately within the spatial planning of the islands.

3.15. Natural Hazards, Art. 20

The procedures to prevent and mitigate natural hazards are more or less incorporated in the national legislation. Pro-active measure such as assessments of hazards or climate change effects are extremely limited and only exercised on a case basis (for example in the case of as specific public work). In addition, prevention capabilities are considered as low due to budget limitations.

3.16. Coastal Erosion

Very limited information exist; it is in our knowledge that there 2-3 (maximum) scientific papers regarding the vulnerability of the island coasts to erosion. Other than that, again as above, proactive measures are limited to absent and the issue is tackled in the case of a specific public work (local preliminary studies for the specific work). The overall knowledge of the administration of the exact levels of vulnerability of the islands to coastal erosion is unclear.

3.17. Response to Natural Disasters, Art. 24

Our consideration is that response to natural disasters is limited due to limited budget and limited infrastructure (example the wreck of the Sea Diamond in Santorini).

3.18. Training and Research, Art. 25

Training and research as funded by the region so far was very limited due to budget limitations and other priorities (tourism in particular). Some early attempts were made by individual officials but did not last long due to budget limitations and bureaucracy. Most of the training and research is conducted by national research centres, Universities and NGOs usually centrally funded (Ministries) or the EU (framework programs). So far to our knowledge, the local Chamber of Commerce is most active.

3.19. Scientific and Technical Assistance, Art. 26

So far, according to the information collected scientific and technical assistance is not delivered from the national research centres and Universities. The main reason for this is the limited budget for covering the expenses of constant presence of scientific teams for meetings and workshops which could facilitate assistance as well as follow-up actions from RTD projects. However, the administration asks for help and support when they decide that it is needed without his to be the correct timing always.

3.20. Information Exchange, Art. 27

To our knowledge information exchange the way the protocol provides does not take place at the level of the CASE region. This may not be the case at higher administration levels (for example at the level of Ministry of Environment, Energy and Climate Change).

4. Policy Issues and ICZM Principles and Approaches

4.1. Local plans

As mentioned elsewhere, the National ICZM plan is under elaboration by the Ministry of Environment, Energy and Climate Change at this moment and therefore it is impossible to assess how the coastal issues will be addressed in the legislation which will be finally produced. This plan will be enforced on **a national scale**.

It is important at this point to evaluate the progress made by Greece in terms of ICZM process (EU-DG Environment, 2011):

ICZM Principle	Spain	France	Italy	Slovenia	Greece	Cyprus	Malta
Principle 1: A broad overall perspective (thematic and geographic) which will take into account the interdependence and disparity of natural systems and human activities with an impact on coastal areas.	↔	↑↑	↔	↑↑	↔	↔	↑
Principle 2: A long-term perspective which will take into account the precautionary principle and the needs of present and future generations.	↑↑	↑↑	↔	↔	↔	↔	↑
Principle 3: Adaptive management during a gradual process which will facilitate adjustment as problems and knowledge develop. This implies the need for a sound scientific basis concerning the evolution of the coastal zone.	↑	↑	↔	↑↑	↔	↔	↑
Principle 4: Local specificity and the great diversity of European coastal zones, which will make it possible to respond to their practical needs with specific solutions and flexible measures.	↑↑	↑↑	↑	↑↑	↔	↔	↑
Principle 5: Working with natural processes and respecting the carrying capacity of ecosystems, which will make human activities more environmentally friendly, socially responsible and economically sound in the long run.	↔	↑	↔	↑	↑	↔	↔
Principle 6: Involving all the parties concerned (economic and social partners, the organizations representing coastal zone residents, non-governmental organizations and the business sector) in the management process, for example by means of agreements and based on shared responsibility.	↑↑	↑↑	↔	↑	↑	↔	↑
Principle 7: Support and involvement of relevant administrative bodies at national, regional and local level between which appropriate links should be established or maintained with the aim of improved coordination of the various existing policies. Partnership with and between regional and local authorities should apply when appropriate.	↑	↑	↔	↑	↔	↔	↑
Principle 8: Use of a combination of instruments designed to facilitate coherence between sectoral policy objectives and coherence between planning and management.	↔	↑	↔	↑↑	↔	↔	↑

↔= the situation is quite the same as 2006; ↑ = actions are still necessary; ↑↑= major actions were made. ii= Insufficient information

The above clearly shows that the progress achieved so far is very limited.

On a local scale, however, the Region undertook the initiative to produce **local scale** spatial plans for the management of all activities on the islands including also the coastal zone. Today only 1 plan is ready and enforced by law (the spatial plan of Paros Island) and another is at its finals stages (the spatial plan of Naxos Island). Both plans are considered as very detailed and rather strict in an attempt to control the fast developing economic sectors (especially tourism) of the islands. Practically these spatial plans designate and allow specific land uses in specific areas in an attempt to prevent the utilization of sensitive and protected areas and ecosystems. In relation to their contents, the plans can be described as sufficiently integrated, designate jurisdictions among the actors and describe fully the situation of each island in terms of ecosystems and habitats.

4.2. Evaluation

The local spatial plans designate and allow specific land uses in specific areas in an attempt to prevent the utilization of sensitive and protected areas and ecosystems. In relation to their contents, the plans can be described as sufficiently integrated, designate jurisdictions among the actors and describe fully the situation of each island in terms of ecosystems and habitats.

To emphasize their value, the contents of the Paros Island specific spatial plan are listed below:

- Urban areas
- Areas for the development of production activities: 3 zones (I, II, III) for for processing, storage and commerce (types I, II, and III)
- Special protection areas
  - PEP.1. NATURA 2000 areas
  - PEP.2. Coastal wetland areas (10 areas are described)
  - PEP.3. Wild life refuges (3 areas are described)
  - PEP.4. Forest areas and reforestation (from fires; 24 areas) areas
  - PEP.5. Nature protection areas: inland from 300 m contour level and up
  - PEP.6. Walking trails area (9 areas)
  - PEP.7. Landscape protection areas and areas of especial natural beauty (6 areas)
  - PEP.8. Marine meadows of *Posidonia oceanica*) according to the Decision 167378/2007
  - PEP.9. Archaeological sites (includes 5 areas and Delos Island)
  - PEP.10. Agricultural land
- Controlled urbanization areas
  - PEPD.1. Greater coastal zone defined from the waterline (level of winter waves) to the contour level of 100 m. The plan provides the exception of 9 beaches which will be studied further for their fauna and flora and only swimming will be allowed there
  - PEPD.2. Peripheral mainland area between the contour lines of 100 and 300 m
- Residential organisation per administration unit and building codes
- Land use tables per municipality and communal
- Existing and required infrastructure per administration unit including kindergartens and schools, hospitals and treatment centres, sports centres and courts, green public areas, parks and squares, cemeteries, administration buildings, road network
- Budgetary issues related to the new required infrastructure, ranked priorities and possible funding sources
- Transitional provisions

Since these plans have just been enforced by law (2010) it is very early to examine whether there have been positive results or not.

In relation to the Protocol Principles (Article 6), we have:

a. the spatial plans already in effect for Naxos and Paros islands (more to follow) have considered the wealth, resources and dynamics of the coast within the context of development including the protected areas and the areas which are considered as sensitive
b. carrying capacity has not been evaluated. This is mainly because such an evaluation is extremely difficult to be carried out. In relation to **tourism**, since it is the main objective for economic development, practically there are no upper limits to the number of tourists that are acceptable at any moment except the lodging availability. Similar to this there is no limit to the **fishing effort** exerted to the marine and coastal areas especially if we consider the sport fishing (sport fishermen are 7-8 times more than professional fishermen in Greece) indicating that fishing effort especially during touristical periods can be extremely high and much higher than the capacity of the system
c. the true ecosystem approach is loosely considered in the spatial planning. It is not evident in **tourism** development al all while it is loosely related to **fisheries** management in terms of the legislation and policies of the Ministry of Agricultural Development and Food due to the Common Fishery Policy
d. the decision making system as has been described is 'top-down' and with main characteristic the marginalisation of stakeholders on a case basis. Fishermen report that they have never been asked to participate and tourism operators have made numerous application to the administration for tourism related infrastructure without any response (eventhough many public projects are on-going should someone would like to present the lack of funds as an excuse)
e. cross sectoral coordination is also lacking; key-positioned and competent officials have also complained for marginalisation by the top political administration of the region
f. the formulation of strategies is slow in relation to the speed with which various sectors (especially **tourism**) are developed creating time inconsistencies between spatial plans and actual sectoral management
g. most of the activities related to this clause and the objectives of the policy makers is related to **tourism** and we consider that adequate measures are taken either directly from the administration or following official complaints by NGOs
h. this clause is not followed in relation to **tourism** development as this is the primary (and only) objective for development and thus unnecessary concentration and urban sprawl are evident; the **port facilities** and the **fisheries** infrastructure are very limited and obsolete as it is reported by the users to enhance concentration and urban sprawl (see also clause f)
i. there have been several scarce studies on risks associated to human activities related to the selected **issues** as well several NGOs active in this field but it is unclear if all these deliverables and reports are used/affect policy making
j. the existing spatial plans and policies/legislation allow for the prevention of extensive coastal environment deterioration while restoration is always hindered by the lack of budget for such works; major exception is the illegal landfills existent in all islands for which there is a major political issue in relation to the EU

5. Relevance with National ICZM Process

5.1. Relevance to National ICZM policy

It is our belief that our work within PEGASO is beneficial for the national ICZM policy of Greece. However it should be always considered that the national ICZM plan of Greece has not been finalized yet by the Ministry of Environment, Energy and Climate Change and enforced by law and therefore the true benefits of our work are not easy to evaluate.

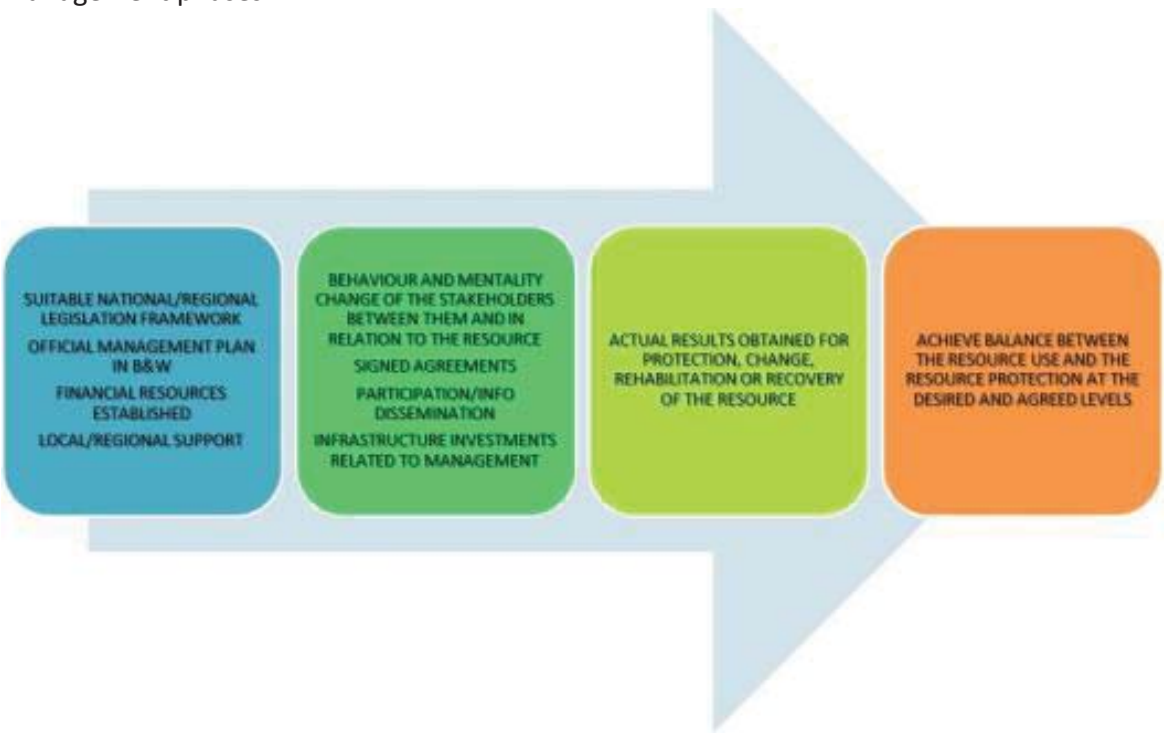
Given the true situation of ICZM process as it is considered and applied in Greece, one major benefit will be to demonstrate the main discrepancies with the ICZM Protocol (2008) the main of which being the limited, selective or absent participation of key stakeholders in the planning process without which no true ICZM process can be established. Furthermore it is demonstrated that marginalisation of stakeholders in ICZM process does not occur only between different stakeholder groups but also within the administration. Without proper participation, it is obvious that neither conflicts are settled nor consensus is achieved - both of which are key elements of ICZM. Also there is no common understanding of the issues involved and the state of the issues in relation to the conservation of the coast and the protection of economic activities from negative externalities. The involvement of stakeholders is necessary in any planning process in order for decisions to be understood and accepted by the community (Airamé et al., 2003; Lundquist & Granek, 2005; Stewart & Possingham, 2005). Top-down regulations have sometimes proved ineffective, consequently bottom-up support by local community should be sought before the imposition of any management measure (Hilborn et al., 2004).

It is also demonstrated that the local spatial plans of the islands prepared by the Region have not been influenced by the protocol.

5.2. Implementation Constraints

Experience from PEGASO and other research projects has shown great failures in these ambitious plans to apply a standard ICZM process because there is a great gap of experience and mentality in the stakeholders which prevents the success of such management instruments. The usual 'success stories' presented in many cases involve the application of such processes at the highest possible levels of stakeholders (usually the Greek Ministry of Environment, Energy and Climate Change and similar) and not with the participation of all stakeholder levels at the same time. Proof of this is that low level stakeholders complain that are left out of the decision making process and the main reason for this is that the project coordinators or administration lack training (cannot handle stakeholders and

especially stakeholders that are opposing the process or stakeholders that do not have political influence) and willingness to involve them in the process creating huge gaps. These gaps are responsible today for the inability to manage any area in Greece because the local citizens and stakeholders are alienated and against any novelty even when it is proven that it is beneficial for them. To summarize, Greece is today in an embryonic stage of participation-based management. The situation is better described if we attempt to put the Greek situation within the Olsen diagram of management phases:



It is obvious that in the case of Greece, the steps taken so far belong to different phases which explain the fact that (a) there are conflicts in the process of management and (b) there are no actual results regarding the true integrated coastal zone management process. For example the legislation framework exists but it requires improvement and codification, the local actors usually **do not** have authority by law to apply management rules, the local management authorities **have not yet** prepared a management plan after at least 1 decade of operation or if they have, they do not follow it, eventhough they are obliged by law to do so (mainly because there is no consensus, hence the conflicts), the local actors have not secured financial resources for management and the local/regional support is limited to the administration level and above ie. some of the first phase requirements are not fulfilled. Instead of putting effort to fulfill all the first phase requirements, the local actors have proceeded to achieve goals from the next phase ie. there are some infrastructures created (telemetry system for environmental monitoring, some fishing vessel refuges etc.) **but** they cannot provide results because the financial support for their operation (from phase 1) is not secured. In addition we have some examples of limited participation mainly within the management authorities but with limited consensus regarding the management decisions. Nevertheless, some results regarding the protection of the wetlands have been achieved (phase 3) as for example ecosystem protection (NATURA for birds and habitats) and Posidonia beds.

To summarise the situation, in Greece it seems that we jump from phase to phase without establishing any foundation for the correct management procedure. This results to (a) severe conflicts, (b) no support by locals and alienation of groups and (c) no important results.

5.3. Thoughts for the Future

It is our belief that ICZM process is not correctly applied in Greece (various examples are known from PEGASO and ARCH projects) which indicates that there is not clear foundation for such development built so far despite the RTD and other projects on ICZM that have been conducted so far.

The first and most important step is to raise the awareness of both the stakeholders on their position and power of influence they possess because of the Protocol of ICZM and the administration so that it will be embedded in their mentality and procedures the key elements of ICZM process ie. participation, transparency, respect and equal access to information.

A second stage will be to attempt to affect the stakeholder mentality by demonstration and training in order to enable them to apply more civilized methods of exchanging information and opinions which also indicates that they should be trained to apply basic or advance ICZM tools. In other words to develop a dispute resolution process for ICZM, including conciliation, mediation, negotiation, consensus-building, and conflict avoidance methodologies. To this end, the introduction of the 'coastal forum' principle sounds as the best idea forward.

A third stage should be the establishment of presence: the usual situation is that there is no follow-up after the completion of projects due to the lack of budget which deprives the stakeholders and the ICZM process itself of any momentum achieved during the project. Some of the stakeholders - usually the low level stakeholders do not possess self-determination within the process (due to lack of proper awareness) lose their interest when they are not properly handled and they cannot see clearly the benefits of participation.

6. Stakeholder Involvement

6.1. Overall

Within the Greek CASE of Cyclades islands the creation of a localized network of stakeholders and end-users for PEGASO was rather easy and straight-forward. This is owed to the fact that Hellenic Centre for Marine Research scientists have long cooperation with several members of the Region's

administration and through these contacts the further exploitation of other local contacts was very easy. During all cases of contacts and focal group workings, the stakeholders accepted the invitation to meet and provided enough time for the process. To this end, the setting from ahead of 'rules of engagement' from the Hellenic Centre for Marine Research team (such as transparency, equality, confidentiality and respect of the other party opinion) and the fact that all meetings were meticulously organized before, made these meetings successful and a wealth of information was collected including some information which usually some stakeholders refuse to provide such as incomes etc.

The level of stakeholder involvement, given their very low experience of such proceedings as integrated coastal zone management participation was mainly for consultation according to the World Bank[34] classification for information sharing, listen and learn sessions and joint assessments of sectoral issues.

6.2. Stakeholder Contact Rules

The CASE team already is aware of the fact that their presence and follow-up of activities with the stakeholders are extremely limited due to budget limitations and that very rarely there are additional funds to continue dealing with the low level stakeholders. This can be a problem of creating trust with these stakeholders because they always have the opinion that they are used without any gain for them and their position along the administration and planning ladder.

For this reason, the objective of all the contacts with the low level stakeholders had the following objectives (ranked by importance):

1. create trust by focusing on their interests and personalities
2. attempt to convince them that partnership is the way forward
3. provide a 'face' to the project so that even when further contact is not 'face-to-face' the stakeholders know with whom they talk and whom to contact if they need to
4. ensure that stakeholders have good knowledge of their position and influence within integrated coastal zone management process
5. promote integrated coastal zone management and PEGASO
6. provide them with actual examples of the tools created in PEGASO and training to ensure that they understand their usefulness
7. contribute in their awareness

[34] The World Bank Participation Sourcebook, 1996

This way we attempted to contribute to our presence for the support of the stakeholders other than the physical presence and create more efficient network. However, the disadvantage of this process is that the stakeholder needs to make the first move and establish a contact when there is reason for this otherwise the Hellenic Centre for Marine Research team cannot be aware that any issues exist.

The methods of stakeholder involvement/interaction were:

- face to face interviews - liberal subjects and Q&A sessions
- face to face interviews - questionnaires
- production of printed material and CDs for dissemination of PEGASO materials and tools from the toolbox
- preparation of specific for the area deliverables (as uploaded in wiki)
- organisation of 1 meeting, round table method
- mental modelling on integrated coastal zone management issues

6.3. Identification of Stakeholders and Stakeholder Conflict Analysis (SCA)

The perspective under which the selection of stakeholders was based on their sectoral position (out of the 4 different perspectives - the others being (a) level of organization, (b) dimensions and (c) degree of impact and interest of the issue examined. The stakeholders can be analysed in the following matrix (Table 6.1):

Table 6.1. Stakeholder matrix

Stakeholder	Interest in ICZM	Perception on ICZM - today	Perception on ICZM - future	Reasoning of perception	Possibility for involvement in ICZM planning
Fishermen	improvement of the profession job security and income improve market standards and demand better fishery products for the market	no idea not involved totally marginalised except on national elections for vote-fishing	the State needs to intervene to organize the activities on the coast and protect the environment for their benefit	environmental quality and pollution reduces production and increases costs conflicts with tourism and especially sport fishermen	provide data act as 'coastal observers'
Scientists	RTD environmental conservation development	too many conflicting uses with negative socio-economic externalities uncontrolled uses of the coast create pollution and endanger habitats absence of spatial plans stagnation in the fate of the protected areas (NATURA 2000 etc.) since their designation illegal activities	national/ regional/ local spatial planning plans are required resolution of conflicts 'open access' vs 'controlled access' to the coast need to be discussed marine protected areas schemes should be implemented	responsibility towards the society support of social and economic development conflict resolution RTD funding	perform targeted RTD projects provide raw and analysed data databases experience, know-how, technology and scientific/expert advice

Stakeholder	Interest in ICZM	Perception on ICZM - today	Perception on ICZM - future	Reasoning of perception	Possibility for involvement in ICZM planning
Geotechnical Chamber	only as profession (the chamber is actually a national union of professionals/scientists in fisheries, agriculture, geology and forestry)	too many conflicting uses with negative socio-economic externalities uncontrolled uses of the coast create pollution and endanger habitats absence of spatial plans illegal activities lack of suitable legislation low involvement of professionals in integrated coastal zone management	national/ regional/ local spatial planning plans are required resolution of conflicts 'open access' vs 'controlled access' to the coast need to be discussed marine protected areas schemes should be implemented more scientific advice should be required	responsibility towards the society support of social and economic development support of professionals in the sector	provide raw and analysed data experience, know-how, technology and scientific/expert advice
Tourism Unions	improve their business through better integrated coastal zone management	the current coast state is not suitable for the further development of their business pollution underdeveloped infrastructure (ports, airports etc.) anarchy in development of coastal activities (such as building new	improved access to the coast improved infrastructure facilities to accept more visitors/ to allow for more types of tourism to be developed control of pollution and other actions to revamp the surroundings	low diversity tourism product offered the area is not as attractive as it can be the area is underexploited eventhough it has been recognized that the development of tourism should be the primary objective for development	assist in developing strategic goals provide data and information

Stakeholder	Interest in ICZM	Perception on ICZM - today	Perception on ICZM - future	Reasoning of perception	Possibility for involvement in ICZM planning
		lodgings etc.)	and make them more attractive to visitors		
Chamber of Commerce	support businesses related to the coast	not their direct interest	improve the capacity and sustainability of businesses related to the coast and all secondary businesses supporting the former	they are business support agency and not planners	assist in developing strategic goals provide data and information
Fisheries administrator	improvement of fisheries sector[35] enforcement of legislation and policies of fisheries sector data collection and reporting on the fisheries sector	production is reducing over the years coastal pollution is evident lack of spatial plans the region administration does not take into account his office for scientific advice			assist in developing strategic goals provide data and information

[35] fisheries sector = capture fisheries, aquaculture and fisheries-products processing

Stakeholder	Interest in ICZM	Perception on ICZM - today	Perception on ICZM - future	Reasoning of perception	Possibility for involvement in ICZM planning
		when planning for the coast			
Environment administrator	improvement of environmental quality resolution of coastal conflicts coastal spatial planning	conflict of uses illegal activities along the coast/lack of suitable legislation and enforcement lack of spatial plans	spatial plans of the islands have already been initiated (plans for the island of Paros have been published in official journal and the plans for Naxos island just started)		assist in developing strategic goals provide data and information actually work on specific tools for integrated coastal zone management due to suitable educational background
NGOs	very high interest in ICZM as means to achieve their environmental protection goals RTD funds	completely ignored as planning approach	the Greek state will be forced to implement	their main opinion is that the Greek state is not promoting environmental/ resource conservation policies	assist in developing strategic goals assist in integrated coastal zone management implementation provide data and information actually work on specific tools for integrated coastal zone management due to suitable educational background

Stakeholder	Interest in ICZM	Perception on ICZM - today	Perception on ICZM - future	Reasoning of perception	Possibility for involvement in ICZM planning
Development Company	conduct development projects on behalf of the region	mainly support the options and planning by the region; sometimes not in line with ICZM protocol	mainly support the options and planning by the region implement the protocol more closely in parallel with development when they offer advice	there sole objective is the support of the region	assist in developing strategic goals assist in integrated coastal zone management implementation provide data and information actually work on specific tools for integrated coastal zone management due to suitable educational background
Municipalities and communals	improve livelihood of the citizens develop their jurisdiction areas attract funds for development	a means to achieve development goals	a means to achieve development goals	the way that state administration is structured, bureaucracy, inefficient legislation and absent funds for development in many ways results to the neglect of integrated coastal zone management planning as priority when	assist in developing strategic goals assist in integrated coastal zone management implementation provide information
Prefecture	make their area of jurisdiction more attractive for investments (private or corporate)				main actors legislation makers decision makers

Stakeholder	Interest in ICZM	Perception on ICZM - today	Perception on ICZM - future	Reasoning of perception	Possibility for involvement in ICZM planning
Region	anyway possible including integrated coastal zone management planning if this serves the purpose			other strategic objectives are considered as more important (for example build a port for tourism)[36] Lack of political will on the part of administration to allow wide participation because they fear loss of power or influence;	main actors legislation makers decision makers
Ministry of Environment, Energy and Climate Change	very high interest since this is an obligation to the EU and any deviation can lead to fines ICZM planning has been an imperative task for the Ministry because it complements a large number of recent policies like MSFD, WFD, the national fisheries data collection etc. and more to come so that they cannot avoid it even if	integrated coastal zone management guidelines need to be included in the national/ regional/ local spatial and development plans integrated coastal zone management influenced national plans are in progress today	to finish and enforce the national coastal planning legislation consolidate in the national coastal planning legislation all the regional/ local plans already enforced coordinate the relevant agencies for a true integrated coastal zone management process possibly enforce the	too many non-codified legislations exist the national coastal planning is missing for many years it is recognised that integrated coastal zone management guidelines are (a) needed for planning and (b) Greece is obliged to use them	legislation makers decision makers can overrule all others can legislate without any further consultation; just the public debate through internet required by the EU (in many cases ignored in the final decision making)

[36] in many cases, local administrators (the mayors, the prefect or the region intendant) have been accused of doing illegal actions in order to achieve a development project ('circumvent' legislation etc.)

Stakeholder	Interest in ICZM	Perception on ICZM - today	Perception on ICZM - future	Reasoning of perception	Possibility for involvement in ICZM planning
	they wanted to		'coastal forum' approach		

Eventhough the ICZM protocol and other platforms for integrated coastal zone management do not distinguish between stakeholders, it is evident from our experience that there are several types of stakeholders based on various criteria:

1. There are stakeholders negative to any planning or change in their status-quo because of the mentality they have formed over the years of marginalisation and intentional non-engagement in the integrated coastal zone management process. Regional administration in Greece follows the axiom 'we know better for you and we plan for you, since you voted us' and therefore, several stakeholders such as tourism unions and fishermen do not participate in the process ('top-bottom' structure). There is Lack of political will on the part of governments to allow wide participation because they fear loss of power or influence
2. There are stakeholders up in the planning ladder (such as administrators) who are parts of the process of integrated coastal zone management planning such as prefects, mayors etc. since they are legally in charge of planning. However there is also complaint about them too from intermediate administrators who also are marginalised in decision making even in the case of issues of their jurisdiction
3. The stakeholders have a highly variable capability to **use** complex tools for integrated coastal zone management such as the deliverables of the PEGASO toolbox. Low level stakeholders in

Greek CASE have no capacity at all to use PEGASO tools since they have no educational background for this. As we move up along the stakeholder ladder, the capacity to use PEGASO planning tools increases depending on the educational background; our medium level stakeholders (local administrators for fisheries, environment etc.) have shown interest in indicators and LEAC/SDI/GIS. Our upper level stakeholders showed great interest for all the tools and for using them, in the planning processes, providing that there is someone that can run them and provide them with the results. To this end, the local development companies established at the regional and prefecture levels are very helpful because they usually employ scientists.

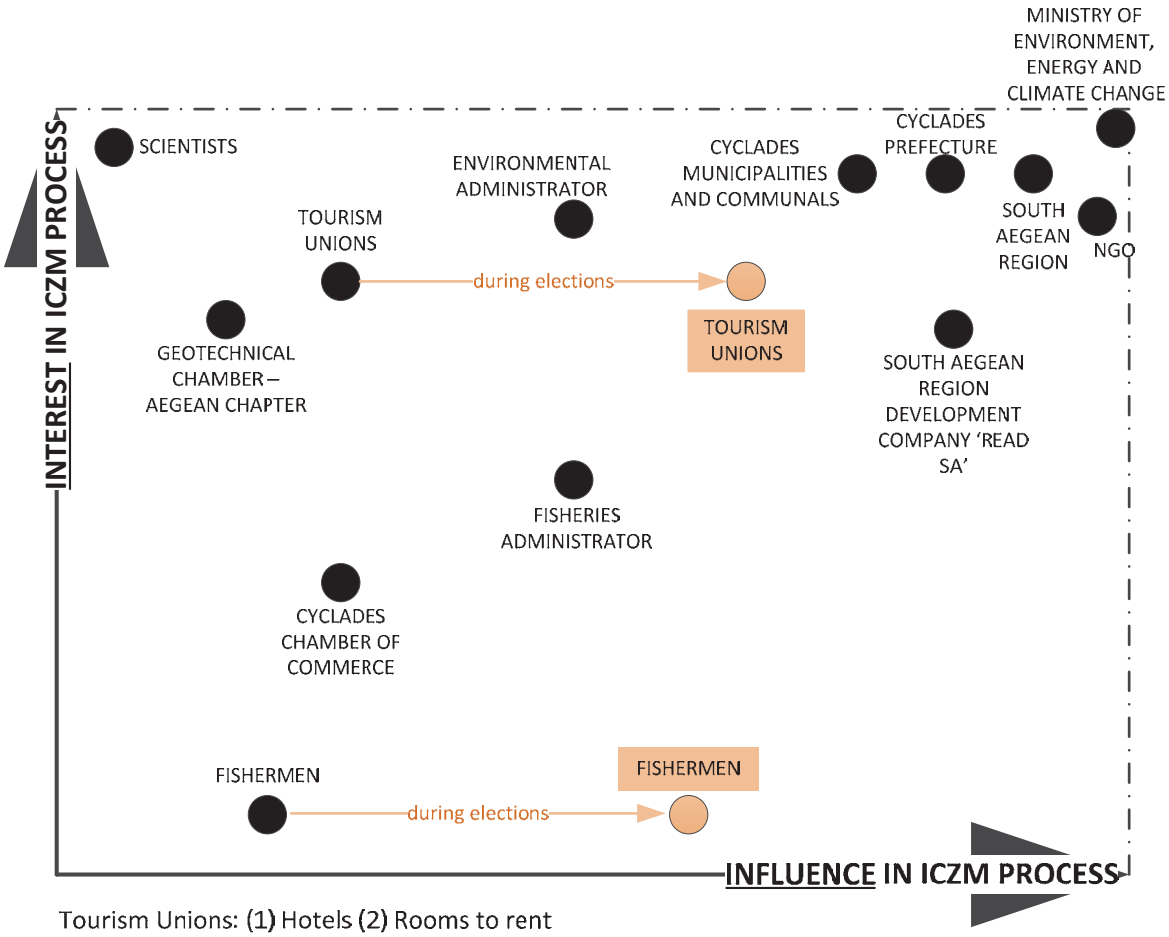


Figure 1. Greek CASE stakeholder influence/interest matrix[37]

Based on the stakeholder influence/interest matrix, it is possible to further categorise the

[37] the positioning of each stakeholder in the matrix was carried out following the evaluation of their position and abilities from the meeting proceedings. In some cases, their position long the INTEREST axis is strongly related to their understanding of what integrated coastal zone management is. Coordinates are arbitrary (expert judgment)

stakeholders in groups based on their dedication to ICZM and their synergy/conflict with other stakeholders (Table 2).

Table 2. Table of stakeholders based on criticality and dedication

	Dedicated		Non-dedicated	
	Critical	Non-Critical	Critical	Non-Critical
Similar perceptions and goals	Scientists Municipalities Prefecture Region Ministry of Environment, Energy and Climate Change NGO	Region Development Company Fisheries admin office Environmental admin office Tourism unions	Fishermen	Geotechnical Camber Chamber of Commerce
Opposite perceptions and goals	NGO	NGO	Citizen groups Mass media	

6.4. Timeline of scientists/stakeholders interaction

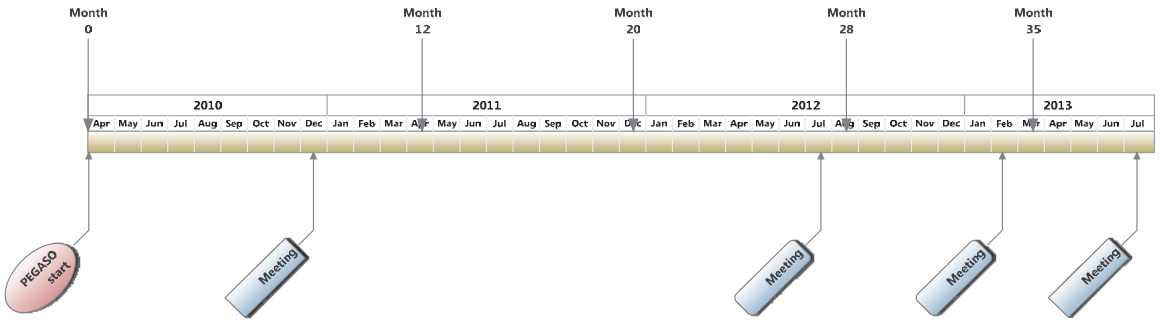


Figure 2. Local CASES meeting's timeline

Initially the meeting schedule was based according to the time schedule set in the DoW for WP5 but later during the project due to the delay of the toolbox, the meetings became less frequent since we did not have something substantial to deliver to the stakeholders but now it has resumed its pace so that during 2013, we can finish the basic deliverables of the project as well as to collect new information requested for other tasks of the project such as the regional assessment task (WP5.2).

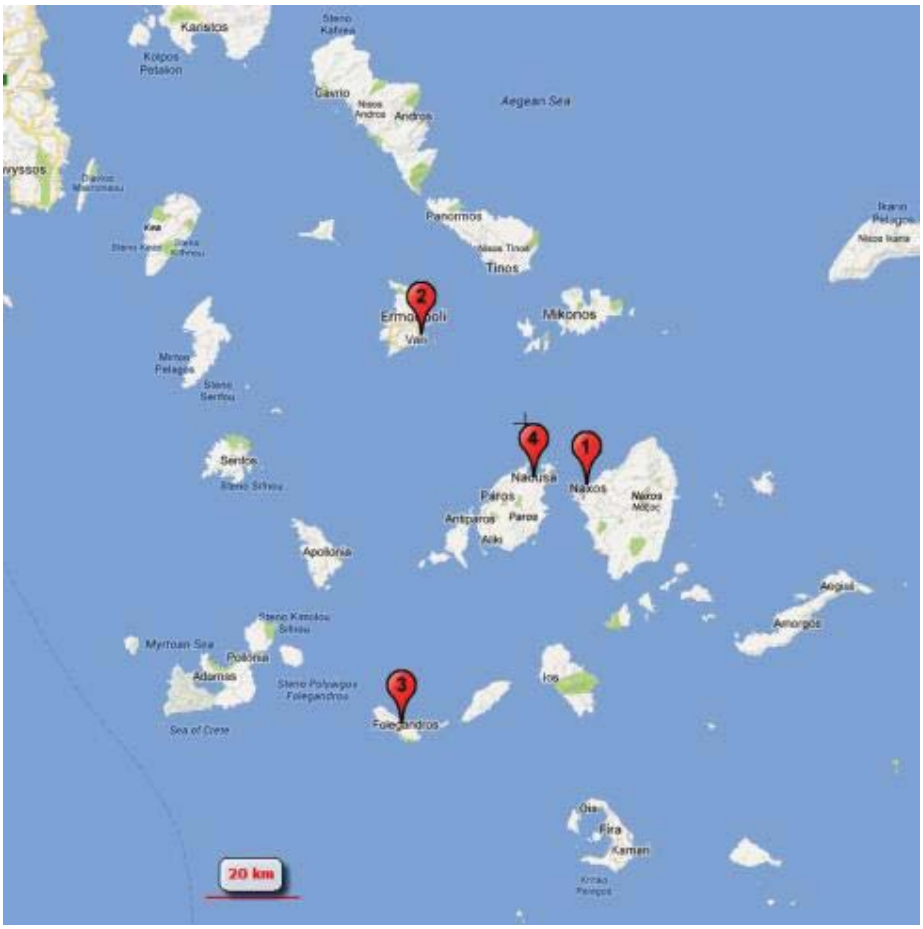


Figure 2. Site visits by Hellenic Centre for Marine Research team

6.5. SWOT Analysis of Scientists/Stakeholder Interactions

STRENGTHS	OPPORTUNITIES
1. good contacts using a long-established network in the area **2.** good knowledge of the region due to other projects in the area; experience in integrated coastal zone management developed by our participation in relevant projects (SPICOSA, PERSEUS, COCCONET, MESMA, ARCH, SESAME, IASON etc.) **3.** most of the stakeholders have common understanding of integrated coastal zone management and similar objectives **4.** there are very few potential opposers which may hinder integrated coastal zone management plans (few 'barking dogs') **5.** possible ways to communicate have multiply for the benefit of consumers and enterprises (internet, cloud computing, smartphones and others); more government information can be found online	1. the main objective of development in the region is tourism; therefore integrated coastal zone management can be very interesting and important since the main axis of development is related to the coast 2. the 2014-2020 RTD calls for Greece will be organized through the Regions exploiting Greek-EU mutual funding of structural funds; thisway we can expect that more focused projects on integrated coastal zone management can be realized 3. the Cyclades region has already initiated a process for spatial planning of the islands (one island is already covered) and therefore the timing of presentation of PEGASO experience, toolbox and deliverables is appropriate

WEAKNESSES	THREATS
WEAKNESS	THREATS
1. lack of funding hinders the face-to-face contact between scientists and stakeholders **2.** scientists in previous RTD projects selectively approached stakeholders based mainly on the criterion of responsiveness and willingness to provide information; ICZM process and discretionary selection of stakeholders are not compatible **3.** some stakeholders have no idea what integrated	1. some stakeholders have developed a bad mentality and opposition in any planning due to marginalisation and isolation of the proceedings 2. scientists in previous RTD projects selectively approached stakeholders based mainly on the criterion of responsiveness and willingness to provide information; we received complaints (also from other parts of Greece in similar projects) from certain stakeholders like the fishermen that they have never been contacted by anyone for planning. integrated

WEAKNESSES	THREATS
coastal zone management is; therefore they lack awareness of their influence and position along the integrated coastal zone management process	coastal zone management or anything else; this has created distrust and restrain on behalf of the stakeholders to participate; Co-optation of the participation process by more powerful or articulate stakeholders, and the exclusion of the poor and disadvantaged
4. there is lack of institutional structure suitable for integrated coastal zone management; the only possible major player for this task would be the Regional Development Company in terms of cost/benefit since they already operate within the Region; therefore there is a lack of connection with stakeholders	3. scientists and stakeholders have much different educational backgrounds and when the integrated coastal zone management tools of PEGASO are meant for scientists they are useless for some stakeholders
5. stakeholders do not know well nor is well documented, which research is being carried out in the area, nor by whom and for what purpose; hence the existing connection between scientists and stakeholders is low (evidence for this is the fact that stakeholders oppose negatively and act very aggressive against scientist teams when they present the results of their research)	4. stakeholders do not know well nor is well documented, which research is being carried out in the area, nor by whom and for what purpose; hence the existing connection between scientists and stakeholders is low (evidence for this is the fact that stakeholders oppose negatively and act very aggressive against scientist teams when they present the results of their research) → results to lack of trust for any future contact attempts
6. language problems; most speak only Greek and therefore the access of stakeholders to important material is extremely limited	5. cultural and traditional aspects may affect how things are perceived by the locals
7. stakeholder access to national information regarding their sector is extremely limited in some cases	6. Lack of political will on the part of governments to allow wide participation because they fear loss of power or influence
8. possible ways to communicate have multiply for the benefit of consumers and enterprises (internet, cloud computing, smartphones and others); not all stakeholders are familiar with this; more progress is required for this	7. stakeholder marginalisation and years of no practical progress in sectoral development (sometimes against their interests) have created 'consultation fatigue'; hence the already present hesitation of some stakeholders to participate; this hinders also their own interest to represent the priorities and needs of the poor and vulnerable groups in the integrated coastal zone management process
9. objective setting processes at administration level are questionable	

7. ICZM Tools

7.1. The TOOLS Used

The general experience from previous projects on integrated coastal zone management such as SPICOSA, IASON, SESAME etc. which produced ICZM tools, is that those tools have not been used in integrated coastal zone management process in the Region of Cyclades and in most cases the stakeholders have no knowledge of their existence even through internet. However, basic integrated coastal zone management tools like GIS have been extensively (actually the environmental administrator of Naxos has a PhD in coastal planning GIS) used and therefore, our evaluation is that the toolbox usage is **moderate**.

Considering the above, a primary objective of Hellenic Centre for Marine Research team was to inform the stakeholders for the PEGASO toolbox by providing internet links and printed material (not only from the Cyclades region but also from all other PEGASO partners) so that the stakeholders have full access to all tools and be able themselves to evaluate their usefulness and their capacity to use them in their planning processes. For example, a special booklet of the science of participatory methods was provided to selected stakeholders for their information (and training).

In addition, it is evident from the educational background of the stakeholders that advanced tools are not very easy to be used by them in the planning process. This is also evident from the fact that usually ICZM or similar plans are usually publicly proclaimed to private technical companies and therefore, for decades there is no such requirement from the public employees (in the administration). The level of education of the stakeholders is medium to low (mostly high school graduates) and therefore their capacity to use and understand tools is not easy or possible for some of them.

The tools which were used in the Greek CASE were:

- indicators - using the initial 310 global list of indicators
- LEAC/GIS applications with one exercise on the effects of Sea Level Rise on the islands
- Socio-economic valuation - within the sea level rise for the estimation of the cost of sea level rise effects on the islands

- participatory methods - in the form of focal group cluster meetings and face-to-face interviews
- Scenarios - in the form of sectoral mental mapping
- SDI/Atlas - by uploading shapefiles

Related to the PEGASO toolbox, the following table summarises our evaluation:

Table 7.1. PEGASO tools acceptance and feasibility of use

	Experience	Willingness to use	Capacity to use	Problems/Concerns/ Comments
Indicators	None	Yes	Yes	1. there is lack of data at the local level as required to plan for small islands 2. NSSG does not provide with suitable data 3. The proposed indicators look interesting and can be worked out by the stakeholders for their own benefit
LEAC/GIS	Only for GIS	Yes	Probably	GIS is a tool which requires dedicated team of people to work on it which does n ot exist at the regional level. For this purpose all such work is done by private technical companies and not the stakeholders themselves
Socio-economic valuation	None	No	No	There is no educational background for this tool application; in addition the existing official data are provided at a scale unsuitable for planning for small islands

	Experience	Willingness to use	Capacity to use	Problems/Concerns/ Comments
Scenarios	None	No	Probably	1. Scenarios require a good stakeholder partnership with all stakeholders participating which is not evident here 2. Probably in the near future and following the setting of the coastal forum by the Ministry of Environment, Energy and Climate Change (if this will be included in the new national coastal plan) then it may be possible that such sessions can be organised
Participatory methods	at the level of invitation of social groups for discussions; not exactly applying the science involved in participatory methods	Yes	Yes	Participatory methods have been used at a very basic level through workshops and public speeches of officials and administrators regarding certain issues including invited speakers as well; the application participatory methods as a science has not been yet performed.
SDI/Atlas	specifically no; most of them can use internet and supposedly they will be able to use	Yes	Yes	Some stakeholders are willing to use this tool for planning; it will depend on how complicated the GUI will be and the type/kind of data it will be able to provide at the island level which is already demonstrated to be extremely poor

7.2. SWOT Analysis of PEGASO ICZM Tools Platform and the Greek CASE

STRENGTHS	OPPORTUNITIES
1. Hellenic Centre for Marine Research team is technically capable to provide training and information to the stakeholders so that to introduce them the tools of the PEGASO platform **2.** Hellenic Centre for Marine Research team is technically able - and it did - to demonstrate to the stakeholders the philosophy of an integrated coastal zone management platform like the PEGASO platform and provide examples of its use as a possible prelude of the 'coastal forum' which may be proposed and enforced by Ministry of Environment, Energy and Climate Change **3.** there is international support by many partners in PEGASO (including international organisations) regarding the application of platforms which can aid our stakeholders at any time in the future and after the end of PEGASO project **4.** some individuals have the appropriate educational background to apply some complicated tools **5.** there is a general willingness for true integrated coastal zone management processes **6.** there are some local data sources that keep and may provide high quality and update data (for example the Cyclades Chamber of Commerce)	1. Ministry of Environment, Energy and Climate Change is in the process to enforce the national coastal plan of Greece which will consider the protocol and outcomes of the various projects including PEGASO; Ministry of Environment, Energy and Climate Change is a member of the PEGASO End-User Committee 2. the local administration is in the process of setting the General Estate/Town Plan of the islands (already finished the first; ongoing the second) out of the over 20 islands that belong in the Region; the timing of presenting the tools is more than extraordinary 3. some individuals have the appropriate educational background to apply some complicated tools but not all 4. PEGASO, ARCH and other integrated coastal zone management projects that are today ongoing can be an opportunity for more information on integrated coastal zone management process 5. the complaint proclaimed by some stakeholders for marginalisation can be used as a basis to invite them to the discussion tables, if such a process is enforced

WEAKNESSES	THREATS
1. the standard procedure of planning through the public proclamation of the studies towards private companies has deprived the capacities of the administration to work with advances tools/methods as well as the capacity to correctly evaluate the results provided by the tenderers 2. lack of data/scarcity of data at the required scale for small islands; there are some local data sources that keep and may provide high quality and update data (for example the Cyclades Chamber of Commerce) 3. some tools require IT infrastructure which is not likely to be available or to be invested upon by the administration including software and hardware	1. lack of data/scarcity of data at the required scale for small islands. Thisway it is difficult to have a good picture of the current state of the coast and set correct objectives and goals (quantitatively); also thisway one cannot perform correct socio-economic evaluation 2. the current process for planning based on the 'top-down' approach only with participation based on a needs-only basis marginalises whole economic and social sectors from the integrated coastal zone management process 3. lack of funding for infrastructure development 4. lack of technical support for the infrastructure 5. inferior quality IT infrastructure is evident and therefore the use of tools is hindered (very low internet speeds, computers exceeding 5 years in age and technology etc.)

8. Lessons Learned

Achievements & Lessons learnt

In order to assess the success of our application and the applicability of the process to the specific CASE, there are several questions to be discussed as:

- is there true partnership?
- is there equal access and collectivity?
- is the ICZM system integrated?
- is there Governance established and at what level?
- is there a DSS toolbox; is it accepted; is it working for the stakeholders?

8.1. Partnership and collaboration

As a participatory process in itself, ICZM requires collaboration between the various stakeholders in order to build a common and sustainable vision of a given coastal area. Our findings suggest that there are stakeholders and key individuals within the ICZM process which have officially declared that are neglected and marginalised from the process. It is therefore our understanding that the ICZM process is running based on the 'top-down' principle instead of both directions within a frame of equality, respect and transparency.

There are at least 4 reasons behind this:
(a) low level stakeholders (for example fishermen) have shown alienation to the process creating a situation for the administration to disregard their participation in the planning process due to their lack of education and know-how; in addition, key members of the administration have also declared that they have been neglected by the political leadership of the region

(b) the administration, took in advantage this particular behaviour from various stakeholders so that to reduce as much as possible the possible conflicts creating a 'top-down' procedure in the end; this procedure has - in many occasions - led to arbitrary decisions which created local social

(c) we were informed by some stakeholders (for example, fishermen) that they have never before been contacted by someone on ICZM (NGOs, Universities, Research Centres etc.) , hence their lack of understanding of what ICZM is and what is their true position in the process. On the contrary they informed us that on various occasions several teams approached them for interviews and data collection but only once and without any follow-up.

(d) it is evident that in many cases scientists within RTD projects on ICZM or similar select the stakeholders to participate in the RTD process according to how good cooperation they have with them. Thisway all stakeholders that may be non-cooperative or present opposition to the process are left out of the loop. It is our understanding that ICZM round-table participation process explicitly requires the inclusion of all stakeholders regardless if they are non-cooperative, aggressive or their opinion is opposite to any of the objectives; the ICZM process explicitly demands that all voices must and should be heard.

The above create doubts whether there are true networks of stakeholders as advertised suitable for ICZM.

8.2. De-compartmentalisation & Collective expertise

The principle of “de-compartmentalisation” allows stepping out of sectorial issues for taking a systemic and transversal overview of the issues. Following this principle, a stakeholder platform brings together, around the same (virtual) table, different stakeholders from the public sector (State, local authorities, public agencies), private companies, scientist community, voluntary sector and civil society, supranational organizations and donors).

However, from the information collected from the stakeholders, there are some who willingly (themselves) or intentionally (by others) have been marginalised and therefore, this particular issue is not clear at this point for the specific CASE.

The only certain issue is that ICZM process requires that the participation process needs to be rebuild even if this will delay the national/regional/local ICZM process. Hopefully if the Ministry of Environment, Energy and Climate Change in its forthcoming national ICZM plan will introduce the institution of the 'coastal forum' then ICZM planning will be on its right tracks in accordance to the protocol. As it is today, the system works the other way round: when a CZ issue is to be addressed, the administration creates - if they decide to - an *ad hoc* round table with specific invited participants.

8.3. Integration within ICZM

8.3.1. Between stakeholders and ICZM planners

The results of the interviews shows **loose** integration between stakeholders and administrators (responsible for ICZM planning). Complaints of neglect and marginalisation were made as well as cases of selective communication between ICZM groups and stakeholders.

8.3.2. Within planners (administration)

There have been complaints that key administration staff for ICZM has been neglected in the process of planning. Therefore, integration within administration can also be characterised as **loose** and mainly based on priorities, political agendas and requirement for 'fast and easy' processes.

8.3.3. Integration of habitats

In terms of integration of habitats, the ICZM planning process within the Region of Cyclades is considered at this point as effective and complete covering all the possible human activities and requirements for the permanent and temporary (seasonal) inhabitants and visitors of the islands. Proof for this is the lately issued General Estate/Town Plan of Paros Island published in 2012 (Ref. 17250/2582/24-4-2012). The template which will be followed for the rest of the islands (now the plan for the island of Naxos is under preparation) covers the following:

i. urban zones
ii. zones for production activities (processing, trading, warehousing)
iii. zones of special protection (NATURA 2000 zones, coastal wetlands, wild life refuges, forestry and reforestation zones, natural protection zones, tourism walking paths, special natural

beauty zones, *Posidonia* meadows, archaeological sites, agricultural land)

iv. zones of building control (coastal zone, building control areas - ZOE, inland ring zones etc.)

v. Transitional provisions

8.3.4. Integration of disciplines

Regarding the integration of disciplines, this is questionable as long as there are complaints that stakeholders are marginalised in the integrated coastal zone management process. This is because each stakeholder usually represents or belongs to a single sector. If a neglected stakeholder represents a sector (for example fishermen union in small coastal areas like the islands), any attempt to neglect or marginalise this stakeholder at the same time will lead to the marginalisation of the sector.

The Hellenic Centre for Marine Research team made any effort to include in the process all stakeholders that have been recognized within this PEGASO project regardless their mentality, opposing opinion or level of aggressiveness, thus covering all the disciplines and individual sectors of economy.

8.3. Governance

The integrated coastal zone management governance so far as evidenced through our experience with the regional administration indicates that it is not in accordance to the integrated coastal zone management process as described in the protocol, rather than a 'top-down' process with a need-basis inclusion of stakeholders.

9. Overall Greek CASES SWOT analysis

STRENGTHS	OPPORTUNITIES
1. enough amassed knowledge and know-how of the area of the central Aegean Sea for fisheries, aquaculture and oceanography from previous RTD projects of the Hellenic Centre for Marine Research, NGOs and Universities	1. in Greece, the next RTD projects will be funded through the Regions and not from the Ministries as before (projects ESPA). This provides a great opportunity for Hellenic Centre for Marine Research due to our relations in the area and the work offered to the Region administration
2. amassed integrated coastal zone management tools from previous RTD projects such as SPICOSA, IASON, SESAME as well as ongoing projects such as PEGASO, PERSEUS and ARCH (all in which Hellenic Centre for Marine Research participated or participates)	2. the local administration has just started working on a new spatial planning for the islands (only one is finished already) so the timing with PEGASO deliverables so that the impact of the output can be maximum, if the administration appreciates it
3. existing network with main administration stakeholders which allows the immediate and direct contact with any other stakeholder not in the network	3. the political and economic crisis of 2010-today can be an opportunity for some; the outcome (positive or negative) though cannot be judged today
4. the Cyclades area exhibits natural beauty with many places to visit combining coasts and mountainous areas, inland waters suitable for many special types of tourism such as spiritual or archaeological; the Region exhibits a very high number of Blue Flag beaches and marinas	4. the new administration division system named "Kallikratis" has grouped together municipalities and communals for which no data existed before but from now on they will be included in the census systems and therefore, accuracy of collected statistical data will improve
5. the Cyclades region attracts all types of tourism including high value tourists since there are available isolated villas costing 500-1000 € per night	5. still there is available land for primary production in the case of diversification of GDP plans; the cultivated land today is the 32.15% of the total arable land
6. PEGASO and other projects have provided a very high number (more than 200) of partners which can be accessed for help, advice, know-how and experience in various subjects and issues should such a need arises	6. a very high number of NATURA 2000 protected sites; 1087.68 km² for birds and 1322.35 km² for habitats
7. all islands have marinas and ports suitable for ferry boats; further development is planned through the Structural Funds of the Regions	7. integrated coastal zone management is now required to be included/implemented in the national coast management plans due to EU polices and directives (MSFD, WFD etc.) therefore interest for integrated coastal zone management will increase constantly
8. the GDP per capita shows positive trends which may indicate that the setting of the option to develop tourism as primary, is a correct planning decision	
9. possible ways to communicate have multiply for the benefit of consumers and enterprises (internet, cloud computing, smartphones and others)	

- eventhough RTD projects have been conducted in the region, not all scientific disciplines have been covered thoroughly leaving significant gas in knowledge for integrated coastal zone management applications
- despite a willingness to make changes, the capacity or knowledge as to how to do so is not sufficient
- there is lack of institutional structure suitable for integrated coastal zone management; the only possible major player for this task would be the Regional Development Company in terms of cost/benefit since they already operate within the Region
- not all departments in administration have sharing system in place
- the mentality of the low level stakeholders is mediocre to bad regarding planning and integrated coastal zone management due to years of marginalisation
- funding and budget limitations hinder significantly the correct application of integrated coastal zone management; for example continuous presence and contact with stakeholder is almost impossible
- there are still lots of integrated coastal zone management issues to be studied; especially the waste management since there are 22 uncontrolled waste dumping landfills and all of them in the region are coastal (all 27 of them)
- fishing sector is very traditional, artisanal (small scale) and old fashioned with old inadequate vessels; the production does not meet the demand especially during touristical period
- the islands are away from the mainland which affects the product prices and availability in the market due to higher costs
- the region is chartacterised by inadequate
- absent holistic approaches in management
- absent integrated coastal zone management dedicated agencies in Greece
- policy making system is operating only along the top-down direction; low level stakeholders are not involved in the process and are marginalised on purpose by the administration; Lack of political will on the part of governments to allow wide participation because they fear loss of power or influence;
- the limitation of funds makes the continuous presence of integrated coastal zone management researchers and policy makers in the region very difficult so the participatory momentum that is established during a project is abandoned; this has catastrophic effects in the establishment of a participatory system based on trust, presence and transparency
- the limited presence of scientists and planners is covered by the NGOs who have independent funding and working locally; their interference is usually creating conflicts among the stakeholders due to different objectives and agendas
- the distance from mainland and the insufficiency of transportation by the ferry boats due to significant number of vessels decommissioned due to age (in Greece the law provides that the use-life of a passenger vessel is less or equal to 35 years) especially out of the tourist season contributes significantly to the isolation of the islands; some fish farms closed for this reason due to problems for transporting their products to the mainland markets and exports
- only tourism is promoted; insufficient marketing efforts are made for other equally important attractions of the islands and local traditional and registered name products
- missing data from the National Statistical

connections via ferry boats with the mainland except the main islands and during the small tourist season. Same stands also for the airports which are of small size and unsuitable for charter flights and medium to big sized aircrafts (the local OA or Aegean uses 40-70 seaters for the connections) • the National Statistical Survey of Greece uses an inadequate system of stratification for keeping and publishing statistical data at suitable NUTS levels in order to cover the needs not only of integrated coastal zone management but also the MSFD and WFD as already has been demonstrated • the existing attractions (for example NATURA 2000 sites) are not modern or suitably developed to attract visitors; the tourism sector is still old-fashioned structured based on the axiom "just provide lodging and a nice beach and this is enough"38; there are only 5 areas officially designated for diving most of which are designated in small islands which require significant transportation of people (and cost) • local administration exhibits small experience in integrated coastal zone management • only a few administrators can be found with good educational background suitable for integrated coastal zone management • most development in the region accounts for tourism; all the rest sectors are slowly diminishing and abandoned: from the total number of enterprises in the region (22704) 82.63% provide services (commerce and tourism), 17.18% are within the secondary sector (industry, construction) and only 0.19% are within the primary sector (producers) according to the enterprise register of the	Survey of Greece are a great threat for correct application of integrated coastal zone management • the political and economic crisis of 2010-today is a significant threat to development of all sectors • until today (when Hellenic Centre for Marine Research submitted an exercise on the effects of sea level rise on the Cyclades islands) no projections have been made for the ongoing and planned coastal works rendering their efficiency, adequacy and cost/benefit, useless • bureaucracy in the Greek administration system combined with the complexity of Greek legislation today and the fragmentation of services and agencies between islands creates extremely high costs and negative externalities in all aspects of development and business • the sea level exercise showed that a high number of inhabitants have high risk of negative effects from climatic changes: almost 60813 inhabitants are within the high risk areas (55.14% of the total population); the problem arises from the fact that a lot of people leave along the coast (also due to tourism business) • in several islands there are issues related to actions incompatible to EU legislation; for example illegal household waste dumping (22 uncontrolled landfills) for which EU has fined Greece several times • given the Greek experience so far, incorporation of ICZM in national planning may lead to over-bureaucratisation • cultural and traditional aspects may affect how things are perceived by the locals • only a few - if any - of the 1239 pillars of

[38] 'Sun, sea and sand' tourism type of conventional and mass tourism (3S tourism)

[39] according to the World Economic Forum, economic competitiveness can be achieved through correct establishment of 12 economic pillars: Institutions, Infrastructure, Macroeconomic stability, Health,

Commerce Chamber of Cyclades (accessed 18 August 2013) • **unemployment is also a potential problem which may be settled through investments in tourism (probably since this is the primary objective for the region): 40.22% of the population are economically active** • **literacy of the youth is very low: 16.8% of the total are literate** • **the season of tourism is very small; from July 20 to September 15 with main peak during August (official vacations time for Greece is August)** • **the islands have limited freshwater water supply; some require to be supplied by tankers; the annual requirements are around 112,000 m^3** • **especially in the small islands there is insufficient provision of social services due to fragmentation costs** • **tools provided by PEGASO which are usable by the high level administrators are the indicators and SDI (LEAC and GIS). The low level stakeholders can use none.** • **possible ways to communicate have multiply for the benefit of consumers and enterprises (internet, cloud computing, smartphones and others); not all stakeholders are familiar with this; more progress is required for this** • **objective setting processes at administration level are questionable**	**economic competitiveness have been achieved in the region** • **stakeholder marginalisation and years of no practical progress in sectoral development (sometimes against their interests) have created 'consultation fatigue'; hence the already present hesitation of some stakeholders to participate** • **law enforcement is problematic**

Education/Training, Goods market efficiency, Labor market efficiency, Financial market sophistication, Technological readiness, Market size, Business sophistication and Innovation

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9.Nile Delta (Egypt)

Chapter 1
INTRODUCTION

Nile Delta is the delta formed in Northern Egypt where the Nile River spreads out and drains into the Mediterranean Sea in a relatively recent geological ages. Its area is about 20000 km2 was formed by the sedimentary processes which have been occurred at the upper Miocene period. It is one of the world's largest river deltas. It extends from Alexandria in the west to Port Said in the east and covers nearly 240 km of Mediterranean coastline. From north to south the delta is approximately 160 km in length. The Delta begins slightly down-river from Cairo.

Seven major old deltaic branches of the Nile River are mentioned in various historical documents and in ancient maps. Only two of these remain active, Damietta and Rosetta branches. These two main branches developed the Rosetta and Damietta promontories which have prograded during Holocene times into the Mediterranean Sea.

People have lived in the Nile Delta region for thousands of years, and have been intensively farming for at least five thousand years. The Nile River used to be flooded on an annual basis, but this ended with the construction of the Aswan Dam. Records from ancient times show that the delta had seven distributaries: (from east to west) the Pelusiac, the Tanitic, the Mendesian, the Phatnitic, the Sebennytic, the Bolbitine, and the Canopic. There are now only two main branches, due to flood control, silting and changing relief; Damietta (corresponding to the Phatnitic) to the east and the Rosetta (corresponding to the Bolbitinic) on the western part of the delta.

Coastal resources are expected to suffer direct impacts through sea level rise and inundation of low elevation areas. It is estimated that a sea level rise of 18-50 cm combined with local Nile Delta subsidence will lead to negative impacts on the low level coastal zones by submerging some of the north parts of the Nile Delta, Affecting the aquifer near the coast; also would affect quality of agricultural and reclaimed lands; in addition to impacts on tourism, trade and ports in the coastal areas. It would also lead to a decline in productivity of some food crops such as rice and wheat; difficulty in cultivating some crops, loss of agricultural land and change in Egypt’s crop structure. Sea Level Rise would also destroy weaker parts of the sand belt along the coastline which is important and necessary to protect shallow and low level lakes and reclaimed lands. It would also change water quality affecting most of freshwater fish, threatening low buildings in Alexandria and Port Said. Recreational tourism may be affected by degradation of beach facilities and salinity of groundwater.

The most drivers on the coastal area that hinder the sustainable development are:

- Flooding of some low-lying parts of the northern Delta and some other coastal zones.
- Increasing rates of coastal erosion, penetration of salt water in soil, intrusion of seawater into groundwater and lack of agricultural productivity.
- A survey using GIS and remote sensing techniques has shown an impact on the northern coast and cities of the Nile Delta on the long term due to Sea Level Rise.
- Impact on fish production due to the change in coastal zones' ecosystems and increasing in sea temperature.
- Associated social and economic impacts.

The Importance of the area

1. More than 80% of agriculture production is coming from this area
2. It is a place of natural gas production
3. More than 90% of fish catch is coming from this area
4. It is pathway of migrated birds
5. It is home to over 50 percent of Egypt's population

The approach used to identify the case key issues in the studied area is to:

1. Review the Egyptian legislation with respect to the development in coastal area and other guidelines issued.
2. Identify the stakeholders
3. Integrate with ICZM Protocol
4. Held and organized series of meeting/workshop with all stakeholders. Local, regional and national stakeholders and policy makers have been invited and participated to discuss the case and to identify the Key issues.

The invited stakeholders to the workshop include representatives from:

1. National Institute for Fisheries and Oceanography (NOIF).
2. Ministry of Environment - Egyptian Environmental Affairs Agency (EEAA).
3. General Authority for Fish Resources and Development (GAFRD).
4. Egyptian Shore Protection Authority (SPA).
5. Coastal Research Institute (CoRI).
6. General Organization for Physical Planning, Ministry of Housing.

7. National Centre for Planning State Land Uses (NCPSLU).
8. The three Coastal Governorates (three representatives from each governorate)

The main coastal issues in the Nile Delta case:

The Nile Delta Stakeholders have been identified the following coastal issues in the Nile Delta case:

- **Irrational land use:**

The most important change in land use pattern in the coastal areas is uncontrolled urbanization (urban sprawl). It is mostly due to a shift in population and activities along the coast. It results in more pressure in this area. Developments are occurring in unsuitable or unsafe area is resulting in deterioration of land and marine habitats as well as conflicts between those involved in agriculture, human settlements and tourism and nature conservation.

- **Water Quality**:

The Coastal waters serve as a sink for land-related pollution, for example from the main urbanized, agricultural, industrial areas and shipping accidents. These derived either directly from coastal cities discharge points or through the irrigation and drainage canals directly open to the sea and from coastal lagoons "lakes" Maryut, Idku, Burullus and Manzala. The discharge includes heavy loads of pollutants from various sources. Three hot spots were identified, Abu Qir Bay, El Mex Bay (Alexandria) and Manzala lake.

Three areas show distinctly high levels of eutrophication. The first is the area around Alexandria, the second is the area of Abu Qir, and the third is the area from the new Damietta to Port Said. Some of these areas are characterized by the discharge of domestic sewage and agricultural runoff from the River Nile, and the impact of the coastal lakes and its related drainage system.

Egyptian Government has taken some action to protect water from pollution such as;

1. Established of Supreme Council for the Nile River and waterways protection from pollution according to Article (47), as repeated in Environmental law No.4/1994 as mended by Law No. 9/2009 and its executive regulations.
2. Applying principles of integrated management of water resources, and in this regard, Egyptian Government has been taking several operational steps:
    - Implement monitoring programs for water quality in Nile River and Lakes through monitoring network
    - Amend laws and their executive regulations concerning protection of water resources to deal with development and advanced technology used in the industry for waste water treatment, such as Law No. 48/1982 for the protection of water resources from pollution

and its executive regulations, amended by resolution No. 402/2009, and Law No.4/1994 amended by Law 9/2009 regarding environmental protection and its Executive Regulation.

- Expand in providing economically, environmentally sound technology for swag network and treatment stations in all of Egypt; in addition to raising the efficiency of existing network and station
- Restrict issuance of clearance procedures for industrial establishments for discharge their treated industrial wastewater into waterways.
- Encourage people for applying clean and environmental friendly technologies

➢ **Shoreline erosion and Climate change**

Coastlines in Nile Delta are naturally subject to erosion and accretion; however, certain parts of coast are protected by hard coastal structure. The Nile Delta is extensively used for agriculture. In lower parts of the delta, the saline seepage from the aquifer aggravates the salinity problems to agriculture. Human presence in certain areas makes protection from erosion. In undeveloped areas, better planning is required to ensure that human activity is integrated with natural processes rather than acting against them.

➢ **Natural resources and habitats in coastal areas**

Alteration and degradation of biophysical properties of beaches, estuaries, and wetlands. Certain activities pose a direct threat to natural resources if not adequately managed. These include fishing, hunting of coastal and marine animals such as turtles and seabirds, boating activity, mining, extraction, refining, and land reclamation.

➢ **Fisheries**

Over fishing activities in marine area, impact released from aquaculture fish farms. Within the low-lying coastal zone of the delta there are some large and shallow coastal lagoons, lakes which supply considerable part of fish production, nowadays, these lakes suffering from deterioration and need to be restoration.

➢ **Socio- economic Impacts**

Furthermore all of the above issues without no doubt can affect the social and economic conditions for population , but the most vulnerable one to direct affects are the fishermen and farmers especially threatened populations in low-lying areas, eg., Inundation, agriculture losses, erosion and impacts on infrastructures.

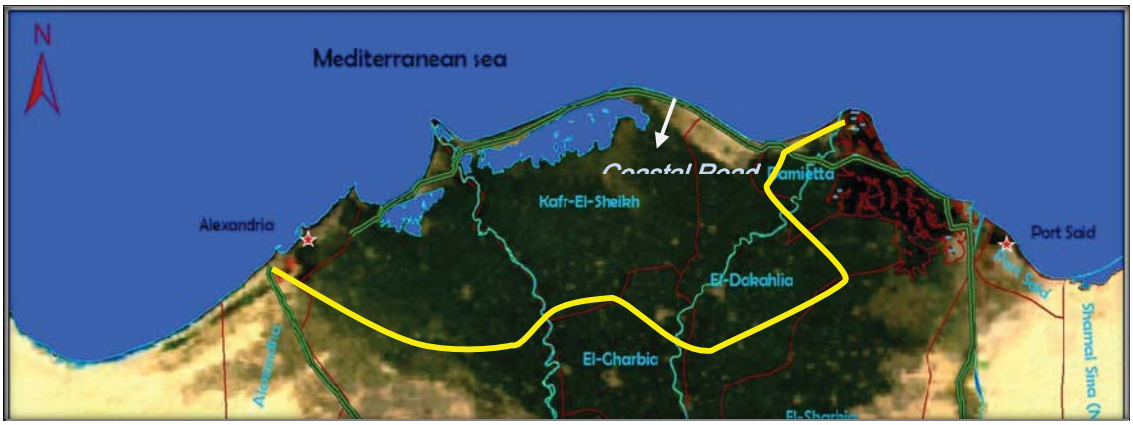
The Social, political, environmental and economical relevance of the identified coastal issue:

The study area covers 3 coastal governorates; El Bohera, Kafr el Sheik and El Dakahlia (Figure-1). The middle eastern part of Nile delta contains a unique ecosystem which is very vulnerable to changes; lakes (two lakes Iduko and Burullus with various biodiversity fauna and flora, route of resting area for migratory birds), wetlands, sandy beaches, sand dune, black sand with its economic value and agricultural fertile land sand. Most of the economic activities in Egypt are running or take place in the Nile Delta such as; farming, mining, fishing, harbor, industrial area, tourism resort and archaeological tourism (pharaonic, Coptic and Islamic in Rosetta town), aquaculture fish farming and transportation with associated infrastructure such as the coastal road. Sometimes this diverse of activities increase the conflicts of interest among stakeholders and gives the opportunity for political influence to take place whenever it is positive or negative decision. Hence, an integrated Coastal Zone management plan is required to solve the conflict of interest among stakeholder and to preserve the ecosystem and achieve the sustainable development.

Map-1: Map showing the Nile Delta governorate

Study Area

The study area considered here is the Nile Delta Mediterranean coast between Alexandria Governorate on the west and Damietta Governorate in the east passing through Beheira, Kafr El-Sheikh and Dakahlia governorates from west to east (Figure-2). The southern limit of the area is taken as a distance of 5 kilometers south of the International Coastal Highway except at existing population centers which are wholly considered in the current study. Legally and for planning purposes, the study area includes land assigned by Presidential Decree No. 108⁄2000 to the New Urban Communities Authority. This land is within a narrow plain stretching for about 160 kilometers in the central sector of Delta base and including four administrative centers; namely, Belkas, Burullus, Motobas and Rashid.



Map-2: The area above yellow line includes coastal area is PEGASO' Nile Delta case

The approach used to develop the ICZM plan for Nile Delta

In the framework of PEGASO project, a **Nile Delta Coastal Group** has been established by Decree No"1' and comprises specialists from the coastal provinces, coastal development, besides the previous mentioned stakeholders (see 1.4) to study and discuss the key issues and put the plan to develop the ICZM plan.

The mandates of this coastal Group are:

1. Identify the key issues (pressure) experienced by the study area
2. Compilation of development plans and programs in the study area
3. SWOT analysis and evaluation of current and terminated plans and programs and identify conflicts and lessons learned.
4. Participation in the preparation of integrated coastal management plan for the study area
5. Development of policies that will be proposed to implement the development plans
6. Approved the Final product of PEGASO project (proposed Nile Delta Integration Coastal zone Management Plan)

The coastal group conducts several meetings and workshops, in the first one, they identified the geographic coverage areas for case study which include the shoreline for the three coastal governorates (Dakahlia, Kafir ElShaiekh and El Bohera) with landward limited 2-5 km or till the international coastal road and then they identified the followings:

1. Review as much as possible all plan and decree issued for study area
2. Review as much as possible all previous work done
3. Identified the gaps and conflicts in plan among stakeholders
4. Identified the opportunities for economic development.
5. Propose the modification needed to land use plan

For this purpose four subgroups have been formulated from the coastal group each one responsible for certain field in relation to one of the key issue. These subgroups are:

1. Land use subgroup
2. Shore line management subgroup
3. Natural resources subgroup
4. Water quality subgroup

Each of subgroups have followed the identified action plan and prepare a report discussed in general coastal group meeting, six meeting were held for this purpose and the output reports from the subgroups are presented to high level policy makers at a ministerial level and authorities in the Nile Delta case Final workshop. These results will be discussed in the following chapters

Chapter 2
Land use

The intricate, pristine fragile nature of the Nile Delta coast has come into major serious challenges since the establishment of Aswan High Dam in the second half of the last century. These were basically typified by extensive rapid shore erosion processes with associated phenomena like destruction and loss of habitats, changes and imbalances in coastal water regimes and bodies, deterioration of coastal water quality through increasing loads of anthropogenic materials from agricultural, industrial and domestic usages etc. These challenges and threats are expected to be heightened with the potential development of the area following the establishment of the International Coastal Highway (ICH) in the North Delta region about two decades ago. The highway has triggered government and local administration bodies as well as investors and locals for exploitation and taking advantage of the new appealing setting of the area. The multiple and conflicting goals of stakeholders for tenure, holding and starting projects with the lack of coordination or integrated planning would result in unplanned development that wastes natural and financial resources on short-, medium- and long terms.

Study Area

The study area considered here is the Nile Delta Mediterranean coast between Alexandria Governorate on the west and Damietta Governorate in the east passing through **Beheira, Kafr El-**

Sheikh and **Dakahlia** governorates from west to east. The southern limit of the area extends to 2-5 kilometers south of the International Coastal Highway except at existing population centers which are included in the current study. Legally and for planning purposes, the study area includes land assigned by Presidential Decree No. 108⁄2000 to the New Urban Communities Authority. This land is within a narrow plain stretching for about 160 kilometers in the central sector of Delta base and including four administrative centers; namely, Belkas, Burullus, Motobas and Rashid (Figure.2).

General Framework

This study comes within the efforts of Egypt to develop the area in environmentally sound consistent approach that minimizes conflicts among different stakeholders maintain natural and financial assets from losses. The growing interest in the Nile Delta Mediterranean coast over the past years led to the need of developing a strategy for urban development (housing, tourist and recreational areas) in the context of environmental determinants and unique characteristics of the region.

Objectives and Methodology

In the context of the preceding framework, the objectives of the study were formulated as follows:

A. To identify locations suitable for urban development within 5 km-distances north and south of the international highway to the Mediterranean coast of the International Coastal Highway to organize urban sprawl and reduce unplanned urban development.
B. To develop a preliminary development strategy for the area taking into account the potential hazards of climatic change and rising sea levels.
C. Taking into account the environmental risks and their impacts on the short, medium and long term.
D. Develop a strategy consistent and do not interfere with national strategies at the same time span. Among the most important of these national strategies is deployment of population and development from the Delta to desert areas.
E. Consider development of economic efficiency as an objective of this strategy.
F. Maximize use of available tourism potential along the coast.

- **Spatial range for the north coast of the Delta**

The northern coast of the Delta belongs to three ranges with diverse potential contribute in enhancing development process:

- **Coastal plain**: exposed to environmental and natural risks on the medium and long term.
- **Intermediate area**: with high potential for urban and economic development.
- **Inside Delta**: require sub-roads to link with their urban centers.

According to the development potential of each sector, they can be divided as follows:

- Coastal strip: fit for transport services, trade and industrial activities as well as business and recreational tourism.
- Intermediary sector: urban development based on services, industry and aquaculture.
- Inside Delta sector: exploitation of the spatial and available economic potential in the spaces around roads leading to the sub-urban centers in central and southern Delta.

This report will focus on the coastal plain area

- **Location and spatial relationships**

Scope of the study area includes the coastal northern part of the following three governorates, (Dakahleya, Kafr El Sheikh and Behaira) from east to west.
The administrative centers are represented in Dakahlia governorate by Belqas center; in Kafr El Sheikh Governorate; Burullus center , Hamoul Center, Riyad center, Sidi Salem center, Motobas center. However in Behaira governorate, Rachid center considers the most appropriate type locality of Nile Delta (see Map 2).

- **Transport and Roads**

The study area is a stripe extends along the international coastal north road. The international road is located in the far north near the beach, and is associated with some cross links and streams from some small towns; Sherbin, Belqas, Hamoul, and Motobas. The passage of the international highway between the Mediterranean Sea and Lake Burullus in the region from Baltim to Rositta makes it difficult to link between the international road and the North Delta area. Thus it reduces the benefit of the international road in this part. Current traffic level on the highway is very light and can face future movement with an adequate standard of service.
The new urban communities that will be established in the study area will be linked by the international road and must be linked to urban areas in the north of Delta with cross streams.

Overview of the current land-use in the three governorates

First: Dakahlia Governorate:

Dakahlia is one of the five largest governorates. It locates east and west of the Damietta branch and is bordered by the Mediterranean and Damietta governorate from the north, Sharkia and Qaliubiya governorates from the south, Gharbia, and Kafr El-Sheikh governorates from the west. It covers an

area of about 3471 km2 which is about 1842 thousand acres.
In the Dakahlia governorate the cultivated areas represent higher proportion followed by unexploited plain areas then urban areas in accordance with uses. The urban settlement mostly in Gamasa city and to the west there is a plain unexploited area. However the encroachment is approximately 2 km^2.

- **The proposed land uses, according to the comprehensive report of the northern coast of the Delta as a new urban settlement as follows:**
  The establishment of public beaches and tourist areas along coast of the governorate and north of the international coastal road is of the most important proposals; the following figure shows that :

- **Population problems**: Several factors affect number of population, for example the area characterized by presence of marshes, coastal lakes ,Salina, high level of salinity in underground water. All these factors decrease number of population and urban centers

Second: Kafr El-Sheikh governorate

Kafr El-Sheikh locates in the far north of the center of the Delta bounded by the Mediterranean Sea on the north, Gharbia governorate on the South, Dakahlia governorate on the east and Behaira governorate on the west. Its total area is about 3748 km2. Burullus Lake is one of its most important natural attractions.

Kafr El-Sheikh governorate acquires the largest share of the international coastal road where more than two-thirds of the road runs through its cities, from the link of Rashid Bridge with Burullus Bridge till the boundaries of Kafr El-Sheikh with Dakahlia and the coast (Map-2).

- **The most important landmarks** is Burullus Lake:
  The lake locates in the middle of the Delta between Rosetta and Damietta branches, the average width of the lake is 14 km, and the area reached 114500 acres in 1981. The depth of water ranges between (0.5 m - 15 m). The region exposed to winds when comes from the eastern north. Agricultural drainages discharge in the southern region of the lake. The lake linked with the Mediterranean Sea in the north at Burullus strait.

- Several factors affect number of population, for example the area characterized by presence of marshes, coastal lakes, sabkha, high level of salinity in underground water. All these factors decrease number of population and urban centers.

- **The current uses of land according to the National Center for State land-use planning** are distributed among urban settlements, fish farms, swamps and islands. However, the percentage of cultivated areas, unexploited plain areas and lakes is convergent.

- **Current land uses, according to the stated comprehensive plan for the development of the northern coast of the delta**;
  Land uses in the study area classified into agricultural areas , lands under reclamation, orchards and trees, exploited areas in agricultural on parts of the sand dunes, as well as marshes , gas fields , urban compounds under construction, rural compound areas , sand dunes , black sand areas, fish farms, lakes and industrial zones.

- **Proposed land use as mentioned in the strategic scheme for land use in northern coast of the Delta**;
  Tourism projects, water sports, camps and green areas along the coast of the governorate; along the northern international coastal road , industrial and strategic areas.

- **Proposed land use within the comprehensive development plan for the northern coast of the Delta as new urban settlement;**
  Establishment of tourist areas and fish farms along the coast of the governorate and north of the international coastal road are among the most important proposals.

Third: Behaira governorate;

Behaira governorate locates at the west of the Rosetta branch of the Nile. It comprises four important highways, namely the Cairo-Alexandria desert road, the Cairo agricultural road, the international road and the circular road. It consists of 13 centres and 14 cities, and contains important industries such as cotton, chemicals, carpets, electricity and fishing.

- **Population Problems:**
  The study area extends in the north of the Delta, with its natural features and characteristics that limits urban development, so that its population is limited. It is characterized by the presence of marshes, Salina, coastal lakes, salinity soil and increase of salinity in ground water. All these factors lead to lack of population and urban centers.

- **Current land uses according to the National Center for State land-use planning:**
  Percentage of cultivated areas, unexploited plain areas and lakes is convergent; the rest uses is distributed among urban settlements, fish farms, swamps and islands.

- **encroachment on agricultural land:**
  Encroachment is approximately 40.5 km^2, the proposed land mandates received from the National Center.

- **Proposed land use received from the National Center:**
  According to the National Center it is suggested that mandate of the region is divided to the Ministry of Housing.

Chapter 3
Shoreline protection Plan

The Nile Delta coastline extends for 240 km from Abu Qir, near Alexandria, in the west to Port Said in the east. The coastline is backed by a plain surface of coastal plain area of ~13,000 km^2 (Fig. 1). This coastal plain is backed by topographic features lying below and above the mean sea-level up to the 3 m contour that include coastal wetlands which range from small ponds to large lagoons; these lagoons are also referred as lakes. These lagoons represent 0.25 of total Mediterranean coastal wetlands (Sestini 1992). Most of delta front, with 1-10 km wide sand belt is still almost empty and unused, due to its poor connection with the rest of Egypt.. However, a number of resort beaches and new cities have been created such as Ras El-Bar city and the new Damietta City near Damietta Port.

The surface of the entire Nile Delta (20 000 km^2) represents only 2.3% of the area of Egypt, but as much as 46% of the total cultivated area (55040 km^2), and it accommodates approximately 45% of Egypt's 60 million inhabitants (Sestini 1992). The importance of this zone is further underlines by its high level of agriculture and fish production.

The Nile delta has substantial resources in its coastal zone and a number of urban centers. As the coastal zone encompasses more than 40% of Egypt's industries, this region is extremely important economically, containing substantial capital investment.

The coastal environment of the Nile delta has been degraded at many places; this degradation has negatively impacted the human use of the coastal zone, causing the loss of important economic assets. Irrational land use, water pollution, shoreline erosion, flooding and deterioration of natural resources and habitats are the main challenges to be addressed and managed. These challenges moreover will be exacerbated due to the foreseen climate change impacts, land subsidence, and prolonged vulnerability to flooding risks and coastal erosion. The saline intrusion in the groundwater will increase; if no measures are taken.

Overview of previous development and ICZM plans of Nile Delta including

Shore protection plans

In 1980 up to now, extensive engineering structures have emplaced along the Nile Delta coastline to modulate effects of beach erosion, including revetments, jetties, groins, detached breakwaters and seawalls (Figs, 2 a-g). Among these protection works, the shore-parallel structures of Rosetta seawall, Burullus seawall, Burullus-Baltim detached breakwaters, Damietta seawall, and El Gamil detached breakwaters.

In order to face the diachronic shoreline losses at the outer margin of the Rosetta promontory, where erosion rates were higher, two seawalls comprised of artificial embankment covered by dolos concrete blocks of 4 to7 ton were constructed between 1988 and 1991 to the west and east of the Rosetta mouth (Fig. 2c). The two seawalls were constructed inland and extend alongshore to a length of 1.5 km and 3.35 km at the western and eastern shores, respectively. They stand 6.75 m above mean sea level, and have a width varying from 48 to 70 m. As a consequence, erosion is terminated at the tip due to construction of this seawall, originally was 106 m/yr prior to construction of the seawall (Frihy and Komar, 1993).

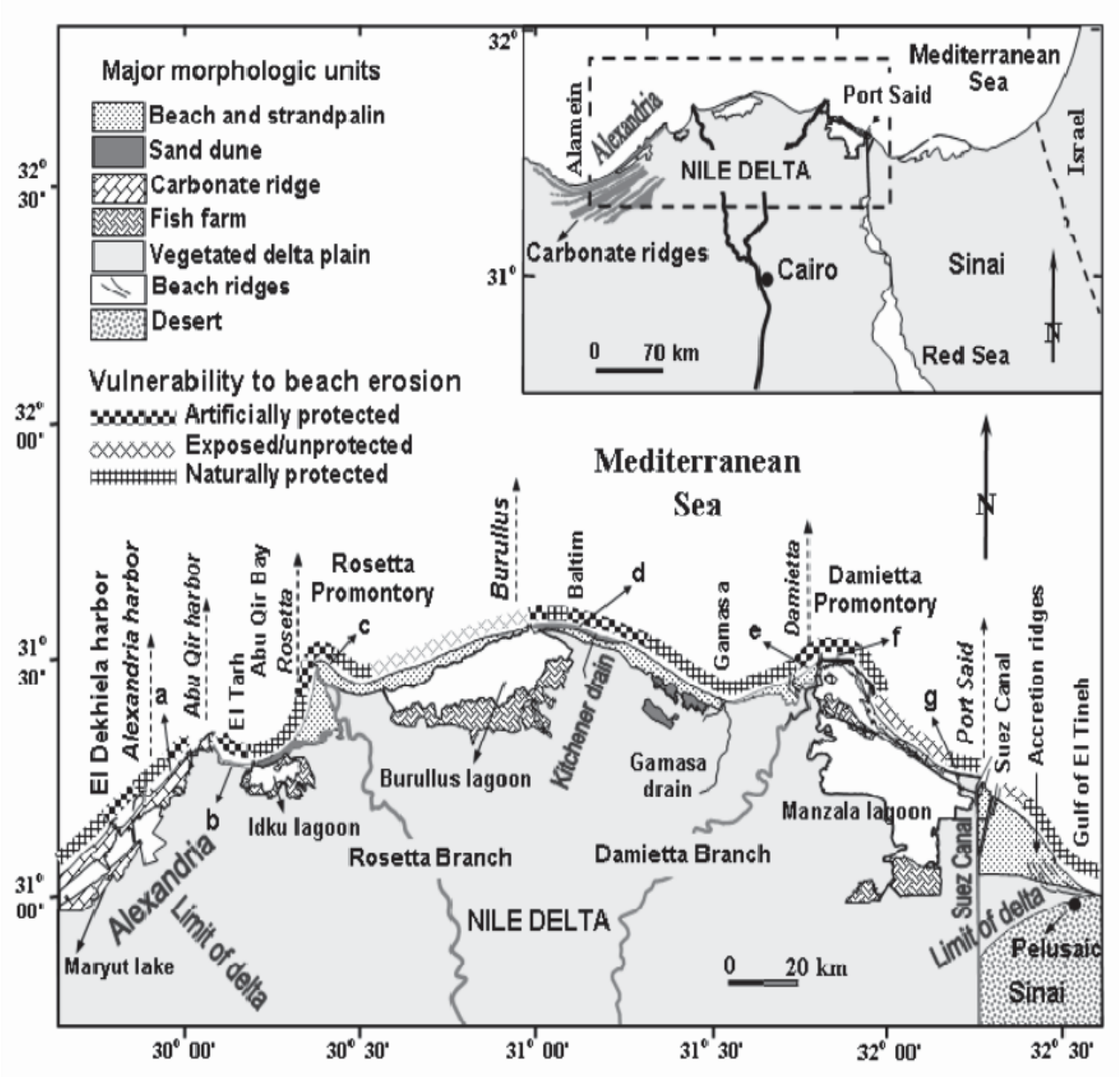


Fig. 1. Map of the Nile Delta and Alexandria region showing major geomorphologic units and coastal sectors vulnerable to beach erosion and protected areas (after Frihy et al. 2011). Small arrows with letters a to g show positions of protective structures enlarged in *Figure 2.*

Despite this structure, wave run up bypassed to frequently flood the low-lying (0-1 m) area behind the western seawall. Additional erosion control structures were then built to face erosion at the eastern and western edges of the seawalls. These included five groins constructed in 2003, their length ranging between 400 to 500 m seaward, spaced 800 to 900 m a part (Fig. 2c). Subsequently in 2005, another 10 short groins (80-150m long) with spacing between 500 to 600 m were constructed at the lee side of the western seawall (Frihy et al. 2010).

Further east, a concrete 600-m long seawall was built in 1950 to protect the eroded beach downstream of the Burullus inlet jetties (Fig. 2d). To the east of this wall a basalt riprap of ~1.3 km in length was constructed. The Burullus-Kitchener drain sector (10 km long), is artificially protected by a series of shore parallel detached breakwaters and nine short groins. The detached shore parallel breakwaters, 17 units, were built in various stages between 1993 and 2007 (Figs. 2d, 3f). Each individual breakwater extends for 250 to 350 m parallel to the beach, at a distance of 220 m from the shore and spaced 320 to 400 m apart. The breakwaters were constructed parallel to the beach in the active surfzone at a depth between 3 m and 4 m. These breakwaters have contributed in protecting the beach and dune belt by forming a series of accretionary tombolos and salient formation (Fig. 2d).

Another series of 8 shore-parallel breakwaters were built during 1991-2002 along Ras El Bar resort; beach erosion was 10 m/yr at the past (Figs. 2e,f), Frihy et al. (2004). A dolos seawall of 6 km-long has been constructed, using 4-7 ton dolos similar to those at Rosetta, to protect the tip of the Damietta promontory east of the Nile mouth (Fig, 2f). This wall is extending straightly in the east-west trend up to the accretionary spit. Both the Rosetta and Damietta seawalls have been effective in protecting the upland areas from wave attack and sea-level rise as well.

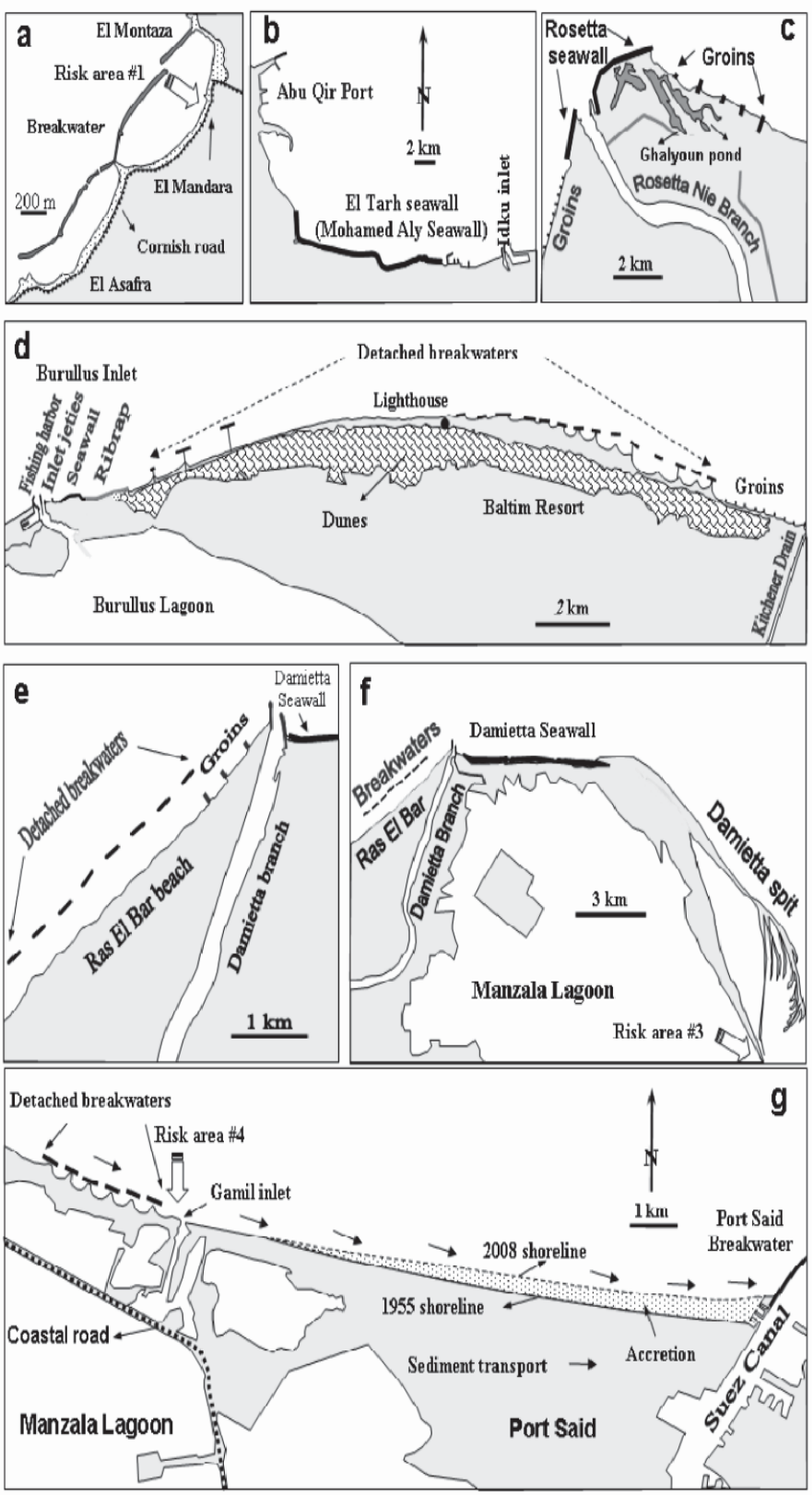


Fig. 2. Vector maps showing major protective structures constructed to mitigate effects of beach erosion and sea-level rise along the Nile delta coastline. (after Frihy et al. 2011) Their positions (**a**-**g**) are illustrated in Figure 1. **a** El Asafra-Mandara breakwater. **b** Mohamed Aly seawall, **c** seawall and the five groins constructed at Rosetta promontory. **d** Burullus-Baltim detached breakwaters fronted a dune belt. **e** Ras El Bar detached breakwaters. **f** Damietta seawall (after Frihy et al. *2010)*

Problems that hamper the development plans of the area

Environmental problems

Main challenges facing the Nile delta are irrational land use, shoreline erosion, water pollution, flooding and deterioration of natural resources and habitats. These challenges are well recognized in Egypt; their seriousness is illustrated by many studies by Egyptian research institutes. Several initiatives have been launched since the early 90-ties to implement coastal zone policies for dealing with these problems. As a result several plans have been elaborated, but they have not been implemented in a consistent way. These might be due to institutional coordination and clarification of responsibility, lack of participatory approach, and limited scope of Egyptian Legal Framework.

Shoreline erosion

Beach erosion associated with seabed sedimentation in channels (harbors, lagoon, and estuarine inlets) still a major issue in the Nile delta coastal plain of Egypt (Figure 1). Erosion commenced along the Nile delta coastline when discharges from the river began to decrease in the late 19th century as a result of construction of river flow control structures, such as dams and barrages, on the upper and lower Nile River (UNESCO/UNDP, 1978). Following virtual cessation of sand delivery to the coast from the Nile, the action of wave-driven longshore currents continued to transport beach sand to the east, resulting in a major adjustment of the delta coastline (UNESCO/UNDP, 1978; Fanos et al., 1991; Inman et al., 1992). Transport processes of sediment have also caused sedimentation problems in channels such as harbors, lagoon, and estuarine inlets.

As the Nile Delta is a typical wave- and current-dominated delta area, extensive beach erosion occurring along the outer margins of the Nile delta-promontories, while some accretion has occurred mainly in the saddles or embayments between these promontories (Frihy et al., 1991; Blodget et al., 1991; Inman et al., 1992; Frihy and Komar, 1993). However, this general erosion/accretion pattern, Figure 1, has been interrupted by numerous protective engineering structures. Maximum rates of erosion occurred adjacent to the delta promontories at, Rosetta, Burullus and Damietta. For example erosion was originally -100, -6, and -10 m/yr, respectively, before protection of the Rosetta, Burullus and Damietta promontories (Frihy and Komar, 1991). The coastal barriers separate between the lagoons and the Mediterranean is also experienced mild erosion of -5 m/yr. In general and under wave action, the eroded sand from these promontories is carried to the east, where it is deposited and results in beach accretion just to the east of the promontory saddles and also along the next embayments with rates of shoreline advancing up to 13 m/yr, resulting in an overall smoothing of the coastline (Figure 1) (Frihy and Komar, 1991). Some of the eroded sand is trapped locally by an artificial structure resulting in local shoreline accretion. A portion of the eroded material has also accreted in the form of spits or

shoals near the lagoon and river inlets that adversely impacted their navigation entrances (Frihy and Lawrence, 2004).

Sedimentation Problems

Erosion of the Nile delta is not the only problem occurring along the Nile delta coast. Sedimentation of the water pathways also constitutes a major problem in the Nile delta coastline. The progress of this problem causes the shoaling and at some times the closure of the Nile estuaries and the lake outlets resulting in navigational hazards and associated impacts on fishing and the national economy. This problem is taking place at Rosetta and Damietta estuaries and the outlets of Idku, Burullus and Manzala lakes. Also sedimentation is taking place at the Damietta Harbor, Gamasa and Kitchener drains inlets.

To mitigate this problem, water pathways and navigation channels along the Nile delta coast are periodically dredged via Hopper dredgers to maintain continuous water exchange and adequate shipping channel depth for safe navigation of sailing vessels, water exchange and fishing boats.

Climate change induced sea level rise

Previous studies have indicated that the Nile River deltaic plain is vulnerable to a number of aspects, including beach erosion, inundation and relatively high rates of land subsidence. Analysis of historical records obtained from tide gauges at Alexandria, Rosetta, Burullus, Damietta and Port Said show a continuous rise in mean sea level fluctuating between 1.8 – 4.9 mm/yr (Frihy et al. 2010) (Figure 3). Projection of averaged sea-level rise trend reveals that not all the coastal plain of the Nile Delta and Alexandria is vulnerable to accelerated sea-level rise at the same level due to wide variability of the land topography. The topography includes high-elevation features: sand dunes carbonate ridges, protection works, and low-lying wetlands (lagoons, fish farms, and ponds). Accretionary or prograding beaches (5-10 m/yr) along embayments and the Nile Delta promontory saddles also can compensate for erosion induced from the effect of accelerated sea-level rise. In marked contrast, local low-lying wetlands and fish farms (<1 m depth) which border the southern margins of Idku, Burullus and Manzala lagoons would be affected if coastal protection measures are not taken. The most vulnerable areas are coastal wetlands (lagoons, lakes and ponds) and most of the 0-1 m elevated strand plain. The most hazardous region would be the Manzala lagoon area, where subsidence rates exceed 5 mm/yr. Consequently, sea incursion will gradually lead to significant change in the ecologic system including fisheries and wildlife as well as water penetration in the surrounding ground water table. Recreation beaches, commercial harbors, fishing ports, cities, villages**,** fish farms, archeological sites and the coastal highway adjacent to these lagoons appear to be threatened socio-economically as a result of possible change in climate. Since wetlands act as buffers to the inland penetration of coastal

flooding, the loss of cultivated Nile Delta land to south of wetlands will be under threat.

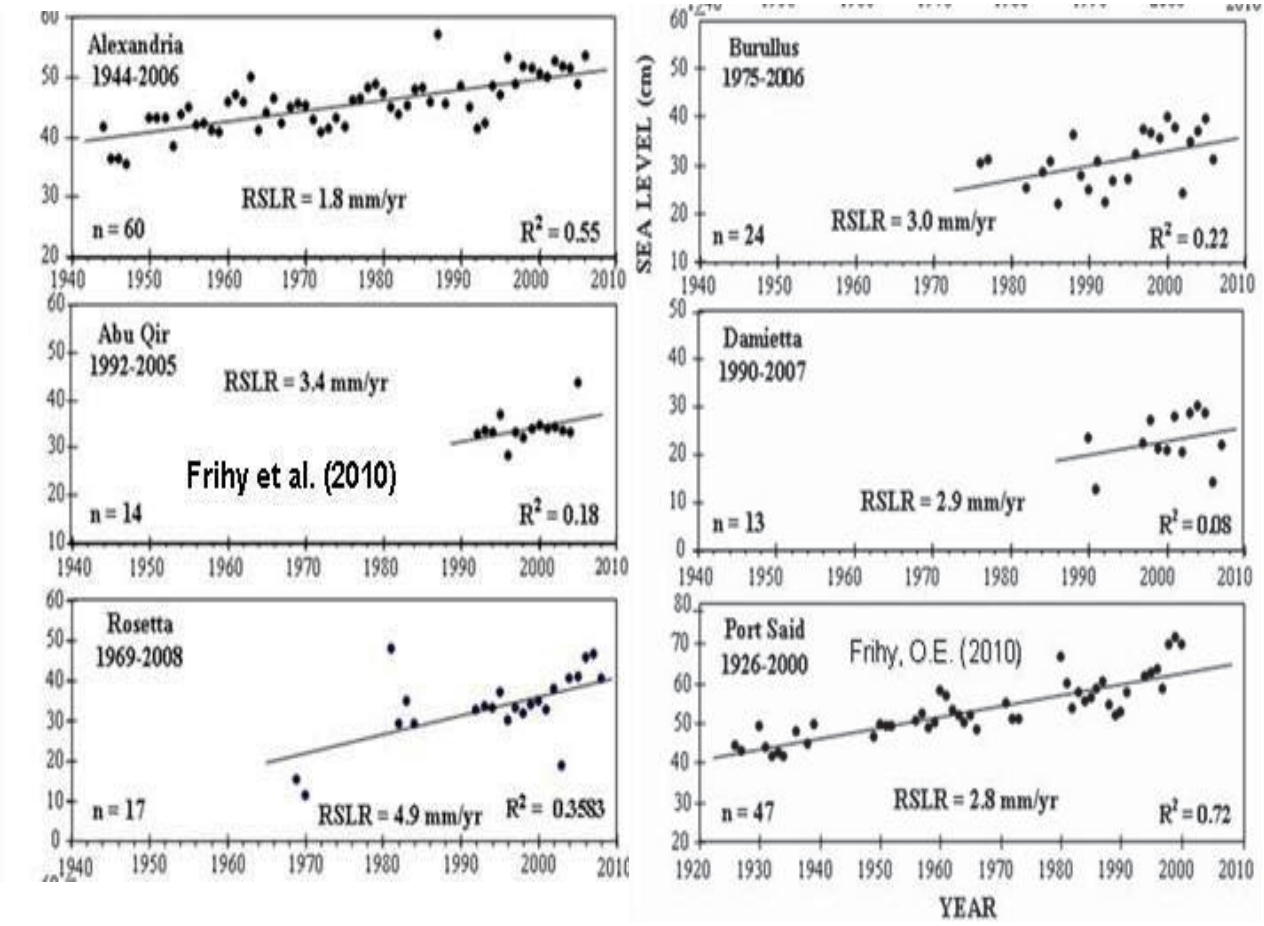


Fig. 3. Comparison of relative sea-level trends estimated from annual tide-gauge records at Alexandria, Abu Qir, Rosetta, Burullus, Damietta and Port Said. Solid line is the regression relationship. The regression lines together with the slopes (RSLR) are indicated. They all show an overall upward trend of relative sea-level (RSLR) fluctuates between 1.8 to 4.3 mm/yr. Tide gauge locations are shown in Figure 1. (after Frihy et al. 2010).

Marine pollution

The researchers from National Institute Oceanography and Fisheries and experts from coastal governorates were reviewed the running and terminated monitoring programs of coastal waters to assess the water quality and define hotspot areas in the study area as well as to propose the activity and to suggest modification of monitoring programme if needed. Their report presented and discussed in general meeting of Nile Delta stakeholders and policy makers.

Due to the increase in development activities whether industrial, agricultural, or urban that are being conducted at the Egyptian coasts, which may lead to generating many kinds of wastes that would

negatively affect marine environment and organisms.

The Egyptian Environmental Affairs Agency (EEAA) has developed a national Monitoring program in collaboration with National Institute of Oceanography and Fisheries and the Institute of Postgraduate Studies and Research at the University of Alexandria, aims to monitor water quality along Egyptian coast periodically and identify sources of pollution and to define pollution hot spots along the Egyptian Mediterranean coasts.

This monitoring program started in 1998 by selecting fixed stations along coasts of the Mediterranean Sea. The monitoring activities are conducted seasonally on a regular timing using water quality indicator which measures physical, chemical and microbiological parameters as follows:

- Physical measurements (temperature - pH - dissolved oxygen -electrical conductivity - salinity – transparency).
- Chemical measurements (nitrate - nitrite - ammonia - total nitrogen - phosphate - total phosphorus - chlorophyll-a – silicate) .
- Bacteriological measurements (coliform bacteria -streptococcus bacteria -Escherichia coli).

Monitoring results of water quality for the coastal waters at Nile Delta during last four years:

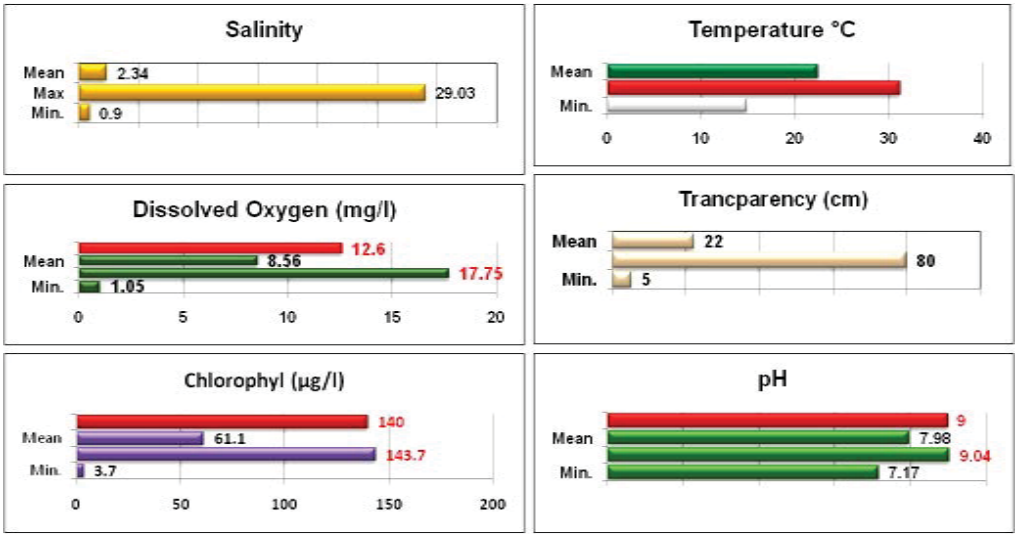
1. The concentration of dissolved oxygen (DO) is higher than the internationally permissible limits in all stations during the year 2010 with the exception of two stations which recorded the lowest values. This could be due to direct sewage disposal to those areas.
2. Salinity concentrations was ranged in all monitoring sites during between (28.06 -38.35 mg / L)
3. pH values and temperatures were within the natural limits of the coastal water during different periods of the year.
4. The highest transparency of water was recorded in Nile Delta coast less due to the
5. increase of different activities at the estuaries of the river.
6. By comparing the average concentration of total nitrogen in 2010 with the average concentration during the 2008-2009 year, it was noticed that there was a significant decrease in values in all sites, in addition to a significant decrease in most of the monitoring sites if compared to 2008-2009 values.
7. There was a significant decrease in the concentration of ammonia in most of the monitoring sites, where it was within the acceptable limits during all stations except at outlet of estuaries.
8. By comparing the average concentration of ammonia in 2010 with the previous two years, it was noticed that there is a decrease in concentration during 2010, as a result of some factories reconciliation of their environmental status by stopping discharge of their wastes on the Mediterranean coast.

9. By comparing the average concentration of chlorophyll-a in the four trips in 2010 with those in the last two years, there was noticed that a decline in most of the sites compared to previous years except for Maadia station and the ELborg as a result of
10. water from Edku Lake and agricultural, sanitary and industrial discharge in those areas.
11. Nitrite and Nitrates concentration are low, ranged between (0.002, 0.033 mg / L) and recorded its highest value in the Maadia area (0.098 mg / L).
12. Total phosphorus concentration ranged between (0.007, 0.093 mg / L). The highest concentration was recorded in the Estuaries outlets.

⇨ Bacteriological measurements were made for water samples the coastal area during the four field trips in 2010 for each of the total coliform bacteria, escherichia coli bacteria and fecal streptococci bacteria, living in the intestines and stomach of humans and other living organisms; their presence in water is considered an indicator of sanitation pollution. Results were compared to European standards of 1988 and Egyptian standards of 1996, as follows: -

- Total coliform bacteria 500 cells / 100 ml of water,
- Escherichia coli bacteria (E.coli) 100 cells / 100 ml of water,
- Fecal streptococci bacteria 100 cells / 100 ml of water.

Results of monitoring during 2010 have been improved in some monitoring sites as; water quality was clean and free from fecal than the previous two years. In general, the report shows that there is an improvement in water quality as a general of the Egyptian Mediterranean coasts compared to previous three years as a result of efforts being conducted through cooperation with stakeholders, continuous inspection of industrial and touristic resorts discharging directly or indirectly in the Mediterranean as well as factories reconciliation of their environmental standards.



Digrame-1: Showing some measurements in the Nile Delta coastal areas during year 2009 (the reference in EEAA report 2009)

In General, the pollutants are accumulated in the lakes or the near-shore sea water may have deleterious effects on its organisms, ecosystem and damage the marine life in the whole polluted area. Major outfalls/ land-based sources along the delta coast and quantities of effluents discharged daily (in million m^3) are positioned in Figure 4.

These problems are confined now, in Abu Qir Bay; due to the drainage of the wastes of the factories and the industrial development directly to the sea and in the three inland water bodies (Idku, Burullus and Manzala lakes).

Mining of the sand dunes

These dunes are acting as a natural defence line against erosion. Recently the inhabitants in the coastal zone are damaging them by excavation e.g. the sand dunes in the western part of Rosetta promontory has been disappeared and the agriculture land are subjected to the dynamic forces of the sea. Large amounts of sand dunes between Burullus and Baltim were used in the construction of the coastal road. This affects the products and hence the economy. Figure 20 shows the summary of these problems.

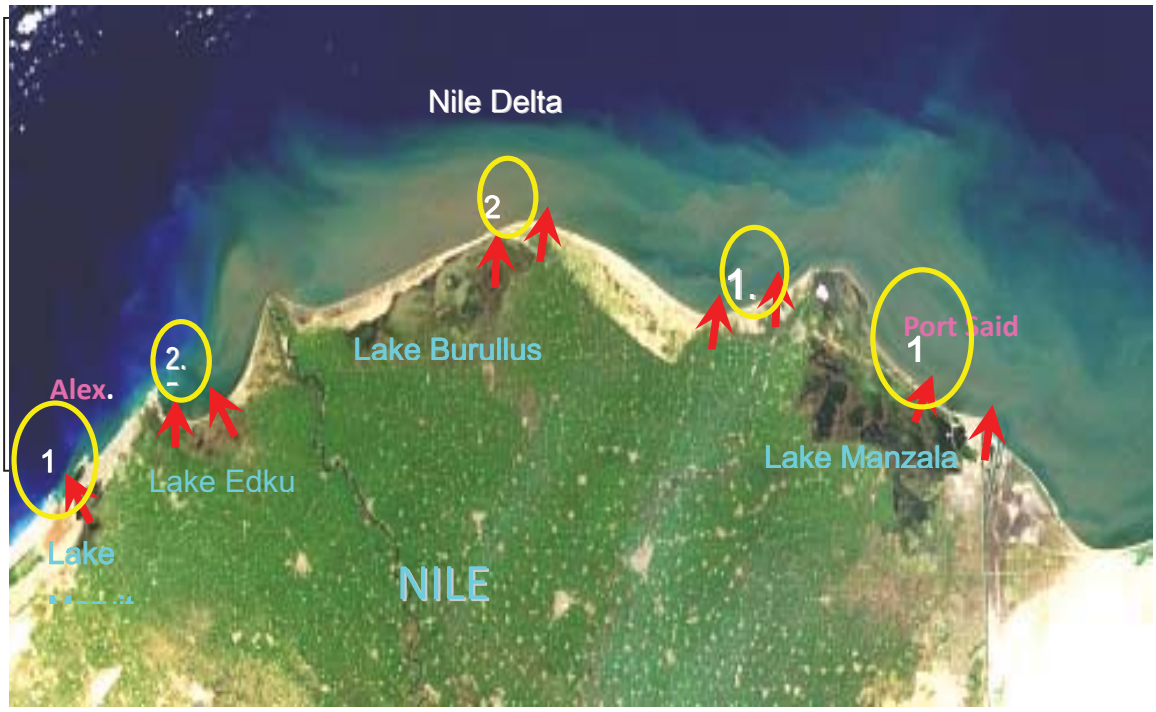


Figure 4. Major outfalls / land-based sources along the delta coast and quantities of effluents discharged daily (in million m^3). Source: MedPoll 1993

Opportunities of the area for development

Irrational land use, water pollution, shoreline erosion, flooding and deterioration of natural resources and habitats are the main challenges in the Nile delta. However, shoreline erosion resulted from

coastal processes and sea level rise due to climate change are essential problems. Although these problems, “areas of opportunity” still exist within the Nile delta coastal plain. These areas are protected by natural and artificial systems (Frihy et al., 2010).

In addition to the man-made engineering structures built at the delta coastline, cited above, a natural defense system provides a natural mechanism for protecting the coastal plain of the Nile Delta against beach erosion and SLR (Figure 1). This system includes: accreting/advancing coastlines, high-elevated topographic features such as sand dunes. Both natural and artificially protected coastal stretches are schematically presented alongshore in Figure 1. In some sectors, beaches are backed by high-elevated features such as coastal dunes or shore-parallel carbonate ridges. Theoretically, the coastal dune systems cover the backshore of the Burullus/Baltim sector, Abu Qir Bay and Gamasa embayment could prevent rising sea level from invading the interior of this region (location in Fig. 1). It is unfortunate that large areas of Gamasa dunes has been dredged for various uses, including land reclamation , land filling, fish farming and road construction.

In a similar manner, prograding or accreting coastlines can be part of the natural sea defense system when its prograding rate exceeds erosion induced from coastal processes and sea-level rise. Commonly, convex shores such as bays and embayments have a higher tendency toward accretion than either straight or concave coasts (Lakhan and Pepper, 1997). Sectors experienced significant shoreline accretion exist particularly along the Rosetta east saddle at Abu Khashaba, the central part of Abu Qir Bay (Fig. 2d), Gamasa embayment and Gulf of El Tineh plain (Fig. 1). These zones are not vulnerable to SLR if the net rate of accretion exceeds or at least balances erosion induced from other factors including SLR. Fortunate that shoreline of these zones are seaward protruding with an average rate between 5 and 12 m/yr (Frihy and Komar, 2003).

Chapter 4
Development Plan of the Nile Delta

Land-use plan

The present and future land-use plans of the coastal plain are presented in Figure 5 and 6. These plans have been made by the national centre for planning state land uses, Urban Planning and Governorates. Such plans include fish farm, industrial zones, beaches rich in black sand, recreational beaches, new coastal cities, unused areas and shipping zone.

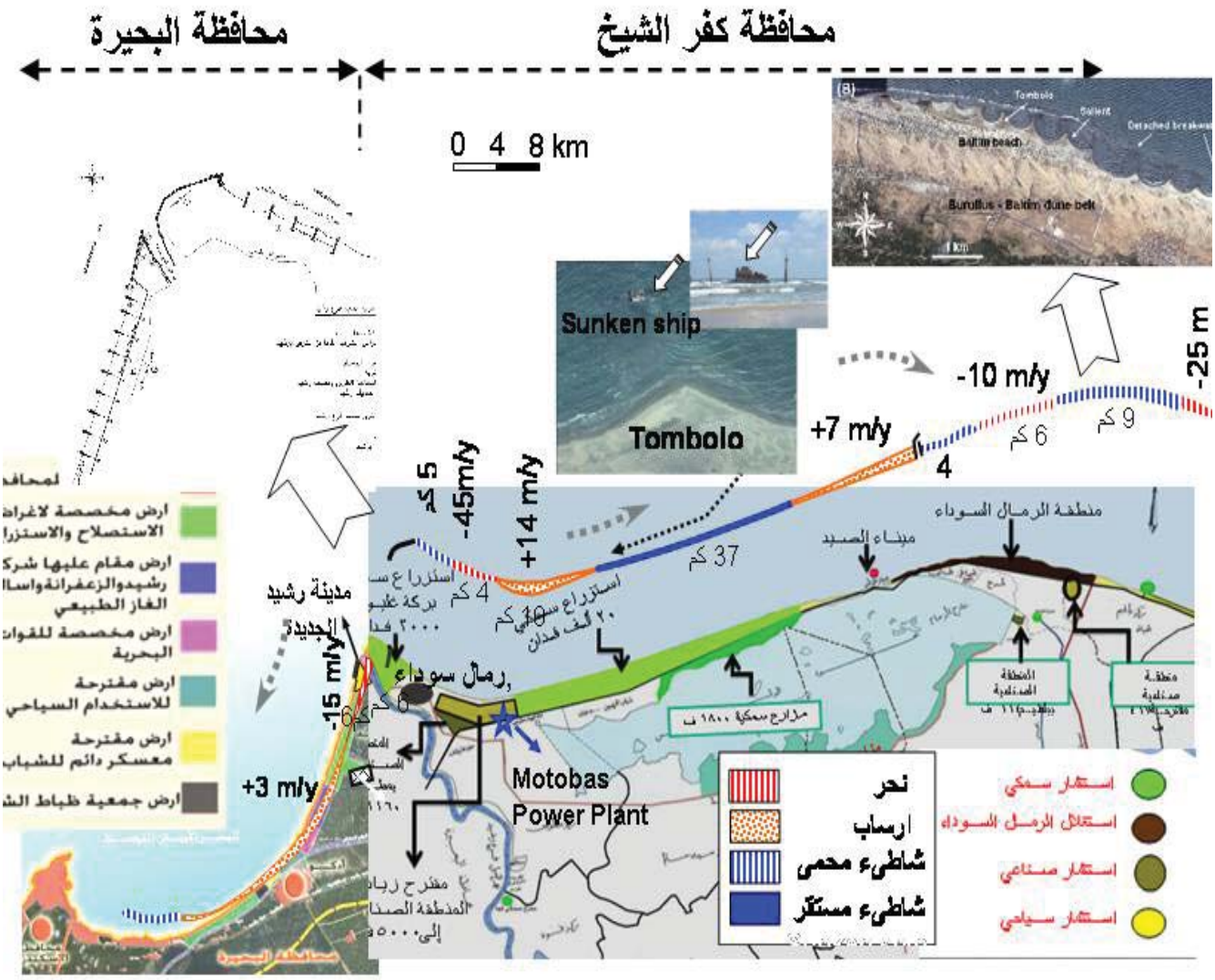


Figure 5. Land use plans at the western Nile delta coastal plan prepared by the National Centre for Planning State Land uses, Urban Planning and Governorates. Rates of beach erosion and accretion are also indicated along the coastline (after Frihy and Debeas (2012).

Shoreline management plan

Management of the delta coastline is discussed herein by combining management plans, rates of beach changes (shoreline stability), protection works and natural resources (Figure 4 and 5).

From the wet, development plans located within the central of Abu Qir Bay are safe in view of beach instability, but they are threatening by marine pollution sources drain in the western part of the bay (Fig. 5). The central part of the bay seems to be stable with an accretion rate of 3m/year. Further east, the new Rosetta proposed to be created west of the Rosetta estuary is fronted by a series of groin

field that will act as a shelter for this new city (Fig. 5).

East of Rosetta estuary, the new Motobos Industrial Zone planned to be established along the Rosetta saddle at Abu Khashaba is located within an accretionary coastline (Fig. 5). Presently, this area is experiencing accretion at an average rate of 14m/year. This area is followed by the Burullus lagoon barrier, 37 km long, which is more or less stable. The development plans existed or proposed between west Burullus lagoon inlet and Kitchener drain are fronted by a various types of protective structures, both natural (sand dunes) and artificial (detached breakwaters), except the area west of Baltim. This area, 6 km log, are exposed with no protection and is not safe for development.

The development plans located within the central limb of Gamasa embayment are experienced significant accretion of 8 m/year (Fig. 6). Fortunately, this sector hosts the proposed new Mansora City.

Recreation centers east of the Damietta Harbor, ~5 m long, need protection as it is eroding at annual rate of 4m (Fig. 6). Material dredged annually from the approach channel of this harbor can be used as a borrow material for nourishment of this coastal sector.

A monitoring plan has to be implemented to evaluate any changes in beaches fronting existing and future planned sectors.

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Chapter 5
Proposed Integrated Coastal Zone Management Plan of the Nile Delta (ICZMP)
Brief background on current status of ICZM in EGYPT

Geographic Coverage of the Egyptian Coastal Zone

According to the amendment made to the Law of the Environment No 4 in 1994 amended in 2009, the coastal zone in Egypt was redefined in Article 1⁄39 as follows:
"The coastal zone extends along the shorelines of the Arab Republic of Egypt seawards, encompassing the territorial water, EEZ and the continental slope areas, and landwards to areas of active interaction with the marine environment for at least 30 km in the desert areas, unless interrupted by major topographical features, while in the lower Nile Delta region the terrestrial part would extend up to the + 3.0 m contour. Coastal Governorates identify the coastal zone in accordance to their physical setting and environmental resources, but should be extended for not less than 10 km landwards"

Mediterranean coast of Egypt

The Mediterranean coastal zone of Egypt is of great economic and environmental significance; and it combines localities of intensive socio-economic activities and urbanized areas. The pressure of the human activity on the coastal resources of the Mediterranean is very intense. The enormous urban population and adjacent agricultural areas, all contribute to the pollution load reaching coastal waters, impacted and threatened the biodiversity/ ecosystems.
Egypt's Mediterranean coastline occupies the south-eastern corner of the Mediterranean. The primary and secondary coastlines stretch for about 1,550 km. Of this, 1200 km is primary coast (i.e. affected by waves) extending from Sallum (west) to Rafah (east), while the remainder consists of the shores of sheltered coastal lagoons (Figure 1). Along this coastal area, there are eight coastal governorates. These are from west to east: Matruh, Alexandria, Behaira, Kafr El-Sheikh, Damietta, Daqahliya, Port Said, and North Sinai. (EEAA, 2005).

The western part of the coastal area is relatively sparsely populated rangeland with rain-fed agriculture and grazing as major land-use as well as local tourism. However, this area is intensively developed at present for tourism and urban projects. On the other hand, the eastern portion and the coast around the Nile delta have population densities which are among the highest in the Mediterranean region and are a host to numerous economic activities including agriculture, industry, tourism, fisheries, and shipping and port activities.

Current ICZM Institutional Context

The national environmental organization is the Ministry of State for Environmental Affairs (MSEA), the Egyptian Environmental Affairs Agency (EEAA) and its eight Regional Branch Offices (RBOs) which are charged with overall environmental issues including ICZM, monitoring and regulatory process. EEAA is continuously developing the capacities and partnerships necessary to strengthen its presence in the Governorates. This is achieved through the expansion and the consolidation of its network of Regional Branch Offices (RBO's), and the development of the capacities of the Environmental Management Units (EMU's) of the governorates.
At the sector level, many line ministries have a department or unit mandated with environmental management issues. These environmental departments/units vary in terms of their capacities and experiences.

Milestones of main ICZM related policy

1994 Law for the Environment N° 4
1994 Establishment of the National Committee for Integrated Coastal Zone Management (NCICZM)
1996 Developing of the 'Framework Programme for the Development of National ICZM Plan for Egypt
1996 Preparation of the Guidelines on EIA Procedures
1996 Preparation of the Environmental Guidelines for the Development of Coastal Areas
2002 Developing the 2nd National Environmental Action Plan
2009 Amendment to Law for the Environment N°4 to integrate ICZM Protocol by law N°9 where ICZM article was introduced.
2012 Developing of ICZM National Strategy (under adaption procedures)

National Committee for Integrated Coastal Zone Management

The EEAA was given specifically the authority to "participate with the concerned agencies and ministries in the preparation of a National ICZM Plan for the Mediterranean Sea and Red Sea coasts".
With this mandate the EEAA has initiated the coordination of ICZM planning, in which the first step was to establish the National Committee for ICZM (NCICZM). A Ministerial Decree constituting the establishment of the NCICZM was issued in 1994, amended in 1996, and finally in 2007.

The function of the committee is not only to draw-up a consistent policy and strategy for future development, but also to resolve conflicts between users interests.
Further to the issuance of consecutive ministerial decrees, the committee consisted at present of members from different authorities and representatives from the Non-Governmental Organizations

(NGOs). Clearly, institutional arrangements are required at different administrative levels (national, regional, local) for taking responsibility for ICZM

a. The mandates of the NCICZM are as follows:

- To coordinate all coastal activities between the competent authorities towards ICZM, through the drafting, setting and approval of general guidelines for all activities, including EIA.
- To ensure that all land use plans and development activities in the coastal area take in account contingency arrangements.
- To harmonize between the proposed development activity and the carrying capacity of the ecosystem for the sustainable use of available resources.
- To ensure efficient commitments to the Regional and International conventions concerning the protection of the marine environment and the coastal areas.
- To approve programmes and plans aims at restoring and rehabilitation of coastal ecosystem that suffers from environmental stress, damage and deterioration.
- To coordinate and specify mandates for different authorities in the coastal area.
- To approve national arrangements related to the protection of the environment in the coastal areas and the contingency plans.
- To review and evaluate all major projects to be executed in the coastal zone, particularly those of a conflict natures.
- To review any future activities or projects, adding to the above, relevant to the ICZM
- Follow up studies concerning climate change and sea levels rise.
- Follow up the procedures regarding the Protection of the Marine Environment from Land-Based Activities.

Currently, the Department of Coastal and Marine Zones Management of the EEAA and the division of the Mediterranean were established. At the Local/Governorate level, EEAA have established regional branches offices covered the coastal governorate. Although, these RBO's have no specific departments for ICZM in their organograms, they are in charge of all aspects related to ICZM

The approach used to develop the ICZM plan for Nile Delta

In the frame of PEGASO project, a Coastal Group of Nile Delta case have been established by Decree No"1' and comprises specialists from the coastal provinces, coastal development, the previous stakeholders to study and discuss the key issues and put the plan to develop the ICZM plan

The mandates of this coastal Group are:

1. Identify the key issues (pressure) experienced by the study area
2. Compilation of development plans and programs in the study area
3. Analysis and evaluation of plans and programs and identify conflicts between them
4. Participation in the preparation of integrated coastal management plan for the study area
5. Development of policies proposed to implement the plan
6. Approved the Final product of PEGASO project (proposed Nile Delta Integration Coastalzone Management Plan)

The Geographic Coverage of the ICZMP of Nile Delta

The coastal group conducts several meeting, in the first one, they identified the geographic coverage areas for case study which include the shoreline for the three coastal governorates (Dakahlia ,KafirElShaiekh and El Bohera) with landward limited 2-5 km or till the international coastal road and then they identified the followings:

1. Review as much as possible all plan and decree issued for study area
2. Review as much as possible all previous work done
3. Identified the gaps and conflicts in plan among stockholders
4. Identified the opportunities for economic development.
5. Propose the modification needed to land use plan

For this purpose four subgroups have been formulated from the coastal group each one responsible for a field in relation to one of the key issue. These subgroups are:

1. Land use subgroup
2. Shore line management subgroup
3. Natural resources subgroup
4. Water quality subgroup

The Aim of ICZM Plan

The overall aim of the ICZM Plan is to progress from the current coastal planning and management, which can be described as Government-driven, towards an effective coastal governance. Coastal governance is herein understood as the model which enables the involvement of inter-organisational networks, made up of governmental and societal stakeholders, and seeks out new means of cooperation so as to achieve specific policy

The main Objective of the plan is:

- To sustain the existing coastal economic opportunities and develop new ones that sustainable contribute to both local and national development and diversify employment opportunities for coastal communities;
- To create a consensus on the envisioned development model for the region and forge partnerships between the government and all other segments of the 3 Delta Governorates.

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The Rationale of the ICZM Plan

a. Barcelona Convention

In 1975, Mediterranean countries adopted the Mediterranean Action Plan (MAP), the first-ever Regional Seas Programme under UNEP' sumbrella. In 1976 these Parties adopted the Convention for the Protection of the Mediterranean Sea Against Pollution (Barcelona Convention), amended and renamed as Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean in 1995.Seven Protocols addressing specific aspects of Mediterranean environmental conservation complete the MAP legal framework. Although MAP's initial efforts were focussed at marine pollution control, over the years, its mandate gradually widened to include integrated coastal zone planning and management.

b. The Protocol on ICZM in the Mediterranean

The ICZM Protocol is the seventh Protocol in the framework of the Barcelona Convention, this Protocol is to encourage the Mediterranean countries to better manage and protect their coastal

zones, as well as to deal with the emerging coastal environmental challenges, such as climate change. The Protocol is forward-looking and proactive, since it aims at preventing and not only reacting to coastal problems. In fact, the Contracting Parties are to develop their national ICZM strategies as an outset for all other ICZM activities and prepare coastal implementation plans and programs.

c. National ICZM Strategy for Egypt(underadoption).

National ICZM Strategy for Egypt (from now on the ICZM Strategy), which was started to developed during 2009 and the draft was completed by 2011, it is still pending of approval. The strategy identified three major strategic objectives are retained that deserve dedicated attention over the next years. These are strengthening ICZM policy by better policy coordination, planning a sustainable use of coastal resources and promoting stakeholders awareness.

d. Analysis of Sectoral Plans

The analysis of the existing Sectoral Plans was carried out to understand which issues already planned and how they are addressed by these plans. Four subgroups were established to provide the policy baseline information and allowed to better comprehend which specific actions are needed and which coordination mechanisms between the different administrations are to improve effective coastal management. The Analysis of the Sectoral Plans aims to evaluate the level of integration between the different sectoral plans and to identified the conflicts between the different plans.

e. The Legal Framework

The Law No. 4 of 1994 and its amendment law No.9 of 2009 the protection of environment constitutes the main legislative body in the field of environment to formulate the general policy and prepare the necessary plans for the protection and promotion of the environment, including the management of the coastal zone, definitions of coastal zone,, coastal ecosystem and coastal plan,. The law provides for the use of environmental management mechanisms.

Law 102 of 1983 provides the legislative framework for establishing and managing protected areas in Egypt**.**

The structure of the ICZM Plan

The structure of the ICZM Plan are inspired by the ICZM Protocol and the National ICZM Strategy and based on the specific needs of the study area and the contribution of local Stakeholders
The structure of the ICZM Plan establishes three different levels: Strategic Objectives, Activities, and Actions. The objectives are based on the objectives of the National ICZM Strategy to ensure the

vertical coherence and coordination between national and regional policies. The three different objectives are developed through Activities, which target the priorities of the study area, as follows:

Strategic Objectives	Activities
1. Strengthening ICZM Policy	A. Maximizing Coordination and Cooperation between administrations and agencies B. Reconsidering existing Laws And Regulations C. Ensuring stakeholder Involvement
2. Planning a Sustainable Use of Coastal Resources	A. Implementing policies and measures B. Implementing the Land Use Management Plan C. Implementing the Shoreline Management Plan D. Developing Water Management Plan
3. Promoting Stakeholders Awareness	A. Promoting Institutional Capacity Building in ICZM to strengthening effective coastal management

Table 1. Priorities of the study area

The Activities are developed through Actions, which better define the specific needs of the study area. These Activities are fulfilled through 23 proposed Actions, which are targeting these needs. Therefore, the ICZM Plan defined 23Actions which are shown in the following tables

Strengthening ICZM Policy

Activities	Actions
1.A. Maximizing Coordination and Cooperation between administrations and agencies	Increasing Coordination between the three delta Governorates and EEAA regional branch and Central CZM dept. EEAA
	Developing a Research Agenda of applied research to support policymakingand management decisions
	Establishing Long-Term Funding mechanisms
	Improve distribution of Competencies
1.B.Reconsidering existing Laws And Regulations	Developing specific ICZM Lawand Regulation
	Simplifying Regulations concerning resource use and exploitation
	Developing effective Mechanisms for stakeholders' involvement
1.C.Ensuring stakeholder Involvement	Developing Conflict Resolution mechanisms
	Promoting Collaborative Management

Table 2. Strengthening ICZM Policy (Activities & Actions)

The expected outcomes of this Strategic Objectives are:

- Establishing an institutional and regulatory framework to enable ICZM improving coordination and increasing cooperation between administrations
- Ensuring the availability of long-term funding mechanisms
- Ensuring stakeholders involvement and reducing conflicts
- Promoting that management options are based in sound scientific knowledge

Planning a Sustainable Use of Coastal Resources

Activities	Actions
	Creating Coastal group in each governorates
2.A. Implementing policies and measures	Developing policies and measures reviewing and updating mechanisms
	Developing A guidelines for coastal development
	Developing Conflict Resolution mechanisms
2.B. Implementing the Land Use Management Plan.	Creating a mechanisms for implementation
	Developing Conflict Resolution mechanisms
2.C. Implementing the Shoreline Management Plan	Creating a mechanisms for implementation
	Creating Water Collaborative Planning group in each Coastal governorate
2.D. Developing and Implementing Water Management Plan	Ensuring the participation of all stakeholders including Farmer represented
	Creating a mechanisms for Adoption and implementation

Table 3. Planning a Sustainable Use of Coastal Resources (Activities & Actions)

The expected outcomes of this Strategic Objectives are:

- Reducing conflicts of interest among all stakeholders
- Encourage the participation of local stakeholders in the problem-solving process to leverage plan implementation
- Developing collaborative planning
- Implementing collaborative management

Promoting Stakeholders Awareness

Activities	Actions
3.A. Promoting Institutional Capacity Building in ICZM to strengthening effective coastal management	Developing Administrative Structures to ICZM process Improving ICZM Capacity Building to all working staff involving in ICZM process administrative authorities and public agencies
3.B. Promoting Public Education and	Increasing Education on ICZM sustainable

Awareness Programmes to create constituency for coastal management and ensure the involvement of all Stakeholders.	development (School & University) Improving the Involvement of Local Population in the decision taking process

Table 4. Promoting Stakeholders Awareness (Activities & Actions)
The expected outcomes of this Strategic Objectives are:

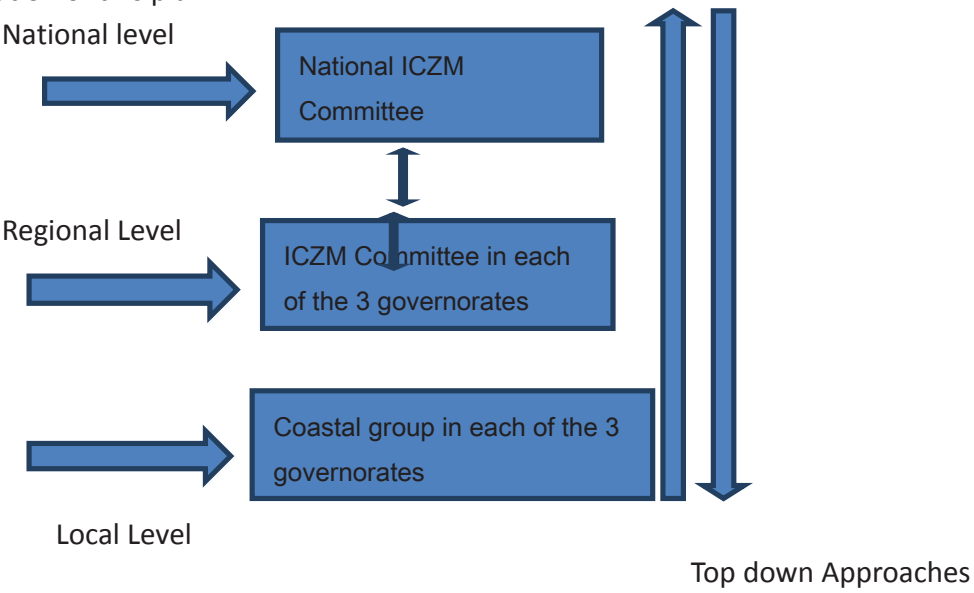
- Increasing capacity building in ICZM at both individual and institutional levels
- Establishment social and administrative constituencies to improve managing process
- Encourage Public Participation in the planning, implementation and management of the ICZM

The Institutional structure required for plan implementation

The National ICZM strategy identified that the main ICZM challenges are:

a. Institutional challenge: coordinated decision-making and implementation
b. Leverage challenge: balancing between management, legal and financial means
c. Capacity building challenge: develop ICZM skills across sectors and levels of government

For this purpose and to achieve the implementation of the ICZM plan the following intuitional structure proposed to ensure the coordination between National, Regional and local level taking into consideration the two different approachesVertical and Horizontal coordination for better government coordination and cooperation, the proposed administrative and executive structures include the existence of National steering committee for ICZM with specific mandateas it is mentioned before , with respect to the experience achieved through the coastal group work during the preparation of this plan .



The ICZM committee in each of the three Delta governorates will be established by the governor decree and headed by the governor membered by decision maker in line ministries within the governorates and the working NGOs in the governorates with the following mandate.

- Agreeing upon common criteria for the decision-making process
- Reducing conflicts and incoherencies between sectorial plans of different agencies and authorities
- Ensuring a close coordination through joint decision making procedures of coastal strategies, programmes and plans between national authorities and regional and local bodies
- Ensuring the availability of long-term funding mechanisms
- Initiation of Regional ICZM process
- Promote administrative coordination in specific coastal and developmental issues
- Resolve specific conflicts
- Revision of Operational Plans

The coastal group in each of the three Delta governorates will be established by the governor decree and headed by the general secretariat of the governorate and membered by the technical officers within the coastal city in the governorates and representative from social and civil society working as advisor group for the ICZM committee in the governorates with the following mandate

- Follow up the implementation of the agreed sectorial plan , and work on the Local conflict mediation and resolution
- Monitor progress in the implementation of the ICZM plan and diffraction
- Promote collaborative planning in specific coastal issues
- Maintain communication channel with Local Competent Authority
- Evaluation and development of policy measures based on the stakeholders expertise and interest
- Definition of development priorities
- Recommendation of a set of policy proposals and collective actions

Monitoring and Evaluation

Monitoring is the continuous or periodic process of collecting and analysing data to measure the performance of a programme, project or activity. It provides managers andstakeholders with regular feedback on implementation and progress towards the attainment of environmental objectives**.**

The following Indicators are proposed to use for monitoring the progress in the implementation of the ICZM plan.

1. Establishment of the ICZM committee in the each of the three coastal governorate and the Coastal group
2. Number of meetings per year
3. Number of agreements per Committee meeting
4. Number of agreements per meeting to develop specific priorities
5. Number of identified conflict competencies
6. Ratio between identified conflicts and agreements to resolve them
7. Quantifiable objectives and principles for ICZM formally adopted
8. Simplifying existing regulation concerning resource use and exploitation
9. Developing conflict resolution tools
10. Development of specific regulations to solve detected problems and in coherencies during Collaborative Management implementation
11. Number of local stakeholders participating in Local Agendas
12. Number and type of stakeholders involved
13. Appropriated indicators to assess the progress in the implementation of sectorial plan
14. Number and character of stakeholders participating in the Workshop
15. Number of seminaries and training courses proposed
16. Number of training activities for technical staff in Collaborative Management
17. Number of participants in training courses and workshops
18. Number of carried out campaigns
19. Number of schools involved
20. Children actively participating on campaign activities