

D4.3: Scenarios Tools for ICZM: Lessons and Applications

Versions:

V1.0_26.01.2014 Final draft Deliverable as sent to task partners for
Contribution/comment

V2.0_17.02.2014 Final Deliverable submitted to Coordinator for Approval

Dissemination Level*	✓ PU	PP	RE	CO
Project Acronym / number	PEGASO	244170		
Project title	People for Ecosystem based Governance in Assessing Sustainable development of Ocean and coast.			

***PU**: Public; **PP**: Restricted to other programme participants (including the Commission Services);
RE: Restricted to a group specified by the Consortium (including the Commission Services);
CO: Confidential, only for members of the Consortium (including the Commission Services).

Authorisation

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Date	February 2014

Document Information

Project Acronym	PEGASO	Grant agreement n°	244170
Project full title	People for Ecosystem based Governance in Assessing Sustainable development of Ocean and coast		
Funding scheme	Collaborative large-scale integrating project		
Project start date	February 1, 2010	Project duration	48 months
Call topic	ENV.2009.2.2.1.4 Integrated Coastal Zone Management		
Web site	www.pegasoproject.eu		

Document

Deliverable number	D4.3	Due date	31/01/2014	Submission date	24.02.2014
Deliverable title	Scenarios Tools for ICZM: Lessons and Applications				
Task Leader (4.3)	Marion Potschin (Marion.Potschin@Nottingham.ac.uk)				
Work Package	WP4 Multi-scale tools, methods and models for assessment				
WP Leader	Denis Bailly (University of Brest)				
Lead beneficiary	University of Nottingham (Partner 9)				
Dissemination level	PU				
N° of pages (cover)	67 pages plus appendices				
Suggested citation	Potschin, M.; Haines-Young, R.; Buono, F.; Conides, A., Giraud, J.-P.; Ivanov, E.; Klaoudatos, D.; Lafitte, A.; Le Tellier, J., Sanna, S.; Soriani, S. and M. Tonino (2014): Scenarios Tools for ICZM: Lessons and Applications Deliverable 4.3, EU FP7 Project PEGASO Grant agreement n°: 244170. Also available under: http://www.nottingham.ac.uk/CEM/WorkingPapers.html				

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Acknowledgements:

We are grateful for comments received on earlier versions from:

- Lisa Ernoul (TdV)

Abbreviations

BBN	Bayesian Belief Network
Camps	Camps Coastal Area Management Programmes
CASEs	Collaborative Application SitES
DPSIR	Driver – Pressure – State – Impact - Response
ICZM	Integrated Coastal Zone Management
IPCC	Intergovernmental Panel of Climate Change
IPEMed	Institut de Prospective Economique du Monde Méditerranéen
LEAC	Land and Ecosystem Accounting
PEGASO	People for Ecosystem based Governance in Assessing Sustainable development of Ocean and coast (Project Acronym)
SEMCs	Southern and Eastern Mediterranean Countries
SRES	Special Report: Emissions Scenarios (IPCC)

Executive Summary

Work performed: We have taken stock of existing scenario studies and assessed their relevance for thinking about the future of ICZM in the Mediterranean and Black Sea Basins. In addition, we have developed and tested participatory scenario tools designed to help people identify the barriers and opportunities for achieving the key ICZM goals of ‘balanced urban development’ and the ‘preservation of natural capital’. The tools developed have used Causal Chain Analysis and Bayesian Belief Networks to represent and explore the interrelationships between the direct and indirect drivers of change and their impacts in the coastal zone.

Key Activities: On the basis of our review of the ‘state of the art’ for scenarios and ICZM issues, we have initiated a series of workshops designed to allow members of the PEGASO Consortium and the end-user community to discuss the future barriers and opportunities facing those concerned with implementing integrated approaches to coastal zone management. These meetings have enabled us to prioritise what are thought to be the major barriers to progress, and begin identifying strategies for overcoming them. These activities have also given us insights into when and where participatory scenario methods are most usefully applied, and where their application is more difficult.

Main Results Achieved: In the context of taking ICZM thinking forward, we found that it is important for people to understand the difference between visioning methods and scenario techniques more widely. In terms of a vision for the future, it was found that the most useful starting point for discussion for both sea basins are the ‘ICZM principles’ themselves. These principles can be used to represent a normative scenario storyline for the future, which describes the set of policy and management aspirations that are needed to achieve sustainable development. If accepted ICZM principles are used in this way to create a normative scenario, participatory scenario tools can then be used effectively to look at the feasibility of achieving such a vision under different assumptions about the major drivers and pressures.

Lessons Learned: While participatory scenario methods can be effective in building shared understandings and visions, they require considerable preparatory work, to ensure that stakeholders have sufficient information and understanding to apply the methods effectively. This issue is especially critical at local scales. Nevertheless, there is a prospect of overcoming some of these barriers by further developing internet-based resources. The participatory workshops undertaken during PEGASO showed that on-line questionnaires can be used to support causal chain analysis and the construction of Bayesian Belief Networks. We also found that the time-scales over which decision makers wanted to look to the future were much shorter (15-20 years) than most published scenario studies (circa 50 years). The difference between thinking about plausible (possible) futures and projections of what *will* happen given current trends and conditions must constantly be clarified in this kind of work.

Proposed Follow-up Actions: We have identified some key actions for the ICZM Governance Platform in relation to taking scenario thinking forward. In addition to further capacity building and training in futures thinking, the Platform could usefully undertake a wider consultation on the impact of the different drivers and barriers in different geographical locations. Such work would allow more effective integration with the results achieved for the ICZM indicators and environmental accounting. These activities could exploit the internet tools that have begun to be developed in PEGASO, and create a more interactive approach to scenario building at regional scales. Such work could also usefully support further modelling exercises, such as that undertaken for the issue of sea-level rise and land-use impacts in Greece.

1. Introduction and Aims

While the future may be difficult to predict, thinking about what might happen under different circumstances can be an important aid to present-day decision making. Moreover, thinking collectively about future threats and opportunities may also enable people to develop shared visions around which, strategies for achieving them can be agreed. In this final report from PEGASO Task 4.3, we describe the use of futures thinking in the context of Integrated Coastal Zone management (ICZM).

Management of the coastal zones in the Mediterranean and Black Sea Basins poses many challenges. In addition to the complex natural dynamics of such areas, policy makers and coastal managers have to cope with the fact that there are significant concentrations of people and infrastructure along the coasts of the two sea basins. *“The total population of the Mediterranean countries grew from 276 million in 1970 to 412 million in 2000 (...) and to 466 million in 2010. The population is predicted to reach 529 million by 2025. (...) Overall, more than half the population lives in countries on the southern shores of the Mediterranean, and this proportion is expected to grow to three quarters by 2025”* (UNEP/MAP, 2012: 26). As Hallegatte *et al.* (2013), have recently demonstrated, the future of the coastal zone is also highly uncertain. Globally, exposure to flooding is increasing in coastal cities as a result of increasing populations and associated development, climate change and subsidence. They identify a particular concentration of cities at risk in the Mediterranean, and argue that significant investment in adaptation measures are therefore required to mitigate the potential losses up to 2050. *“Growing coastal populations, urbanisation, ever-increasing maritime commerce, exploitation of natural resources, and coastal tourism are the drivers behind the chronic pressures that continue to degrade Mediterranean seas and coasts”* (UNEP/MAP, 2012: 18).

The principles of ICZM have been proposed as a way of coping with the problem of governance in the coastal zone (Haines-Young *et al.*, 2014a). They aim to provide a more comprehensive and inclusive approach to coastal zone management than has been the case in the past, taking into account activities in all the sectors that affect the economic, social and environmental character of these areas at different scales. Scenarios are one of the tools that have been explored in PEGASO to help decision makers understand and manage change. The work sits alongside that of ‘Indicators’ (Task 4.1) and ‘Environmental Accounting’ (Task 4.2), which mainly focus on the present and the way past trends have played out. By looking to the future, scenarios can help decision-makers work with different actors and groups to develop visions for the coastal zone, and to test the robustness of current policies and plans against the different drivers of change that might affect them. The participatory dimension of scenario building is especially important, given the work on stakeholder engagement and capacity building that has been undertaken in PEGASO (Task 4.4).

The aim of the Scenarios Task has therefore been to develop a set of scenarios so that different national policy and planning authorities can explore the policy and management implications of possible futures for the coastal zones of the Mediterranean and Black Sea Basins. To do this we have reviewed existing scenario studies, and especially those which have focussed on the two Basins themselves. This is grounded on a thorough needs analysis that has considered the particular character of ICZM issues. The needs analysis is presented in Section 2 and the review in Section 3 of this document. On the basis of this work we provide in Section 4 an analysis of some of the important stressors and risks that stakeholders have identified as potentially significant, given the

long-term goals of ICZM. This provides the basis for a discussion of potential policy responses, that draws on an understanding of trade-offs and synergies between indicators of ecosystem structure and function in the coastal zone. In the final part of this report we consider the implications of the scenario work for the development of the ICZM Governance Platform.

2. Visions for ICZM and the design of Scenarios for the Mediterranean and Black Sea Basins

2.1 Scenario methods

Scenarios have many different purposes in research and management. The diversity of the field and the challenges this brings for the design of any scenario work has been identified by a number of recent commentators, who have attempted to provide a typology of approaches and methods. Börjeson *et al.* (2006) and Bishop *et al.* (2007), for example, note that while there is no consensus on the different types of scenario, a basic distinction can be made according to whether they are being used to explore 'possible', 'probable' and/or 'preferable' futures (Figure 2.1). Börjeson *et al.* (2006) go on to argue for a classification based on the major questions that people want or need to ask about the future, namely: 'What will happen?', 'What can happen?' and, 'How can a specific target be reached?' These three questions highlight the predictive, explorative and normative aims of different kinds of scenario studies.

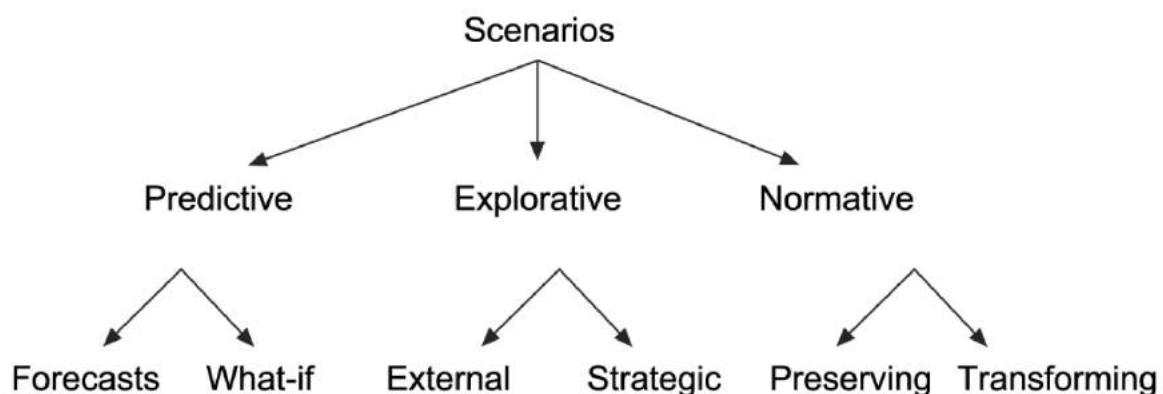


Fig.2.1: A scenario typology (after Börjeson *et al.*, 2006)

The use of scenarios as predictive devices is one of the most common ways in which this kind of futures thinking is represented or described. It is also one of the most easily misunderstood aspects of such work. The future is generally hard to predict, especially when dealing with complex systems like the coastal zone. Moreover, as Hume and Dessai (2008) have pointed out, even if we suppose that prediction is the main purpose of a scenario study, the outcomes are generally impossible to test. Not only are the timeframes used in many scenario studies too long to make it practical to 'wait and see', but also the intention of many scenario studies is to identify futures that we want to avoid by actively intervening in events. In terms of prediction, therefore, it is helpful to visualise such work in terms of either a 'forecast', made in response to a question about likely event or a kind of 'what-if' type of analysis made to identify what might happen given some specific set of assumed circumstances.

Although the typology of futures studies described by the EEA (2007) differs from that shown in Figure 2.1, it also sees predictive, forecasting types of activity to be confined to situations of lower complexity and lower uncertainty than other kinds of future work. For them 'scenarios' sit more

properly in the middle ground between ‘hard facts’ and ‘robust predictions’, on the one hand, and ‘speculation’ on the other. Their account of scenarios therefore has a strong resonance with the more exploratory kinds of work identified in the typology proposed by Börjeson *et al.* (2006) (See Figure 2.1).

According to Börjeson *et al.* (2006) explorative scenarios are generally devised to answer the question: ‘*What can happen?*’. To some extent this overlaps or extends the kind of predictive ‘what-if’ thinking described above; however, it is generally quite open-ended in its character. Such explorative studies therefore seek to examine a range of *possible* or *plausible* futures, and identify the impacts of external factors or drivers on the system of interest or the implications of different strategies or ways of acting. Often the range is captured by using two contrasting axes that determine the influence of the major drivers of change that define the scenario set. Exploratory scenarios therefore typically cover an array of possible developments, longer time horizons and broader ranges of uncertainty than ‘what-if’ types of analysis.

In many respects, the explorative mode of work captures the essence of scenario thinking. Cork *et al.* (2012) suggest that three strong conclusions can be drawn from the recent literature on scenario planning, that: (a) success depends on designing a structure process that uses sound information and which examines a diverse set of assumptions; (b) that scenarios are most useful to those involved in their development; and (c) that effective communication of the results of scenario studies requires that the needs of the target audience are considered carefully. They go on to argue that to be most useful they also need what Cash *et al.* (2003) refer to as ‘legitimacy’, ‘saliency’ and ‘credibility’. Thus if people involved in scenario work are to have confidence in its outcome then the scenario design process should be legitimate in that it is based on reliable information that is consistent with current scientific knowledge. The work should also be salient or relevant to the issues that people are confronting. Most importantly the work should be credible or plausible, that is within the bounds of what could conceivably happen. Taken together each of these characteristics implies that fundamentally the successful application of exploratory scenario thinking involves a careful process of deliberation between the different groups involved.

While exploratory scenarios tend to look from the present to a range of possible futures, the last way of working with scenarios is to look back from some future point in time that represents some goal, *objective or vision of where people want to be*. According to Börjeson *et al.* (2006) these normative scenarios are designed to help people explore the question ‘*How can a specific target be reached?*’ by asking either what adjustments need to be made to the current situation to achieve success (preservative approach), or what steps need to be taken to achieve the desired outcome (transformative approach). The latter is often referred to as a type of ‘backcasting’ activity. Most commentators agree (see Bishop *et al.*, 2007) that in contrast to exploratory techniques, normative scenarios are most useful in situations where the people are seeking to establish a vision, identify some preferred future or outcome, set appropriate goals, or seek to identify an appropriate level of performance.

On the basis of the typology presented in Figure 2.1, both Börjeson *et al.* (2006) and Bishop *et al.* (2007) go on to review the different methods that can be used to construct the different types of scenarios (Table 2.1). They usefully distinguish the approaches that can be used to *generate* the scenarios (which include such activities as surveys, workshops and more formal ‘expert-based’

Delphi¹ techniques) from those used to *integrate* the different sources information into a consistent narrative so that their *consistency* can be checked.

Tab.2.1: Contribution of techniques in the phases of scenario development
(after Börjeson *et al.*; 2006)

Scenario types	Generating	Techniques Integrating	Consistency
Predictive			
Forecasts	<ul style="list-style-type: none"> • Surveys • Workshops • Original Delphi method 	<ul style="list-style-type: none"> • Time series analysis • Explanatory modelling • Optimising modelling 	
What-if	<ul style="list-style-type: none"> • Surveys • Workshops • Delphi methods 	<ul style="list-style-type: none"> • Explanatory modelling • Optimising modelling 	
Explorative			
External	<ul style="list-style-type: none"> • Surveys • Workshops • Delphi modified 	<ul style="list-style-type: none"> • Explanatory modelling • Optimising modelling 	<ul style="list-style-type: none"> • Morphological field analysis • Cross impact
Strategic	<ul style="list-style-type: none"> • Surveys • Workshops • Delphi methods 	<ul style="list-style-type: none"> • Explanatory modelling • Optimising modelling 	<ul style="list-style-type: none"> • Morphological field analysis
Normative			
Preserving	<ul style="list-style-type: none"> • Surveys • Workshops 	<ul style="list-style-type: none"> • Optimising modelling 	<ul style="list-style-type: none"> • Morphological field analysis
Transforming	<ul style="list-style-type: none"> • Surveys • Workshops • Backcasting Delphi 		<ul style="list-style-type: none"> • Morphological field analysis

As Table 2.1 suggests, different forms of modelling techniques can be used in the integration phase while morphological and cross-impact analysis can be used to examine the consistency of the internal scenario logic. Overall, however, there is no simple correspondence between the types of scenario and the methods used in their construction; the same approach can be used to achieve quite different outcomes depending on the goal of the exercise. Moreover, what this overview also demonstrates is that the different methods have to come together in terms of process of scenario construction, and depending on the nature of the exercise different elements will be emphasised differently. Finally, depending on the goal of the work, the relative importance given to the *process* of constructing the scenarios as opposed to the *products* from the exercise will also vary.

The view of scenarios as a product is, perhaps, the more conventional one (O'Neill and Nakicenovic, 2008; Hume and Dessai, 2008; Haines-Young *et al.*, 2014b). Thus according to one reading of Table 2.1, it starts from the position that scenarios are primarily tools for understanding the implications of different assumptions about the future, and therefore places emphasis on the creation of their content. Getting the internal logic 'right' is therefore one of the important steps according to this perspective, and as Table 2.1 shows such work is often supported by the use of quantitative theoretical and empirical models. The idea of scenarios products is also encouraged by the notion

¹ Delphi methods generally involve a process of collecting together and harmonising the opinions of a panel of experts.

that building them involves a series of prescribed steps that, if applied correctly, ultimately lead to a well-defined and coherent outcome. However, while people clearly need some content to discuss, an alternative reading of the methods summarised in Table 2.1 is that it is the processes of engagement and deliberating that are fundamental rather than the methods used to stimulate debate. Echoing the ideas of Cork *et al.* (2012), who suggested that scenarios were most useful to the people involved in their construction, this alternative reading emphasises that the value of scenarios mainly lies in the individual and group learning that they achieve (Haines-Young and Potschin, 2014). Thus in Table 2.1, the workshops and surveys, and the modelling and the methods used to check consistency must all be seen as a process by which those involved in the scenario exercise come to articulate their understandings of the world more coherently and begin to understand those of others more clearly – *and as a result of this process, can make better or more informed decisions*. The learning dimension of scenarios may be especially important given the kinds of adaptive management that are part of ICZM and the Ecosystem Approach (Haines-Young et al., 2014b; see also Tourki *et al.*, 2013).

2.2 Scenarios Resources and the Challenge of ICZM

In parallel with our review of types of scenario and approaches to scenario construction, the work in PEGASO has examined a range of published scenario studies to determine their relevance to the issues that surround ICZM. The detailed results can be found in Appendix 1. Since the work was undertaken at an early stage in the project, we take the opportunity of this report to update and expand on the key findings, and explain how they informed the design of the subsequent work programme.

The aim of the initial review was to identify the relevance of published studies to the issues of ICZM in general, and to the particular challenges facing decision makers in the Mediterranean and Black Sea Basins. The work therefore selected only those studies whose geographical extent included one or both of the basins, either directly or as part of their wider global coverage. A particular effort was made to collate information on the most frequently analysed direct and indirect drivers of change as well as the most commonly used indicators of change for each scenario. The construction techniques of each scenario were also reviewed. Altogether 49 scenarios, projections and reference documents were included in the analysis. Of these, 27 could be considered as formal scenario studies; the remaining could be regarded as either providing either projections, policy ‘visions’, geopolitical reviews, or analyses of coastal or marine environmental issues that were relevant in the Mediterranean or Black Sea regions. The key findings that emerged from the review were:

- The majority of studies were exploratory in nature, mostly using a ‘four story line model’. The storylines generally included a future with a strong, libertarian, de-regulated world (‘World Markets’) that contrasted with a more planned and regulated future that took in the goals of sustainable development (‘Global Sustainability’). Also included were futures that emphasised a more fragmented world in which nation states asserted their independence (‘National Enterprise’) against a future where there was greater regional autonomy and developed approaches to sustainable management (‘Local Stewardship’).
- Of the five indirect drivers analysed (demographic, economic, socio-political, cultural/behavioural, science/technology), cultural and behavioural factors were considered most

often (77% of studies), while scientific and technological influences were considered least (61% of studies).

- For the direct drivers, climate change impacts or strategies featured highly among the outputs of the studies (in 67% of them), followed by environmental (65%) and biodiversity (57%), socio-economic (53%) and agriculture (49%), land use, water and geopolitical (all 47%) whilst the least common were health and welfare, ecosystem services and telecommunications (all featured in fewer than 20% of the studies). Marine (37%) and coastal (39%) ecosystems were featured in surprisingly few of the studies, reflecting the bias towards most studies focussing on terrestrial ecosystems.
- Most scenario studies had medium or highly complex scenarios and the vast majority (68%) used both qualitative and quantitative descriptions of the storylines. Most studies adopted expert judgement in their creation while only three studies included a 'wildcard' approach.
- The timelines were mostly found to be short-term extending to 2020 or 2030; only four extend the timeline beyond 2070 (the longest to 2100). Nevertheless, all explored futures centred around the endpoint of the timeline rather than the trajectory that led up to it; in this sense they are mostly 'snapshots' of some plausible but alternative future.

A key conclusion to arise from the initial review undertaken in 2010/11 was that coastal zone issues were not sufficiently covered and that while the storylines could provide a starting point to explore how the ICZM objectives might play out in these different and contrasting worlds, further work was required to make the existing studies useful. The subsequent work in PEGASO has therefore been directed towards gaining a better understanding of the kinds of additional scenario analysis that is required, and how best it can be designed to support the development of the ICZM Governance Platform. To do this we have (a) continued to monitor on-going but wider initiatives that are relevant to understanding the challenges facing the Mediterranean and Black Sea Basins; (b) worked with members of the PEGASO consortium and the End User Committee, to better understand their perspectives and needs. The outcomes of both activity streams are reported in the next two sections. The aim of both is to identify a set of focal questions that could be considered in the context of the different storylines and to better understand how those questions and storylines can be used to support policy analysis and decision making.

3. Scenarios and the developing science and policy agendas

In its report '*Balancing the Future of Europe's Coasts*' the EEA (2013) noted that while the principles of ICZM have been adopted in many coastal areas, there has been uneven progress, and that in 2012 implementation had only occurred across about half of the EU; key barriers included budget restrictions, lack of training and awareness, as well as lack of data and knowledge gaps.

Important in this respect are also the resistance by established organizations towards the possible redistribution of funds, human resources, powers, and eventually status that can be brought about by ICZM efforts, and the very often limited public participation of vested interests, which very often results in poor legitimacy of the taken decisions.

Two principle barriers appear to exist: the lack of clear administrative responsibilities for ICZM implementation (this is more for the Black Sea); and a lack of commonly agreed objectives and timeframes in which these objectives should be achieved. It is unlikely that such barriers are confined to Europe, and so one of the general goals of PEGASO has been to understand how they play out across the whole of the Mediterranean and Black Sea Basins, and whether a common set of strategies might be developed to achieve more rapid process across the study area and beyond.

The EEA (2013) suggested that the major characteristics shaping the future of coastal zones in Europe was that the coasts are densely populated and will be heavily impacted by new economic development. Against this backdrop of a concentration of people and infrastructure, it is also clear that many areas are also highly vulnerable to sea-level rise and extreme weather events, a situation that will be exacerbated by the impacts of climate change. As the analysis of Hallegatte *et al.* (2013) has shown, these characteristics and their associated challenges extend beyond the European part of the PEGASO study area. As a result the question of how to ensure that future development is sustainable emerges as one of the key planning and management objectives for the Mediterranean and Black Sea Basins.

An exploration of the contrasts between 'more sustainable' trajectories for coastal areas and less constrained development paths has been the focus of several recent scenario studies that are especially relevant in the context of PEGASO. These studies provide much of the evidence to support the claim that development and sustainability issues are a focus for the future.

Lavalle *et al.* (2011), for example, have modelled land use changes across Europe using EUClueScanner for the period 2000-2050. The study looked at the differences that sustainable and uncontrolled policy alternatives had on the IPCC SRES B1 (Global Cooperation) Scenario, which assumes an 'integrated' and 'environmentally friendly' world, nevertheless experiencing rapid economic growth and global population increasing to about 9 billion by 2050. This scenario was selected because it was felt that it assumed the kinds of policy developments that are currently in train within Europe, and as such represented a kind of 'business-as-usual' perspective (Pérez-Soba *et al.*, 2010). The analysis assumed that under the 'uncontrolled' policy option urban growth will continue and the only restriction would be the current framework of environmental protection, while the 'sustainable' policy option would entail a balanced approach under which urban growth would be constrained by attempts to protect more vulnerable areas and minimise risks. Lavalle *et al.* (2011) found that the rate and extent of urban growth was higher under the uncontrolled policy option but that the differences between the two policy alternatives was *greater* for the coastal zones than for the European land mass as a whole. The conclusion therefore was that the coastal

zones of Europe were especially sensitive to the effectiveness of policies that might control development in these areas; under the uncontrolled policy option a higher proportion of settlements are exposed to coastal erosion and coastal flooding and more potential assets at risk.

The enviroGRIDS Project² also used the IPCC SRES scenarios as the basis for their futures work in the Black Sea Basin. In this project all four of the SRES scenarios were considered by using quantitative statistical downscaling techniques to spatially disaggregate the outputs from the global scenarios to the regional level for the period up to 2050. The major contrasts between the storylines were along axes relating to economic growth and environmental policy. A comparison with historic trends was used to confirm the robustness of the modelling techniques. Mancosu *et al.* (in press) report that in agreement with the interpretation of the SRES global scenarios, the enviroGRIDS scenarios showed a constant expansion of urban and built-up areas for all regional scenarios, although there were spatial differences between them and differences in the intensity and scale of change. A major driver identified was an increase in second homes and the expansion of tourist facilities. Urban sprawl was also observed in areas of lower population pressure as a result of the desire to create new living spaces outside of the old inner city areas. The conclusions of enviroGRIDS about the impacts of economic growth and environmental policy on the scale of impacts brought about development are perhaps not surprising. Its major insights lie more in identifying where spatially the major changes are likely to be seen under each scenario and the wider implications of these future trends for water stress and pollution in the region.

In contrast to the enviroGrids Project, a more detailed sectoral analysis of potential future change in the marine and coastal zones of Europe has been provided by the *Blue Growth* study undertaken for DG-MARE (Ecorys, 2012). The aim of this work was to better understand and articulate the maritime aspect of the Europe 2020 strategy. It takes 'Blue Growth' to be 'smart, sustainable and inclusive economic and employment growth from the oceans, seas and coasts', and therefore seeks to identify where it might occur in both the short and medium term, and how policy interventions might overcome the major constraints. Although the study deals with Europe as a whole there has been an effort to disaggregate the findings spatially; we focus here on those most relevant to the Mediterranean and Black Sea Basins.

The *Blue Growth* study began by analysing the trends and drivers that are relevant in the context of different maritime economic functions and activities relevant to the different development stages used in the analysis (Table 3.1). In contrast to the other scenario studies reviewed in this section, the time horizon considered was much shorter, only extending through to 2025. However, the results confirmed the findings of this other work, in that the two most relevant and uncertain trends identified were 'economic climate' and 'degree of sustainability'. These were used as axes to construct the general 'scenario matrix' (Figure 3.1). These axes were considered to represent the major 'external factors' shaping the future that are largely outside the direct control of policies.

² <http://envirogrids.net/>

Tab. 3.1: External drivers for the sub-economic activities, their estimated relevance and certainty identify by the *Blue Growth* study (Ecorys, 2012)

External drivers category	subcategory	nr of times mentioned	estimated degree of certainty*	Mature stage	Offshore	Coastline	Coastal	Growth stage	Cruise	Marine	Maritime	(Pre-)development stage	Blue bio-	Ocean	Marine
				shipping	oil and gas	tourism and yachting	protection	Offshore	tourism	aquatic products	monitoring and surveillance	technology	renewable energy	minerals	mining
Demography	population growth	1	++								x				
	ageing	3	++						x		x				
	urbanisation	1	++												
	increasing water and food scarcity**	1	++				x								
	increasing international migrations	1	+/-								x				
Economy and market	economic climate, economic crisis	5	--	x		x	x		x		x				
	globalisation/increasing internat.	11	+	x	x	x	x	x	x	x	x	x	x	x	x
	striving after self-reliance	3	+		x				x						x
	increasing economic role Asia	2	++						x						
	increasing price volatility	2	-						x						
	increasing scarcity of raw materials	1	++												x
	increasing scarcity of fossil fuels	7	++	x	x	x		x	x			x	x		
Technology and science	upcoming role Asia in R&D	1	+												x
	technology is driver for growth***	4	-								x	x	x	x	
Environment, climate change	pressures on environment/space****	4	++		x			x			x				
	climate change, sea level rise	4	+			x	x				x				
Politics and institutions	increasing emphasis on sustainability*****	8	+/-	x	x		x	x	x		x				
	increasing role of EU*****	5	+/-	x				x			x				
	retreating public sector	1	+/-								x				
	development of 'weak states'	1	+/-								x				

* Certainty scores from literature and authors, see explanation in text.

**Increasing water scarcity as caused by increasing demand for water by increasing population and increasing per capita use. Not including stress caused by decreasing supply, result of climate change.

*** Technological development is important for virtually all maritime economic activities. In most cases technological development is driven by the sector itself, and thus is part of the Response Capacity.

Here the scope is restricted to world-wide, external technological developments that offer new growth potential, such as ICT, nanotechnology and DNA-technology.

**** Pressures on the environment/space: physical changes in the environment and reduced availability of space, as a result of socio-economic use and waste discharges

*****Both as result of policy and underlying public opinion.

*****EU policy is an external driver for non-governmental stakeholders, while for DG Mare it is part of both the contextual and the transactional environment. On balance the bias is on the external character, hence an external driver.

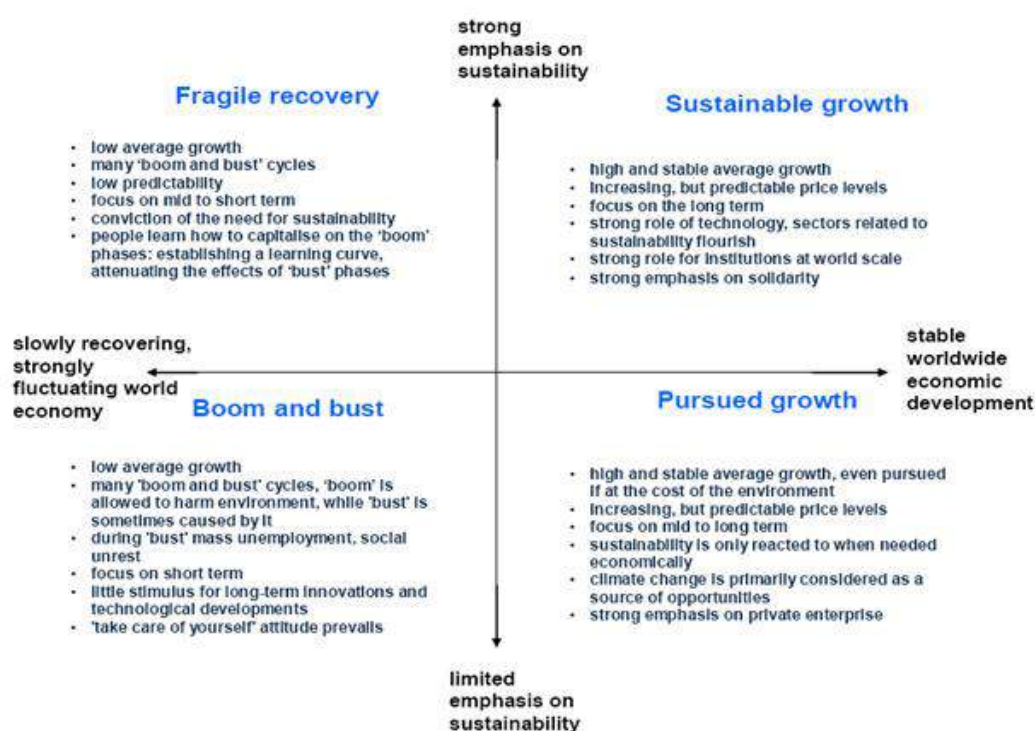


Fig. 3.1: The four back ground scenarios of the *Blue Growth* study (after Ecorys, 2012)

Although the *Blue Growth* study does not consider ICZM concepts explicitly, many of its findings are relevant to this broader debate. It concludes, for example, that the maximum potential for blue growth is under the 'sustainable' scenario, while the 'fragile economic recovery' storyline, with its limited emphasis on sustainability would more likely constrain it. Within the *Blue Growth* model of sustainability it is expected that there would be a strong focus on promoting maritime spatial planning, needed to overcome the increasing complexity of maritime uses and to increase public acceptance and understanding; the need to foster integrated (balanced) local development; a strong emphasis on stimulating public engagement in decision making.

The report also notes that blue growth is expected to occur in different ways and to different degrees in the different sea basins. For the Mediterranean the study notes that pollution related to urbanisation and industrial activities, overexploitation of fisheries resources and threatened marine and coastal habitats are amongst the most important environmental challenges that need to be overcome if more sustainable development paths are to be achieved. The importance of good environmental quality is an issue in the context of the tourist sector. The study notes that the Mediterranean is experiencing increased competition from other European coasts because it is often perceived to be overcrowded. Tourists are now spending shorter periods of time in the Mediterranean spread through the year and so there is a need to develop new more specialised offerings such as nautical tourism, wine-tasting, gastronomy, health and wellbeing and green tourism (see also Spilanis and Le Tellier, 2012). In the context of the Black Sea, the report notes the social and economic costs that environmental degradation has had in a number of sectors, such as fisheries sector, where catches of the most important commercial fish species fell dramatically during the 1980s and 1990s. The study finds the Black Sea especially vulnerable to pressures from land-based human activities, and argues that the need for integrated planning and policy approaches are therefore essential.

The work undertaken by Plan Bleu within the PEGASO project brings together many of the concerns identified in several scenario studies (See Appendix 2). It has revisited the scenarios and storylines it developed prior to the start of PEGASO, principally *A Sustainable Future for the Mediterranean: the Blue Plan's Environment and Development Outlook* (Benoit and Comeau, 2005; Plan Bleu, 2008, c.f. Sanna and Le Tellier, 2012). It has developed both a 'trend' and 'alternative' scenarios in order to stimulate the development of an ICZM vision within the project, and provide material for the Integrated Regional Assessment. The work in PEGASO further updates the foundational work done by Plan Bleu by taking into account the subsequent Euro-Med 2030, IPEMED and PARME studies (Appendix 2).

Developed by Plan Bleu, the PEGASO internal deliverable ID4.3.3 "Building on the Mediterranean Scenario Experiences" (Appendix 2) aimed at identifying how existing foresight analysis and tools can be used in the context of the PEGASO project. After an overview of the methodology used to define regional scenarios, Plan Bleu carried out a synthesis of existing foresight analysis in the Mediterranean. Focusing both on the "business as usual" (BAU) and alternative scenarios, this synthesis was fed by sectorial focus on several topics: population and demographic trends (and consequences on employment); climate change and consumption of natural resources; water; energy; coastal development and urbanization; tourism and recreational activities; maritime transportation; fisheries, etc. This analysis is extended by considering other recent scenario studies: *Tomorrow, the Mediterranean* (IPEMED, 2011), *EuroMed 2030: Long-Term challenges for the Mediterranean Area* (EC/DG Research, 2011), *What research and what partnerships for the*

Mediterranean? (Quelles recherches et quels partenariats pour la Méditerranée?) (French National Agency for Research - Agence Nationale de la Recherche / ANR-France, 2011). Moreover, some reflection elements are developed to take into account linkages between main changes and recent events, such as economic crisis at the global level, “Arab Spring” in the Southern and Eastern Mediterranean Countries (SEMCs), as well as institutional initiatives for the Mediterranean (i.e. Union for the Mediterranean/UfM). Finally, in order to put into perspective foresight analysis at regional scale on the one hand, and participatory prospective at local scale on the other hand, the ID4.3.3 report revisited the “*Imagine*” method developed and implemented in the framework of several Coastal Area Management Programmes (CAMPs) of the Mediterranean Action Plan (UNEP/MAP). “*Imagine*” allows building “participatory scenarios” at the local scale by considering stakeholders and end-users as experts at their level (in and for their territory).

The ‘trend’ scenario summarised by Plan Bleu attempts to give a picture of what might be expected under ‘business as usual’ up to 2025. By contrast the alternative scenario gives a more normative picture of what might be anticipated if a sustainable trajectory is achieved over this period. A summary of the contrasting outcomes across a range of sectors is shown in Table 3.2. Key themes and issues identified include the impacts of development on the environment of the coastal zone, the increasing vulnerability of infrastructure under the trend scenario, and more efficient use of resources and better public awareness of coastal issues under the sustainable storyline.

Despite the EEAs conclusion that a major barrier to progress with ICZM is a lack of commonly agreed objectives and timeframes, our review has shown that there is broad agreement about what the major challenges for the coastal zones are. The conclusion that we took from our review of on-going work was that there is probably little need for further ‘scenario products’ (storylines, trend analyses) *at this stage*. We believe that the principle need is to use the existing materials to help people think through the issues already identified in more depth, so that ‘objectives and time frames’ could be agreed. In order to test this conclusion, and to take the PEGASO scenario work forward in a more practical way, we have therefore undertaken a series of workshops. The outcomes are reported in the next section.

Table 3.2: Summary of scenarios (by a cross-cutting approach and by issue) detailed in the text of the PEGASO ID4.3.3 drafted by Plan Bleu (October 2012)

	Business as Usual scenario	Alternative scenario
Cross-cutting view	<ul style="list-style-type: none"> – Growing vulnerability to natural hazards because of an intensification of global warming (less than 1°C by 2025) and an increase of extreme climatic events in the Mediterranean area. – EU will strengthen its presence in the Mediterranean by the accession of five coastal States (Albania, Bosnia-Herzegovina, Croatia, Montenegro, and Turkey) and by the improvement Euro-Mediterranean cooperation. – Economic growth remains uncertain by 2025, but Euro-Mediterranean economic interdependencies are likely to increase. – Environmental policies: they will keep remaining basically top-down, corrective, and regulatory instead of participatory. 	<ul style="list-style-type: none"> – More efficient management of natural resources on the basis of sustainable consumption patterns. – Process of economic and social convergence in SEMCs with the European countries that takes place in the form of integration of production systems through the development of a Mediterranean network of synergies and collaboration. – Euro-Mediterranean integration: establishment of the four EU freedoms (persons, goods, services and capitals), access to the European domestic market and standardized norms allowing the emergence of a regional preference system. – New impetus to trade flows from the Middle East and the Maghreb to the European countries and the Gulf countries.
Demography	<ul style="list-style-type: none"> – Fertility rates in the SEMCs will converge towards levels of NMCs. – Demographic growth rates in the NMCs slacken. – Accentuation of differences in the age structure between the SEMCs and the NMCs. – Demographic growth in the SEMCs will determine increased demand for labour, for higher educational facilities, for housing, water, energy, transport... 	<ul style="list-style-type: none"> – The expansion of the labour market favoured by the regional integration process will limit the migration of qualified workers from the SEMCs. – Countries such as Algeria, Croatia, Serbia, Tunisia, and Turkey will stop being countries of emigration and will become one of the main Mediterranean destinations of migration.
Coastal development	<ul style="list-style-type: none"> – Increase in urbanization in coastal areas because of the increase of population and because of the doubling of tourist flows. – Coastal overdevelopment, sprawl of large conurbations and saturation of coastal areas, together with an enormous increase in transports will not only worsen degradation of biodiversity but will increase natural and social risks in nearly 50% of the coastline. – Degradation of coastal environment because of the global warming (increased submersion of lower lying coasts, particularly deltas, lagoon 	<ul style="list-style-type: none"> – Sustainable management of the Mediterranean natural and cultural coastal heritage thanks to the implementation of policies aiming at the protection of ecosystems, at ensuring a quality environment for local populations and at the development of sustainable tourism. – Strategic urban planning through multilevel cooperation (cities, regions, States).

	Business as Usual scenario	Alternative scenario
	coastlines, marine marshes, mangroves, coral reefs and certain islands; accelerated cliff and beach erosion; increased salinity in the estuaries).	
Urbanization	<ul style="list-style-type: none"> – The considerable increase of urban population (expected to amount to 220 million in 2025 against 151 million in 2005) – A raise of urbanization of coastal regions (one third of the urban population in 2025 will focus right on the Mediterranean coasts) – Wild urbanization in SEMCs will limit access to water, sanitation, and other basic facilities to urban-dwellers – In SEMCs waste production levels will increase. – Losses of agricultural land contributing to extending artificial land cover 	<ul style="list-style-type: none"> – Sustainable urban development based on urban regeneration, on urban renewal, on the promotion of Mediterranean cultural heritage – Integration of transport and urban planning, protection of farmland and natural areas, creation of green areas, promotion of hinterland tourism and urban tourism, improvement of maritime and rail transport – Reduction of total waste production in Mediterranean countries – Amelioration of participatory process and improvement of Euro-Mediterranean cooperation (at local level and national level) in governance of urban development
Tourism	<p>(Only drivers and current trends)</p> <ul style="list-style-type: none"> – The market share of Mediterranean destinations in total tourist arrivals worldwide will decrease slightly from 32% in 2010 to 28% in 2030. – Sharp increase in touristic flows towards Balkans and the Middle East (Turkey) which are forecast to become the new main important destinations in the area. – Environmental pressures coming from tourism on landscapes, biodiversity, and quality of the urban environment and natural resources quality are expected to grow. – Problems related to drinking water quantity and quality, seawater quality, energy consumption, and noise could seriously affect those areas which are expected to face a growth in touristic arrivals. 	
Cruise sector	<p>(Only drivers and current trends)</p> <ul style="list-style-type: none"> – Cruise tourism sector has high growth potential in Mediterranean Sea. If one focuses on the five-yearly rate of change over the past 25 years, cruises increased by only 3% between 1985 and 1990, then fell sharply (by 45%) between 1990 and 1995, before experiencing 15 years of rapid growth (106% between 1995 and 2000, 55% between 2000 and 2005 and 57% between 2005 and 2009). – Greece, Italy, Spain, France are the major Mediterranean cruise destinations. – In Italy and France the cruise segment has high added value compared with the tourism sector in general. In Italy, cruises generate, per night, four times more revenue than tourism (over €800 per night compared to over €200 for tourism in general) and in France, the ratio is six to one (about €600 for cruises and €100 for tourism in general). 	

	Business as Usual scenario	Alternative scenario
	<ul style="list-style-type: none"> – 35% of Mediterranean ports that receive cruises are Italian and 34% are Greek, pointing to an almost identical number of ports in both countries. In contrast, 63% of ports of departure are located in Italy (France comes in 2nd place with 13%) and 42% of ports of call are in Greece (Italy is in 2nd position with 28%). – In order for the cruise industry to stimulate regional development, countries must combine cruise ship production with a high ratio of ports of departure to ports of call and a considerable number of overnight stays. In the Mediterranean, only Italy manages to combine these different factors. – Inability of the dominant model of Mediterranean tourism development to meet sustainable tourism objectives because of an inefficient governance of tourism on the international, national and local scales. 	
Marine and Coastal Protected Areas (MCPA)	<ul style="list-style-type: none"> – The 2010 Aichi target of protecting 10% of Marine and Coastal Areas by 2020 is currently far from being achieved in this region. – Slight increase in the protected surface, along with a stagnation, or even decline, of the budgets of existing MCPA, sometimes leading to an abandonment of some MCPA that are generally perceived as obstacles to local economic growth. 	<ul style="list-style-type: none"> – Awareness raising on local benefits brought by MCPA leading to easier local acceptance, a deeper implication of local stakeholders in MCPA management including compensatory measures for the sectors that are negatively affected, and eventually the multiplication of MCPA until the Aichi target is reached.
Water resources	<ul style="list-style-type: none"> – Climate change, reduced rainfall, excessive pressure on water resources, and reduction of renewable water resources will result in a substantial water shortage affecting almost 290 million people in the SEMCs. – Aquatic ecosystems, providing procurement services and regulation as wetlands (natural purification and filtration of water) will be increasingly at risk because of urbanization, particularly on the coasts. – In terms of management policy for the water supply, implementation of desalination or wastewater reuse techniques is coming increasingly to meet the more and more growing demand. – Development of new forms of water production: desalinization of sea water or brackish water. 	<ul style="list-style-type: none"> – Improved water demand management: water savings. – Implementation of sustainable policies able to promote improved water and soil conservation, and increased recourse to the artificial replenishment of water tables in arid areas.
Energy	<ul style="list-style-type: none"> – Primary energy demand in the Mediterranean will grow over the next few years because of high demographic growth combined with rapid urbanization and major socio-economic development needs. – The increase in energy demand will be more pronounced in Southern Mediterranean countries in parallel with their demographic and economic growth. 	<ul style="list-style-type: none"> – Sustainable and efficient use of energy resources thanks to a rapid improvement in use of renewable energies: solar, wind, geo-thermal energy and hydroelectricity. – Thanks to a reduction of 18% in energy dependency (compared with 38% in the trend scenario) and of 860 million tons less of CO₂ in greenhouse gas emissions the new trend will take to the creation of numerous jobs in

	Business as Usual scenario	Alternative scenario
	<ul style="list-style-type: none"> –The energetic infrastructure of the SEMCs is developing fast and the construction sector is expected to double by 2030. –The Mediterranean energy mix will still be dominated by fossil fuels and the region will enter the natural gas era from 2020. –The power generation industry will continue to expand. –Renewable energies will grow strongly, by the equivalent of two Mediterranean Solar Plans by 2020 and two others between 2020 and 2030. –Energy efficiency offers significant and attainable potential and is a priority. –Environmental challenges will be exacerbated: climate change, interaction with water resources. –Energy dependence could thus hit 40% by 2030, which would exacerbate tension around the security of supply. 	<p>the innovative sectors of the ‘post-oil’ era.</p>
Transports	<ul style="list-style-type: none"> –Massive growth of transport by 2025: a 2.6 fold increase in land freight traffic, 3.7 fold in maritime freight traffic, and a virtually two-fold increase in passenger traffic. Impacts on environment are dramatic because of the raise of congestion, noise pollution, greenhouse gas emission and local pollution. 	<ul style="list-style-type: none"> –The intermodal rail transportation system and maritime reach up 20% of the mode of transportation choices: that means a limitation of the road primacy. –Extended and stricter implementation of rules to combat pollution from ships. –Sustainable policies aiming at guaranteeing efficiency will need to be adopted at all governance levels: Euro- Mediterranean, national, regional, and local.
Maritime transports	<ul style="list-style-type: none"> – Mediterranean basin as the main transit area for trade flows between Asia and Europe. –Economic growth gives new impetus to the massification of the movement of goods. – Greater flow of investment in port and logistics platforms. 	<ul style="list-style-type: none"> – Significant investments in ports and the support of proactive public policies in terms of the development of rail transport: connections to ports, logistics platforms, and institutional reform. – Leading groups hold control over logistic chains. – Development of logistic platforms connected to the railway would reduce the pressure on coastal and ease road congestion.

	Business as Usual scenario	Alternative scenario
	<ul style="list-style-type: none"> – Governments envision scale-ups and construction of deep water ports. – Increase by a factor of 2.2 over twenty-year container handling capacity. 	<ul style="list-style-type: none"> – Intra-Mediterranean exchanges remain quite low with respect to exchanges with Asia and do not alter the status of the Mediterranean as a “transit sea”. – Proactive policies help multiply railway traffic by facilitating good connection of the ports with the railway network.
Agriculture	<ul style="list-style-type: none"> – Increasingly problem of water shortage, desertification, increase of population, not-planned urbanization and enhancement of tourism will threaten Euro-Mediterranean agriculture. – Maintaining or enhancing desertification and rural poverty in SEMCs. – Growing vulnerability to the risk of fires and floods. – Irreversible loss of biodiversity. – Weakening of family farming. – Fluctuations of agricultural products prices. 	<ul style="list-style-type: none"> – Agricultural competitiveness increases. – Modernized crops subsistence farming. – Development of little and medium agriculture. – Promotion of high quality food products, corresponding to the Mediterranean cultural and gastronomic traditions.
Fisheries	<ul style="list-style-type: none"> – Widespread overexploitation of living marine resources. – Economic and demographic drivers will provoke an increase in intensive fish farming (aquaculture) and in fishing activity. – Development of new techniques and increase in boat size will determine ever more acute fishing pressure with increasing risks for environment and especially for some major fish species (e. g. Red tuna). 	

4. Refining scenario thinking in the PEGASO community

Section 3.1 provided an insight into ‘state-of-the-art’ of scenario work that is relevant to coastal issues in the Mediterranean and Black Sea Basins. Given that such work is primarily intended to support understanding and decision making, the *application* of these ideas was identified as an important priority for PEGASO. It was anticipated that while further refinement of storylines and the analysis of trends and drives may be required, engagement of potential users and brokers of such knowledge would be valuable to promote a shared understanding of issues and to agree what further work is required.

In the PEGASO project guidelines for the development of participatory strategies for ICZM implementation were provided (Soriani *et al.*, 2014). Among the many methods and tools to support participatory engagement, a specific set was provided to support the ten Collaborative Application SitES (CASEs) during the “Analysis and futures” phase of the ICZM process (Tab. 4.1). This phase aims at integrating in the scenario building process local values and stakeholders’ knowledge.

Table 4.1: Participatory Engagement within PEGASO (after Soriani *et al.*, 2014)

Method	Objective	Link
Backcasting	Backcasting allows a group of people to weigh up the implications of different future options or policy goals.	http://www.pegasoproject.eu/wiki/Backcasting
Future search conference	A future search conference helps a group of people attempt to create a shared community vision of the future, and agree on a plan of action.	http://www.pegasoproject.eu/wiki/Future_search_conference
Open space technology	Open space technology aims to provide an event which is relevant, timely, and participatory. Its relevance is determined by the participants, who determine the agenda, the length of the event, and the outcomes.	http://www.pegasoproject.eu/wiki/Open_space_technology
Scenario testing	Scenario testing is a way to test alternative (hypothetical) futures so as to make better choices today. Scenario testing is useful to identify general, broad, driving forces, which are applicable to all scenarios.	http://www.pegasoproject.eu/wiki/Scenario_testing
Sketch match	A Sketch Match is a series of interactive design sessions lasting up to three days in which participants (citizens, policymakers, farmers and other stakeholders), under supervision of a spatial designer and a process supervisor, analyse and work out the spatial problems in a specific region.	http://www.pegasoproject.eu/wiki/Sketch_match http://www.pegasoproject.eu/wiki/Participation_in_the_Danu_be_delta
IMAGINE Workshop 3 and 4	These workshops aim at “modeling and exploring” (scenario building) the trends and the alternatives regarding the future of the area. The prospective and scenario methods allow to clarifying present actions and building scenarios in the light of the past trends as well as possible alternatives. Diagrammatic representation of indicators compared to the band of equilibrium provides a visual image of the “sustainability” of the area and of its possible futures.	http://www.pegasoproject.eu/wiki/PEGASO_workshop_3_and_4_-_modelling_and_exploring

The ‘Imagine’ method for systemic and prospective sustainability analysis has been developed and used effectively by Plan Bleu (Bell and Coudert, 2005; Coudert and Larid, 2011) (See Appendix 2). In the UK, participatory scenario methods that have included the use of Bayesian Belief Networks

(BBNs) have been applied by the University of Nottingham (Haines Young, 2011; Haines-Young *et al.*, 2011, 2014b). It was therefore decided to build on this expertise for the purposes of PEGASO, by organising a series of workshops during 2012 and 2013.

The different potential participatory approaches were considered at an expert meeting held in Paris, in June 2012. It was noted that although the “*Imagine*” method has been used successfully, it requires an iterative approach involving several meetings with stakeholders. It was therefore decided to use a more ‘streamlined approach’ based on the related notions of ‘causal chain analysis’ and Bayesian Belief Networks. It was also felt that given the geographical and political differences between the Mediterranean and Black Sea Basins, any initial work should look at the issues in the two basins separately through two ‘regional workshops’. Based on the outcomes of these meetings a further, integrated workshop that brought all the issues together was organised in conjunction with the PEGASO General Meeting in Rabat in 2013.

Thanks to these three workshops, the CASEs of North Lebanon Coastal Zone and Dalyan-Köyceğiz Special Protected Area decided to organize Bayesian Belief Networks workshops. The former was addressing the issue of artificialization of the North Lebanon Coast and the BBN tool was used to identify drivers and influences and their importance in “controlling artificialization”. The latter aimed at identifying the main issues hampering the sustainable management of the natural capital of the Dalyan-Köyceğiz Special Protected Area including the nesting beach of *Caretta caretta*.

The design and outcomes of the regional meetings (Arles and Istanbul) and the Integrated workshop (Rabat) are reported below.

4.1 The regional workshops

The aim of these two workshops was to develop and explore future visions for the coastal zones of the Mediterranean and Black Sea Basins. It was decided that they should draw on the existing scenario work undertaken by Plan Bleu (Appendix 2) and apply some of the scenario tools that can be used to support the kind of integrated assessment being undertaken in PEGASO. In the context of the Mediterranean the meeting was designed to provide participants with the opportunity to discuss the kinds of ICZM policies and management activities that can achieve the goals of the Barcelona Convention and of its additional Protocols (particularly ICZM Protocol and SPA Protocol), as well as the EU Marine Strategy Framework Directive (MSFD) and Water Framework Directive (WFD). A second meeting explored how similar policy goals might be developed for the Black Sea building on such initiatives as the Permanent Secretariat of the Black Sea Commission (PS-BSC - Bucharest Convention).

Although the two meetings focused on issues in the Mediterranean and Black Sea Basins separately, they were designed to have a common framework and approach that would allow participants to explore the ideas behind the Ecosystem Approach and its links to ICZM. The events were also designed to allow participants to use and reflect on the work that has been undertaken in PEGASO on indicators, ecosystem accounts, and participatory methods more generally. On the basis of the analysis reported in Section 3.1, it was decided that the meetings should concentrate on two key ICZM policy objectives, namely to:

- preserve the natural capital in the coastal zone; and,
- have a balanced use of the coastal zone, avoiding ‘unnecessary urban sprawl’.

To explore these policy objectives the workshops brought together experts and decision makers who were working on coastal zone issues at different scales. Their expertise was used to consider the implications of current trends for the main drivers of change for these policy objectives, and how this might feed into the Integrated Regional Assessment (Task 5.2) work that was being carried out in PEGASO. The workshops were also designed to engage with the PEGASO CASES partners, to help them reflect on how the situation and issues in their study areas relate to the regional pressures and trends identified. Background material for the meetings was drawn from recent UNEP/MAP assessments, and the foresight analysis in the update of *Plan Bleu's 'Sustainable Future for the Mediterranean'*.

The regional workshop for the Mediterranean

The workshop in Arles held in November 2012 looked specifically at issues in the Mediterranean (see Appendix 3 for details). It used causal chain analysis, based on the DPSIR framework, as a way of discussing key issues. The meeting also considered how scenarios developed by Plan Bleu (Sanna and Le Tellier, 2012 and 2013) could help to identify how issues might evolve in the future and what this meant for the goals of ICZM within the Region. The meeting sought to identify what people thought were the important focal questions around which scenarios could be built so that people better understood the impact of the drivers of change at local and regional scales relevant to ICZM under a range of plausible futures. A number of thematic areas were identified by the stakeholders present and therefore considered at the workshop, namely biodiversity, aquaculture and fisheries, waste and water management and governance.

The regional workshop for the Black Sea

The follow-up meeting in Istanbul, in December 2012, focussed on issues from a Black Sea perspective. It too considered a range of key issues in the light of some future scenarios, especially the work done in enviroGRIDS. The discussions covered the topics of: urbanisation and its wider impacts; waste management; erosion and changing currents; cross border pollution (including radioactivity); infrastructure and transport development; and tourism and the often poor state of beaches.

A key difference between the Istanbul workshop and that in Arles was the greater number of 'end-users' who attended the meeting; they were mainly drawn from the Black Sea ICZM Advisory Group. As a result they were more comfortable discussing governance issues rather than making an analysis of issues using methods such as causal chain analysis. Nevertheless, a tentative vision for the next decade was suggested, involving the implementation of some kind of legally binding ICZM agreement at regional and national scales, broadly equivalent to that in the Mediterranean, supported by various activity centres and tools such as that being developed by projects like PEGASO.

4.2 Conclusions from the regional workshops and the PEGASO work plan

Since the two workshops were planned as a coordinated set of activities, it is useful to consider the conclusions arising from them together. These were:

- *That any 'vision for the coastal zone' developed in PEGASO and its Governance Platform needs to be consistent with, and supportive of, the more general policy goals expressed in such documents as the ICZM Protocol for the Mediterranean, and the Black Sea Strategic*

Action Plan. However, work within the project and beyond should strive to add detail and help articulate issues in more specific ways. For example, one contribution that should be explored by PEGASO was the meaning of concepts such as ‘balanced use’ in relation to ICZM. It was agreed that future scenario work could suggest what kinds of indicator might be used to measure such outcomes. Similar conceptual and management contributions were identified in terms of describing what is meant by ‘the healthy function of natural capital’.

- *That any scenario used to test the ‘PEGASO vision’ needs to be engineered or adapted to make reference to both coastal zone issues and the principles underlying ICZM, so that the conditions necessary for implementing them could be identified and tested. Thus any scenario work should, for example, be framed around the indicators being developed and populated by PEGASO, and should where possible use base-line data such as that provided by the different types of environmental accounts being developed in the project. In particular, the workshops recommended that the work should build on the assessment of current conditions expressed in the PEGASO Regional Assessment.*
- *That in considering potential future strategies and possibilities, people agreed on the helpful timelines about one or two decades rather than periods of 50-100 years that are sometimes considered by scenario studies. This was especially the case when governance issues were being considered, and when audiences mainly consisted of end-users, as in the case of the Black Sea Workshop.*

As a result of these regional workshops it was therefore apparent that given the existence and acceptance of general policies to promote sustainable development, and to achieve specific policy goals such as those set out in the ICZM Protocol, a ‘desired future’ has to a large extent already been agreed or defined by the PEGASO community.

As we have argued in Section 2.1, normative scenarios are a cross between a description of a plausible future and a vision statement. They define what an organisation or group of stakeholders want the future to be, and in this sense define a ‘goal state’ that they seek to realise. By ‘backcasting’ from this ‘desirable future’ the scenario can then be used to help identify the steps that need to be taken in order to achieve the agreed goals, and the potential barriers to success. Thus, given that the ICZM Protocol for the Mediterranean represents a normative statement about a desired future state, it was decided that on the basis of the regional workshop outcomes, the main thrust of the scenario work undertaken in the time remaining for PEGASO should consider how these goals might sit in relation to any alternative development pathway. It was also decided that on the basis of the de-brief from the workshop in the Mediterranean it was also clear that the robustness of the goals of ICZM could be tested against a range of assumptions about the future in an interactive way, using techniques such as ‘what-if’ modelling approach. This was especially appropriate given the short time scales that stakeholders wanted to consider.

Since the general goals of ICZM also define a normative outcome for the Black Sea, even though an international agreement is not in place, it was agreed that a similar approach could be adopted in this part of the PEGASO study area. It was decided that the work might identify what differences exist between the Mediterranean and Black Sea in terms of the barriers to implementation and the drivers of change.

As noted above, during the regional workshops breakout groups explored how causal chain analysis based on the DPSIR framework could be used to describe different issues affecting the coastal zone. While this method was successful in helping people explore a range of issues in a general way, the scenario team felt that this kind of analysis needed to be extended, made more formal and if possible used as the basis for a broader set of discussions across the whole consortium. Thus subsequent work focussed on the development of a more structured 'what-if' modelling approach using Bayesian Belief Network (BBN) tools. The latter can be used to explore how sensitive ICZM outcomes might be to different combinations of assumed drivers, and thus give insights into the impacts of different future scenarios. In the next section we describe in detail how these methods were developed and used in the third major workshop in Rabat, 2013.

5. Implementing ICZM: exploring the barriers, opportunities and options

5.1 Contexts

The two regional workshops set the scene for the Rabat meeting. The goal was to build on the experience gained from the earlier discussions to explore how the tools being developed in PEGASO could be used to gain a better understanding of ICZM issues, and how these might be explored in a systematic and evidence-based way. A particular concern was to exploit the work done to develop a set of ICZM indicators within PEGASO, and use them to develop a medium term vision for both Basins. A corollary was to better understand the opportunities and barriers to taking the goals of ICZM forward, and the kinds of threat that might hinder sustainable development. In keeping with the overall aims of PEGASO, it was essential that this should be done in a participatory way that could illustrate and inform people's understanding of what the ICZM Governance Platform being developed by the Project might do.

The specific aims of the Rabat workshop were therefore to:

- Explore what 'balanced urban development' and 'protection of natural capital' means in the context of ICZM, and how to measure them both qualitatively and quantitatively in terms PEGASO indicators and the factors that influence them;
- Give people experience of using participatory processes to develop influence diagrams, and the way they could be used to model causality using Bayesian Networks; and,
- Give people insights into how PEGASO tools might be linked and used.

As the work undertaken in PEGASO Task 4.1 on 'Indicators' had noted (Santoro *et al.*, 2011), a structured approach to ICZM requires the development of a set of indicators to measure progress in, and effects of, ICZM policies. Such a set should cover issues related to governance, environmental, and socio-economic factors that relate to the specific management interventions that can be triggered by ICZM practices. The indicator set proposed has therefore been built around the different principles of ICZM as defined by the work in PEGASO Task 2.1 (Haines-Young and Potschin, 2011).

From the work leading up to Rabat, two thematic policy areas were identified as especially important to explore, namely the ICZM goals of 'preserving the wealth of natural capital in coastal zone' and achieving 'a balanced use of coastal zone, and avoid urban sprawl'. It was felt that while these goals have been widely accepted as fundamental to what ICZM is seeking to achieve, their implications are not easy to understand or measure 'on the ground', not least because the way they are interpreted might vary in different geographical situations. These two policy objectives were therefore taken as the focus for the Rabat workshop.

In planning the event at Rabat, a small team from the Consortium looked at the way some of the PEGASO ICZM indicators related to the two policy areas, and in particular how thinking about the factors that influence them could be made 'operational' using a tool such as a Bayesian Belief Network (BBN) (Haines-Young, 2011; Haines-Young *et al.*, 2014b). BBNs enable people to storyboard the way they think or believe systems are structured and potentially onto model both qualitatively and quantitatively how systems behave. A first step in constructing a BBN is to draw up an influence diagram, describing the causal relationships between the variables that people think make up the

system; in the case of the Rabat workshop, these were the policy goals of preserving natural capital and balanced use of the coastal zones.

Given that PEGASO was entering its final stages a further motivation for the Rabat workshop was the need to show how some of the key components developed in WP4 'Multi-scale tools, methods and models for integrated assessment' could be used in an integrated way. By using influence diagrams and eventually Bayesian Belief Networks (BBNs) to more formally examine the factors that influence the 'preservation of natural capital' and 'balanced use' under a range of different assumptions, it was considered that the 'Rabat Workshop' was a useful opportunity to look at the PEGASO ICZM indicators in the context of scenario development (T4.3), and that the outcomes could then feed into the Regional Assessment being made in T5.2. It was recognized that the workshop also provided an opportunity to showcase some of the accounting data and methods (T4.2) and how they might be used to understand geographical differences across the two Basins, and to illustrate the use of participatory methods (T4.4) within the context of the ICZM Platform being developed by PEGASO.

5.2 Structure of the Rabat Workshop

The 'Rabat Workshop' lasted one and a half days; the programme followed is shown in Appendix 4, together with the briefing notes given to the facilitators. Its design was formulated during a preparatory meeting hosted at Nottingham in February 2013. The programme was split into two parts: creating influence diagrams, and using BBN tools. In terms of the composition of the group, the majority of participants were from countries bordering the western Mediterranean (especially European countries). More than 70% regarded themselves as 'researchers', while around 10% described themselves either as coastal managers or policy advisors; it should be noted that people could assign themselves multiple roles.

Creating Influence Diagrams

The initial phase was designed to help participants develop a shared vision and understanding of what the issues were by working together in small groups. This was necessary because although many of them were familiar with the aims of PEGASO and ICZM, the groups consisted of people from different backgrounds. Their task was to create an influence diagram of the factors that determine the success or failure of the policy goals relating to the preservation of 'natural capital' and 'balanced use'. Altogether there were seven groups, one of which conducted their discussions in French. Each group was allocated a facilitator or moderator, who helped the groups to do the different exercises. The moderators (Appendix 4) were briefed before the workshop and met in Rabat prior to each exercise for briefing and update.

The preparatory meeting in Nottingham (February 2013) identified a range of PEGASO ICZM indicators that could be relevant to the two policy goals. At the Rabat workshop the groups were then asked (Exercise 1) to review the indicators, suggest how the different variables might causally relate to each other, and consider the wider drivers and pressures that might steer change in the system. In a further step of Exercise 1 the groups were asked to use their influence diagrams to consider how the system would respond over the medium term under what they considered to be the 'best' and 'worst' case scenarios. Although the groups were free to define the scenarios for themselves, the best case was assumed to be something like 'full realisation of the goals of ICZM'. A key conclusion from the Arles workshop was recognition that the aspirations of agreements such as the ICZM Protocol represented a kind of 'normative scenario' that could be used to explore the barriers and threats that might prevent these desired outcomes from being achieved. Groups were

thus encouraged to think about what the best outcomes might be and identify the major factors that could hinder progress. Their views were captured by asking them to identify which drivers might be controllable or uncontrollable under the best and worst case scenarios (Exercise 2).



Plate 5.1: 'Building Influence Diagrams' (Photos: Gloria Salgado)

Throughout, the groups worked in a highly interactive way (Plate 5.1), arranging and fixing cards to a base to identify the variables that were considered important and the relationships between them. Although the outcomes from the individual groups are important in their own right, a purpose of the exercises was a common understanding of issues and different perspectives that could be built on in the subsequent work, when the focus moved to using a BBN tool. The group work generated much discussion but the outcomes clearly depended on establishing some kind of consensus. In order to preserve and capture views at an individual level, however, an on-line questionnaire was administered at the end of the first phase of the workshop.

The questionnaire was constructed following the preparatory meeting at Nottingham, and designed to elicit information from the workshop participants about the factors they thought influenced the policy goals of preserving natural capital and achieving balanced use of the coastal zone. It was implemented using the Survey Monkey system³, with question formats selected to capture the kinds of data that could be used to construct a BBN. A copy of the questionnaire is shown in Appendix 4. The questionnaire took about 20-30 minutes to complete. Altogether 49 people provided responses.

³ <http://www.surveymonkey.com/>

Using BBN tools

The questionnaire results were analysed overnight by the authors, and used to calibrate some key variables in a Bayesian Belief Network that had been created at the preparatory meeting in Nottingham. While in principle each of the groups could, with assistance, have turned their own influence diagrams into a BBN, the time available at the workshop was limited. Thus the pre-prepared BBN was used to illustrate what could be done with the kinds of experience developed during the first part of the workshop, and how these kinds of tool could be used to operationalise the kinds of thinking the group work had generated.



Plate 5.2: ‘Building BBNs at the Rabat Workshop’ (Photos: Gloria Salgado)

The details of the BBN presented to the participants will be discussed below. Following a short presentation of the results from the questionnaire and the way the data was used to calibrate the BBN, the groups were given copies of the network to use as the basis for Exercise 3. The BBN was built using the NETICA software, which could be downloaded for free⁴. Initially the network was loaded onto the laptops of the facilitators, but in many groups individuals installed the software for themselves and used the software directly (Plate 5.2).

The groups were asked to explore the way the BBN had represented the issues of preserving natural capital and balanced use, compared to their influence diagram; in particular, participants were asked to use the network to explore the consequences of the ‘best’ and ‘worse’ case scenarios that they had identified in the first part of the workshop, or at least a version that was as consistent as possible, given that not all of their drivers might be represented in the BBN. The BBN Exercise 3

⁴ <http://www.norsys.com/netica.html>

concluded by asking groups to provide feedback on the insights that the BBN had provided over and above the experience gained with the influence diagram and any conclusions they drew about the suitability of the methods used in the workshop for decision support and, in particular, as an aid in the development of action plans for ICZM at local, national and regional scales.

5.3 Results from the Rabat Workshop

Building Influence Diagrams (Exercise 1)

The set of influence diagrams developed are shown in Figure 5.1. There was considerable diversity of thinking between the groups and the resulting paper-based diagrams looked very different. Following the workshop the diagrams have been transcribed by the UNOTT team into NETICA so that the commonalities and differences can be more easily seen. In a BBN the variables that make up the system are known as ‘nodes’ in the network. In Figure 5.1 the nodes have been represented as simple labelled box, but these have been coloured up in the same way according to the kinds of thing the nodes represent, across all the groups. This the indicators for natural capital and balanced development have been represented in shades of green and pink, respectively, and the drivers that influence them in blue. During their work, groups were asked to identify any important geographical (i.e. spatial factors) that might result in different outcomes in different types of location. In the networks shown in Figure 5.1 these factors are shown in yellow. The colour coding was used by the groups who had been given a set of pre-prepared cards on which they could enter their information. The same coding was used in the BBN that subsequently became the focus of discussion in Exercise 3. The approach was designed to help people find their way around the different networks during the workshop exercises.

The work of each group was constrained by giving them a limited number of cards for each policy theme and potential drivers, and restricting the number of arrows they could use to represent the relationships between them. This was done so that the resulting networks would not become overly complex, and to ensure that by having to prioritise groups only included what they considered to be the most important variables in their network diagrams. A further advantage of this method was that the resulting networks were all of roughly the same size so that they could be more easily compared. Since influence diagrams (and the BBNs that might result from them) are not meant to be complete representations of the world, simplicity of the outcomes is an important goal of such work. Participants were encouraged to take a broad view, and not attempt to identify all the steps in a causal chain in detail but to think and represent the system at a high level by simply identifying preconditions and outcomes. In building the network, the groups started with the cards representing the two policy goals of integrity of natural capital and balanced use, and worked outwards through the indicators that they thought could be used to characterise them and the drivers that in turn would influence them. In order to assist discussion, the groups were given a list of potentially relevant indicators from the PEGASO ICZM set, but were able to add any others they thought relevant.

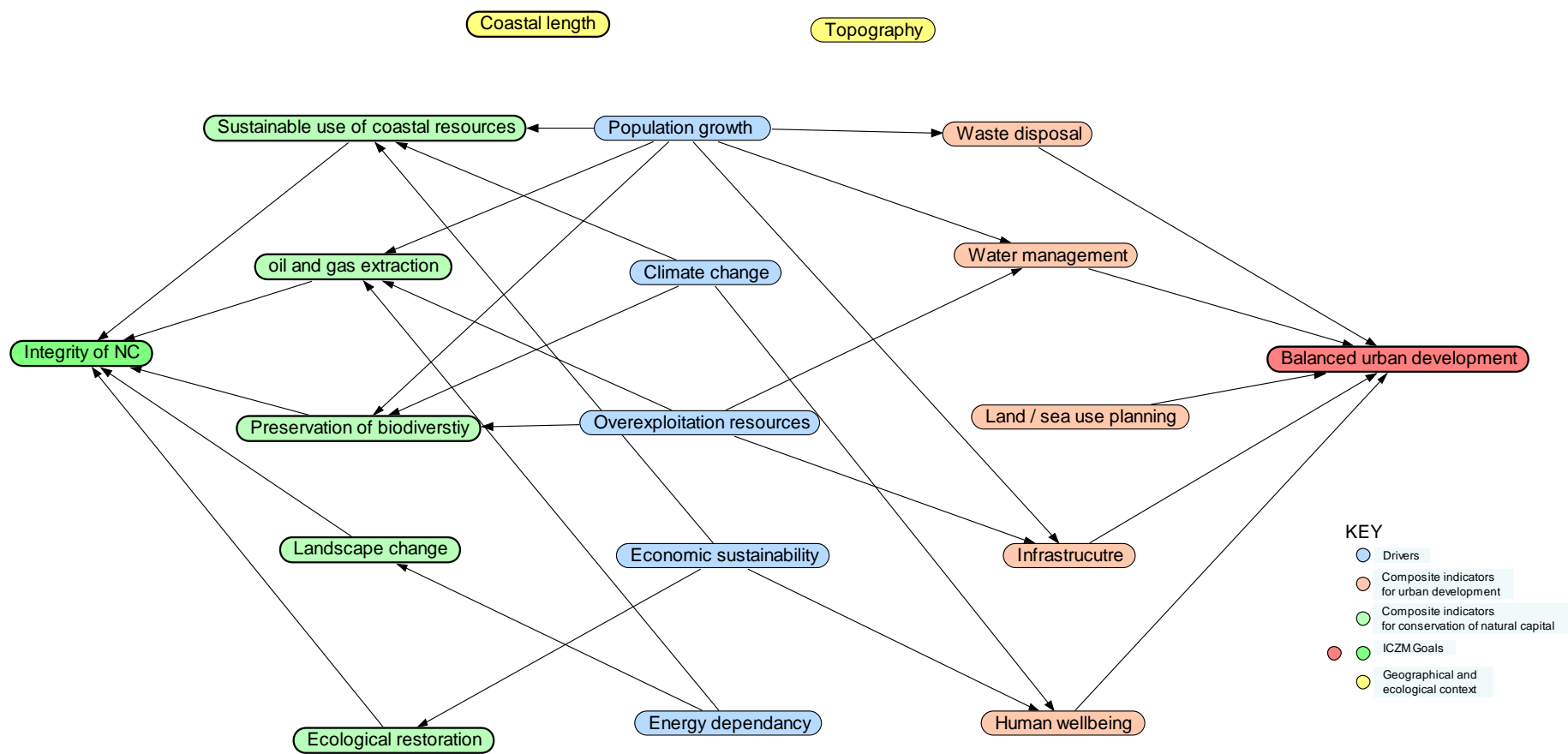


Fig. 5.1: Group 1: Influence diagrams developed during Day 1

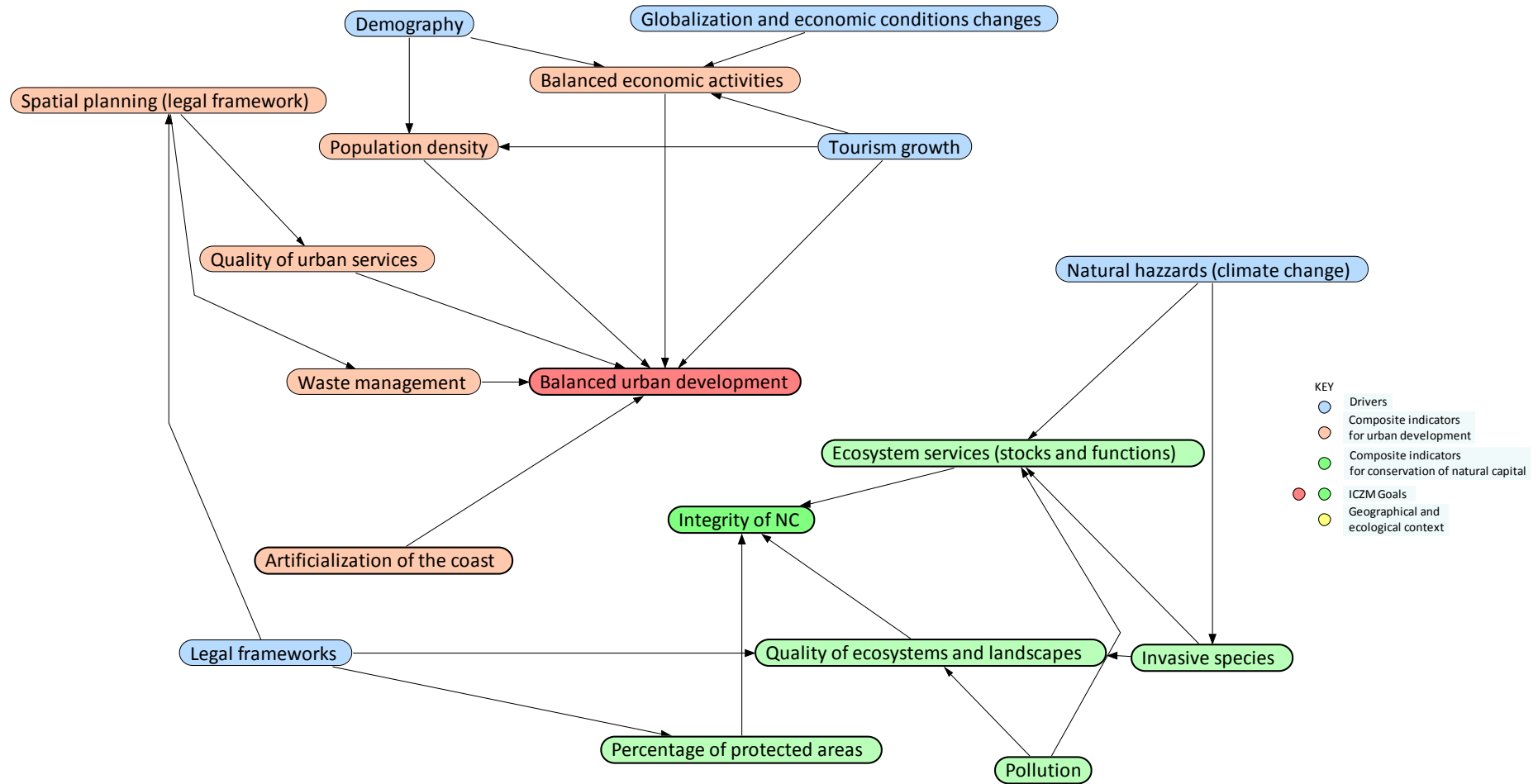


Fig. 5.1 (cont.): Group 2: Influence diagrams developed during Day 1

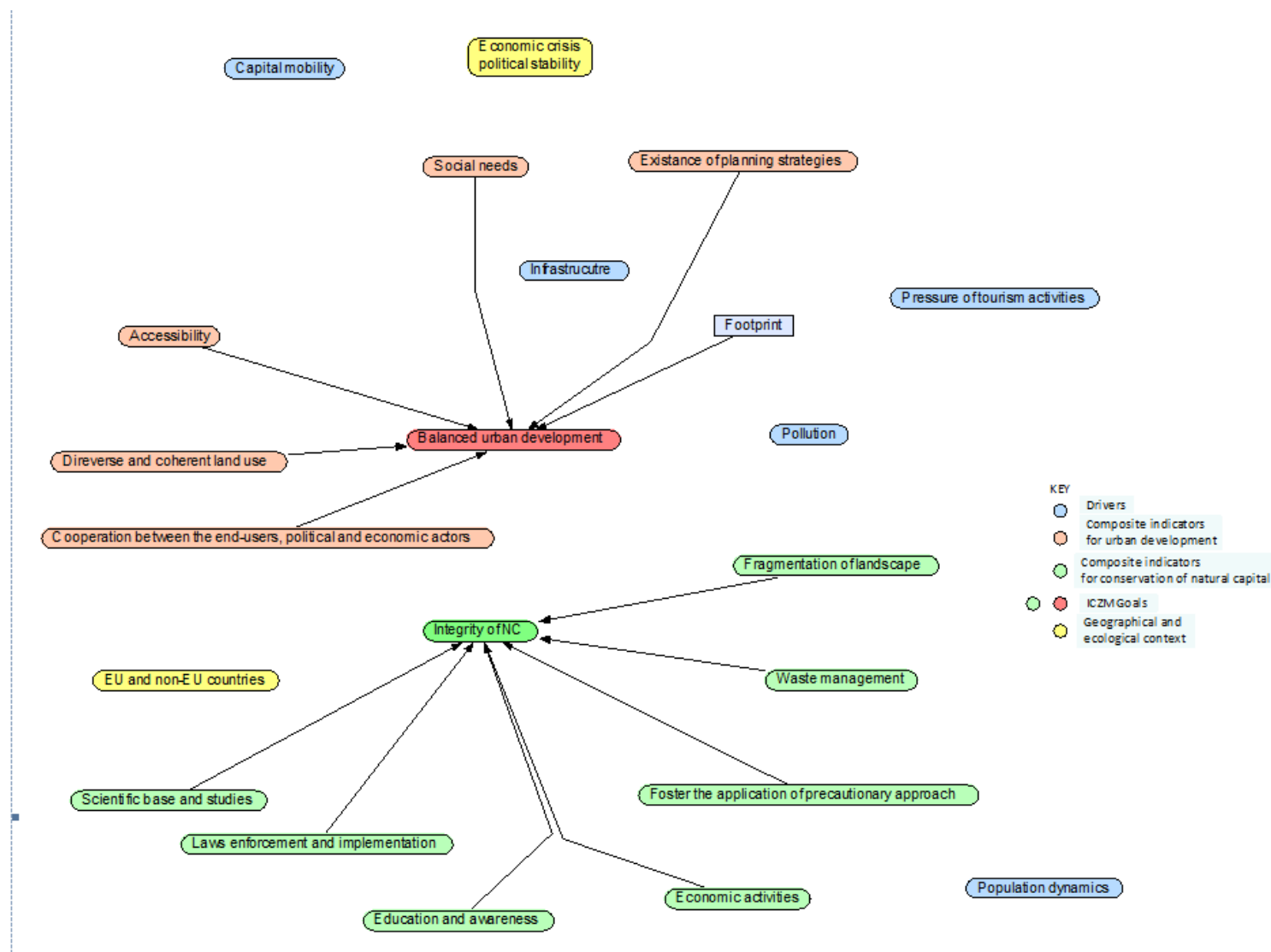


Fig. 5.1 (cont.): Group 3: Influence diagrams developed during Day 1

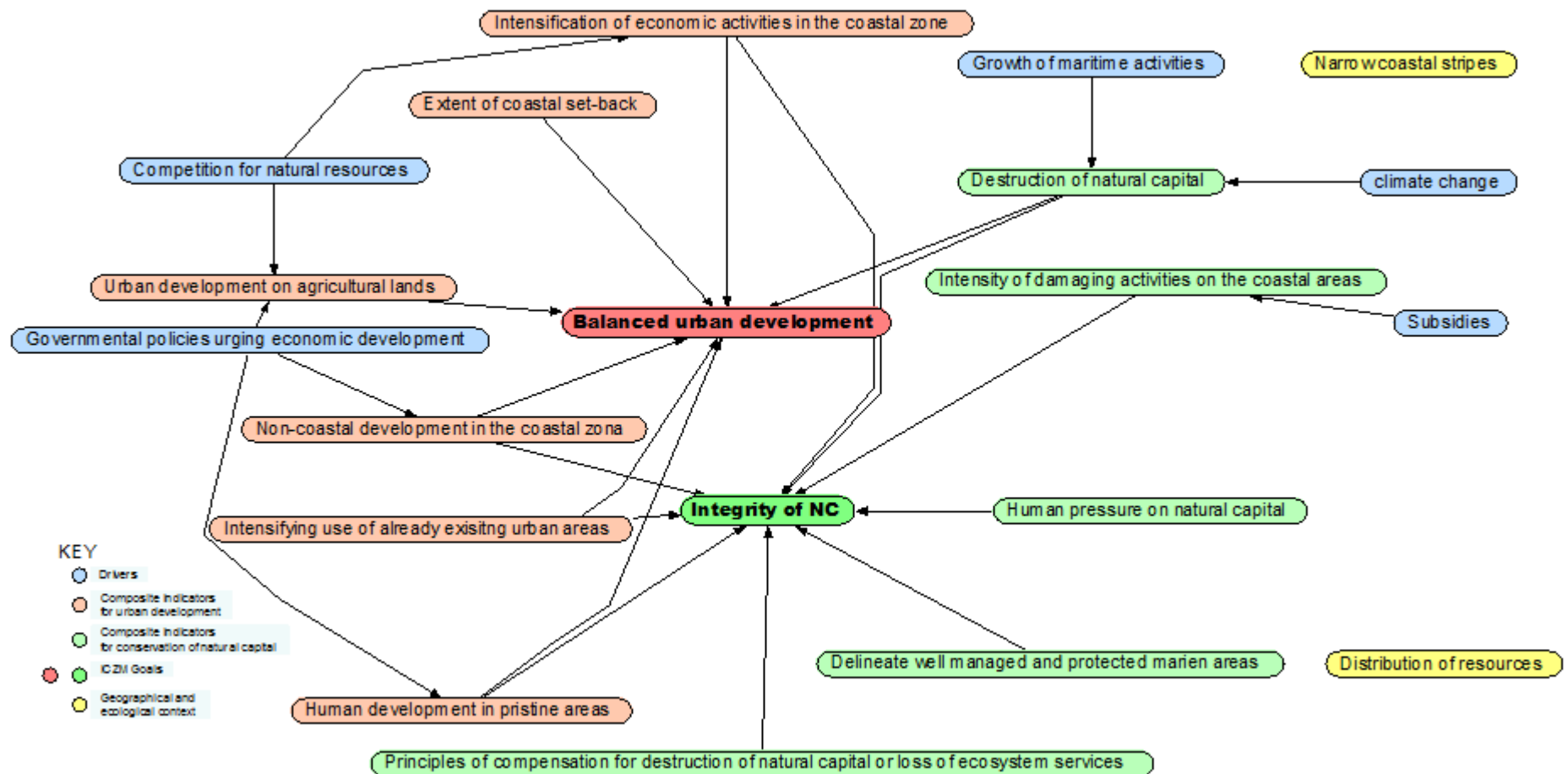


Fig. 5.1 (cont.): Group 4: Influence diagrams developed during Day 1

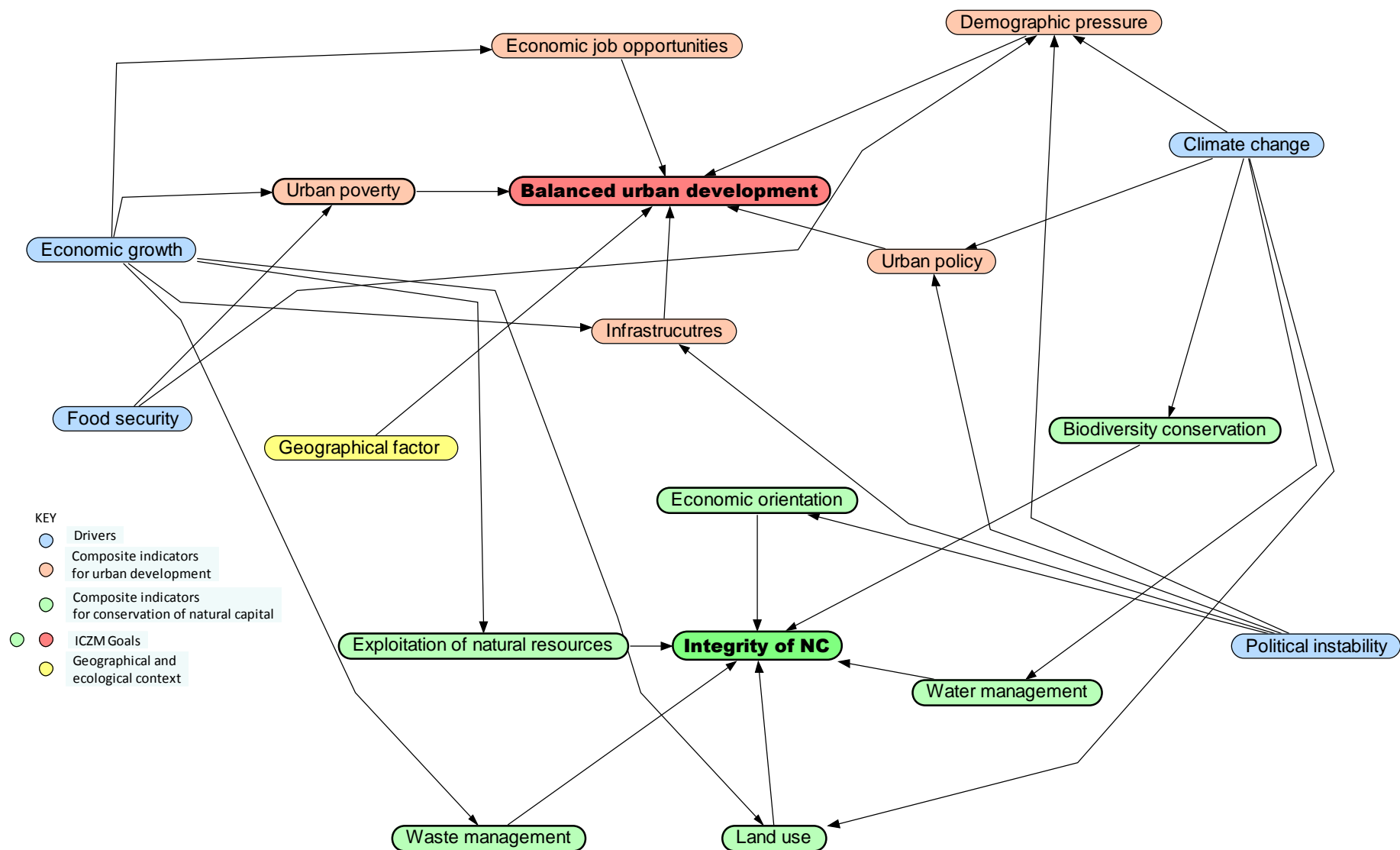


Fig. 5.1 (cont.): Group 5: Influence diagrams developed during Day 1

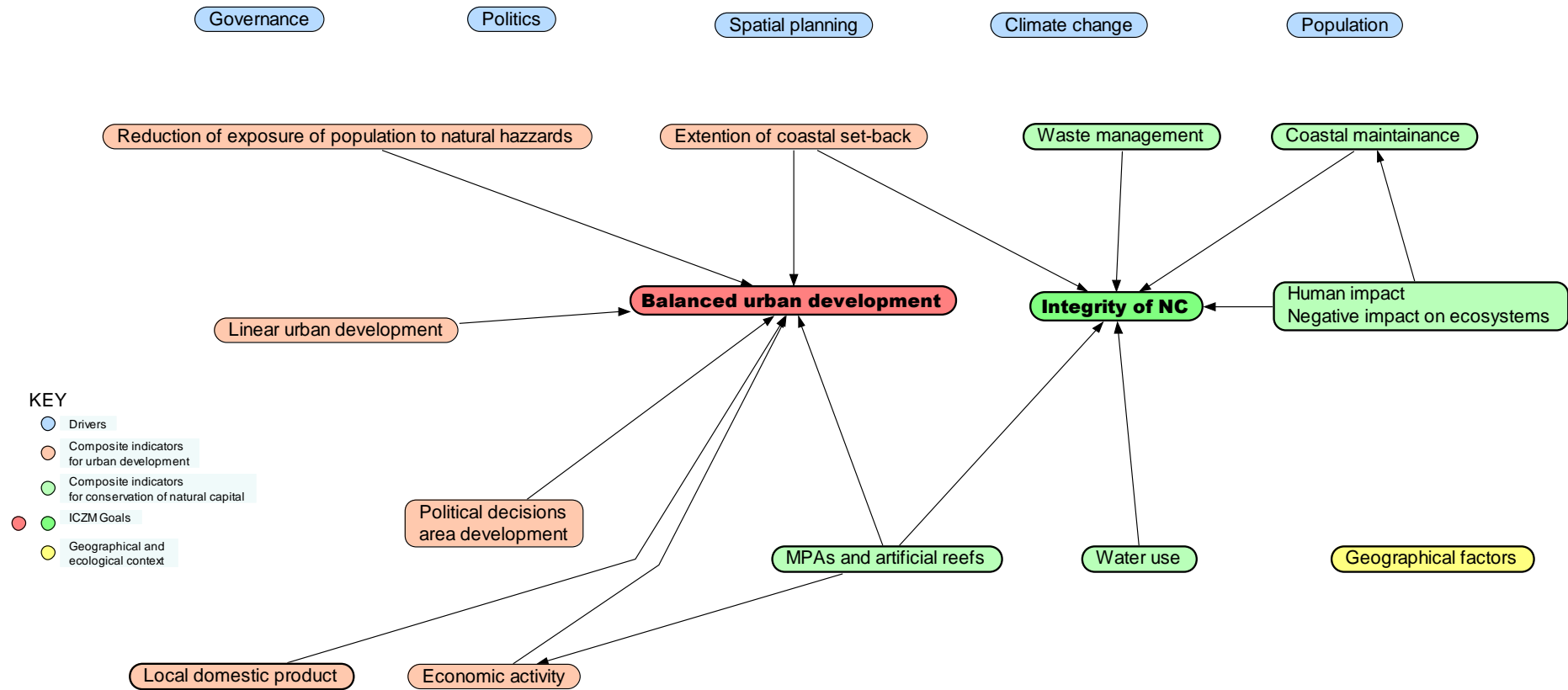


Fig. 5.1 (cont.): Group 6: Influence diagrams developed during Day 1

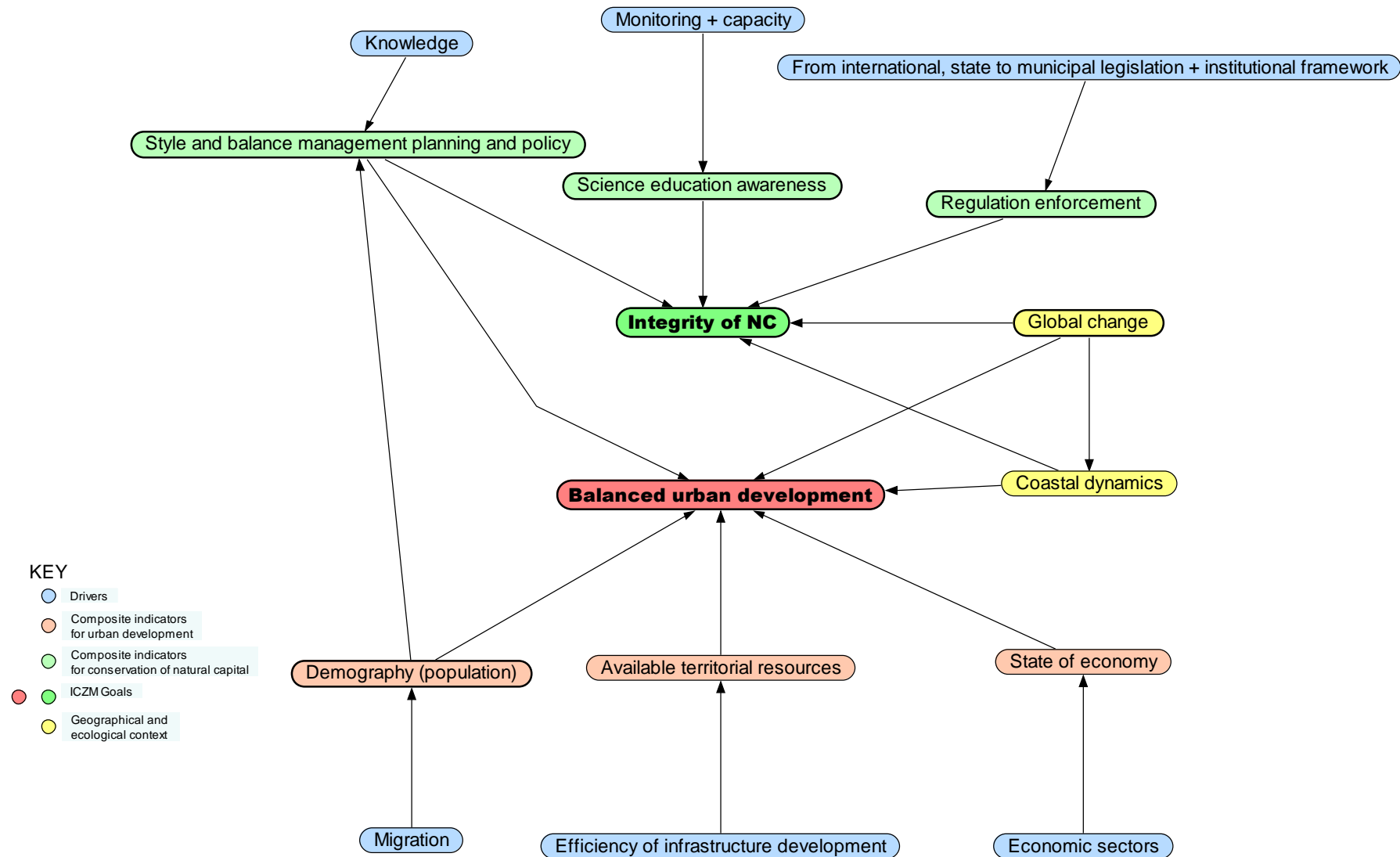


Fig. 5.1 (cont.): Group 7: Influence diagrams developed during Day 1

As a review of the influence diagrams (Figure 5.1) shows that the groups differed in their approach and level of complexity they attempted when constructing the influence diagram. In order to identify the commonalities across the groups, the seven networks have been analysed and the similarities and differences in nodes were identified and recorded (Table 5.1). The data for the two policy themes have been separated along with the nodes that the groups suggested were either 'context' variables or 'drivers'. In each block of data shown in Table 5.1, the variables have been ranked by the number of times the groups included a theme in their network.

Table 5.1 shows that the indicators most frequently cited as a way of characterising balanced urban development related broadly to planning policy, and especially the extent to which development respected the need for coastal set-back, together with measures related to human well-being and prosperity and extent of infrastructure development. For the preservation of natural capital, measure of land use or landscape change were considered most influential, followed by measures of human pressure on resources, the output of pollution and wastes, and efforts to preserve biodiversity and ecosystem services. Knowledge, monitoring capacity and awareness, together with the effectiveness of legal frameworks were identified as the major drivers of change. Differences in the impacts of or exposure to the risks of climate change, the influence of variations in coastal structure and processes, and exposure to globalisation processes were identified most frequently as the major contexts variables affecting the two policy themes.

Inspection of the data in Table 5.1 also shows that some factors were considered to play different roles by the groups. Thus spatial planning was considered to be important in the context of achieving balanced urban developed and the preservation of natural capital. Climate change was regarded as both an important driver and context variable.

The purpose of this first exercise was to initiate thinking within the groups about how they might structure ideas, and to developed a shared understanding of issued that could provide a focus for subsequent discussion. It is interesting to note, however, that the metrics that the group as a whole identified that would be important for characterising progress towards balanced urban development and preservation of natural capital were broader than those identified in the preparatory meeting. Most of the measures from the PEGASO ICZM set suggested in the preparatory were flagged as important by the group as a whole; the measures that corresponded to the preliminary set are those highlighted in Table 5.1.

Table 5.1: Factors shaping ICZM identified by workshop groups (Exercise 1)

	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Citations
DEVELOPMENT Indicators								
Land and sea use planning/Setback measures/Policy for coastal zone	x	x	x	x	x	x		6
Human well-being/Employment/Prosperity	x		x		x	x	x	5
Infrastructure/Artificialisation/Intensification of use/Economic pressure	x	x		x	x	x		5
Population density		x					x	2
Waste disposal/waste management	x	x						2
Accessibility			x					1
Balanced economic activities		x						1
Cooperation between stakeholders			x					1
Quality of urban services		x						1
Reduction of exposure to natural hazards.						x		1
Resource availability							x	1
Water management	x							1
NC Indicators								
Landscape/Land use change and fragmentation	x	x	x	x	x			5
Human pressures and resource exploitation (esp. oil & gas)	x			x	x	x		4
Pollution and waste management		x	x		x	x		4
Preservation of biodiversity and ecosystem services/coastal protection	x	x			x	x		4
Economic activities			x	x	x			3
Foster the application of precautionary approach/Awareness/Compensation			x	x			x	3
Laws enforcement			x				x	2
Spatial Planning						x	x	2
Water management/use					x	x		2
Ecological restoration	x							1
Invasive species		x						1
Scientific evidence			x					1
Sustainable use of coastal zone	x							1
Drivers								
Knowledge, monitoring and capacity, awareness			x	x			x	3
Legal frameworks		x	x				x	3
Climate change	x				x			2
Economic sectors							x	1
Economic sustainability	x							1
Efficiency of infrastructure development							x	1
Energy dependency	x							1
Food security					x			1
Migration							x	1
Overexploitation resources	x							1
Political instability					x			1
Population growth	x							1
Pressure of tourism activities...			x					1
CONTEXT								
Climate change and natural hazards		x		x		x		3
Coastal structure and dynamics	x		x				x	3
Demography/Population		x	x			x		3
Globalization and economic activity/Capital mobility		x	x				x	3
Governmental policies for economic growth				x	x			2
Spatial planning/Governance/Institutional frameworks						x	x	2
Competition for natural resources				x				1
Distribution of resources			x					1
Economic crisis political instability			x					1
EU and non-EU countries			x					1
Growth of maritime activities				x				1
Infrastructure			x					1
Pollution			x					1
Subsidies				x				1
Topography	x							1
Tourism growth		x						1

Note: The theme names do not correspond precisely to the labels that the groups used in the exercise; terms used by the groups have been combined and broad correspondences interpreted in order to better identify commonalities. The thematic areas shaded approximately correspond to the nodes used in the BBN prepared prior to the workshop that were based on indicators derived from the PEGASO ICZM set. For Group identification compare Appendix 4.1

Developing Scenarios (Exercise 2)

Having developed their influence diagrams, the groups were asked to consider how the relationships that they had defined for the two policy areas would affect outcomes under the 'best' and 'worst' case scenarios. The idea of using the goals of ICZM in a normative way to define the best case scenario was explained to the groups, who were asked specifically to look at the factors they had identified and explore whether they thought they were 'controllable' or 'uncontrollable', under the best and worst case scenarios. The briefing given to the groups suggest that they could understand the notion of controllability under the conditions of a scenario, involve the idea that some kind of intervention could be made that would result in positive outcomes.

The exercise generated a considerable volume of output (Appendix 5). An overview of the thinking that emerged can be gained from the 'word clouds' shown in Figure 5.2; these were generated using the on-line Wordle tool. These word clouds show the contrasts that emerged between the things that groups thought were controllable and uncontrollable under the different scenarios. A key point to note was that the density of terms describing the things that can be controlled is much higher than for the things that cannot be controlled under the best case scenario (top row in Figure 5.2), whereas for the worst case scenario the reverse is true (middle row, Figure 5.2). The word cloud at the bottom of Figure 2 shows those things that switch from controlled to uncontrolled between the best and the worst case scenarios.

In order to summarise their thinking and give feedback for their ideas, the groups were asked to highlight three characteristics of what they took to be the best and worst case scenarios. For the best case, factors like 'grass root support for ICZM', 'ICZM governance policy developed and endorsed', and 'policy implemented and respected' were identified. Political and economic stability and integrated thinking, through effective spatial planning in the terrestrial and marine sectors, were characteristics emphasised as significant under the best case scenario by many of the groups. Commitment to rehabilitation of ecosystems and mitigation of human impact was also highlighted. In most cases the groups described the worst case scenario as being characterised by the lack of these preconditions.

When asked about the implications that the comparison between the two scenarios had for policy or management, a number of measures or strategies were identified. They included incentives to promote a green economy in the coastal zone, and efforts to ensure better 'institutional coordination and administration of governance by all interested parties'. Measures to promote education and awareness and especially to encourage participatory styles of governance were also recognised as important. Since many of these factors were considered 'controllable' under the best case scenario, the ideas generated were potentially useful for people, in terms of trying to identify and prioritise the kinds of policy or management options that might need to be considered.

Groups were much less certain about the role of geographical or spatial factors within the best and worst case scenarios, although it was suggested that differences of coastal types, vulnerabilities to climate change and demographic trends might be important factors. Political and social differences between European and North African countries were also suggested as a potentially important factor to consider.

As with Exercise 1, the purpose of the second exercise was to develop shared thinking around the idea of scenarios and what factors might need to be included when developing them in a more formal way. The exercise was also designed to get participants familiar with the ideas of 'controllability' so that they would more easily understand the questionnaire that they were asked to complete at the end of the day.

Capturing Stakeholder Views: Questionnaire Results

As noted above, the questionnaire was designed to enable people to express their views at an individual level, and to understand better the diversity of thinking within the group as a whole. It was also experimental in that different question formats were being tried, to better understand how such tools could be used to help develop influence diagrams, Bayesian Networks and scenarios by interacting with people outside a workshop environment.

The questionnaire had three major sections. There were a series of preliminary questions to establish people's background and the geographical areas they were most familiar with. Next were a set of questions to allow the BNN that had been prepared prior to the Rabat meeting to be calibrated on the basis of the views within the group. Finally, were a set of questions designed to explore the factors that people considered to be important under the best and worst case scenarios, as they had done in Exercise 2.

For the questions relating to the factors that influence balanced urban development, the most significant factors identified by in the responses were: the proportion of economic activities concentrated in the coastal zone; the extent to linear urban development; and the degree to which coastal set-back for new development has been achieved (Figure 5.2). As noted above, each corresponds to ICZM indicators proposed from the work done in Task 4.1. For the preservation of natural capital the two most important indicators identified were: human pressures on natural capital; and effectiveness of waste management systems in the coastal zone (Figure 5.3a,b).

When people moved on to consider the scenario aspects of the questionnaire, they were asked to identify what they consider to be the likely barriers to implementation of ICZM over the next 20 years (Figure 5.3). The 'top 10' identified were, in descending rank order:

1. Biodiversity loss and degradation of natural capital
2. Political uncertainties
3. Low priority given to coastal management in governmental agendas
4. Gaps in legislation
5. Insufficient/weak institutions (both organizations, governance mechanisms)
6. Water security issues
7. Conflict of economic interests on the ground
8. Economic crisis preventing integration
9. Lack of administrative culture on participation and transparency
10. Failure by decision makers to prioritize consideration of environmental issues

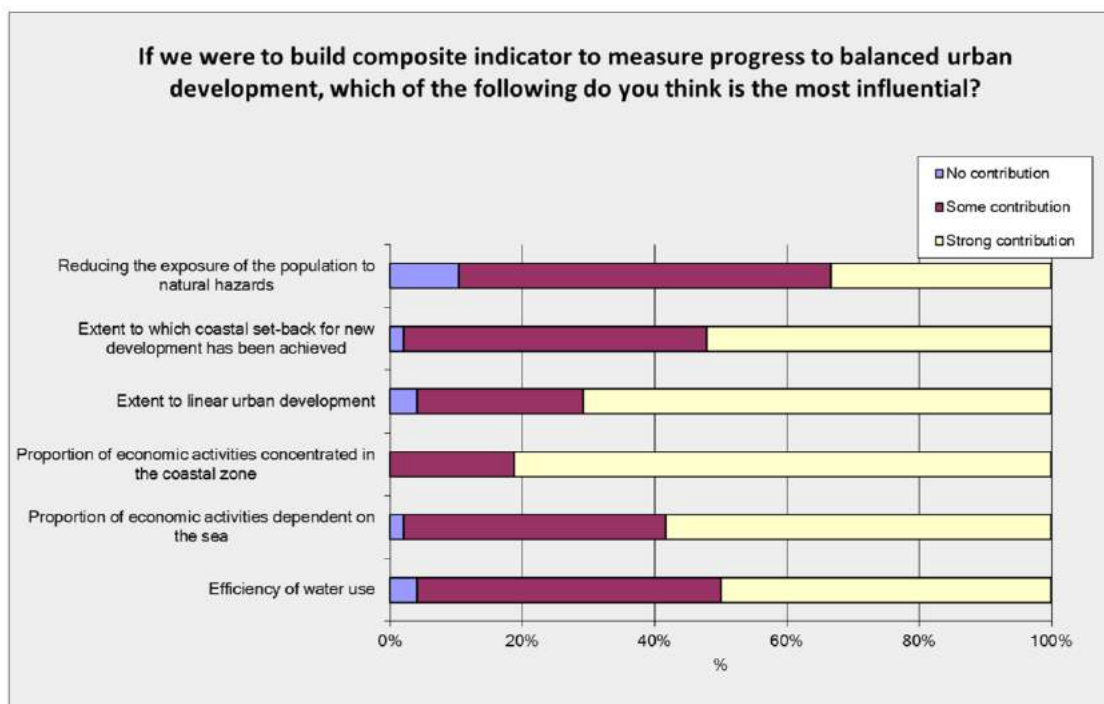


Figure 5.3a: Characterising balanced urban development

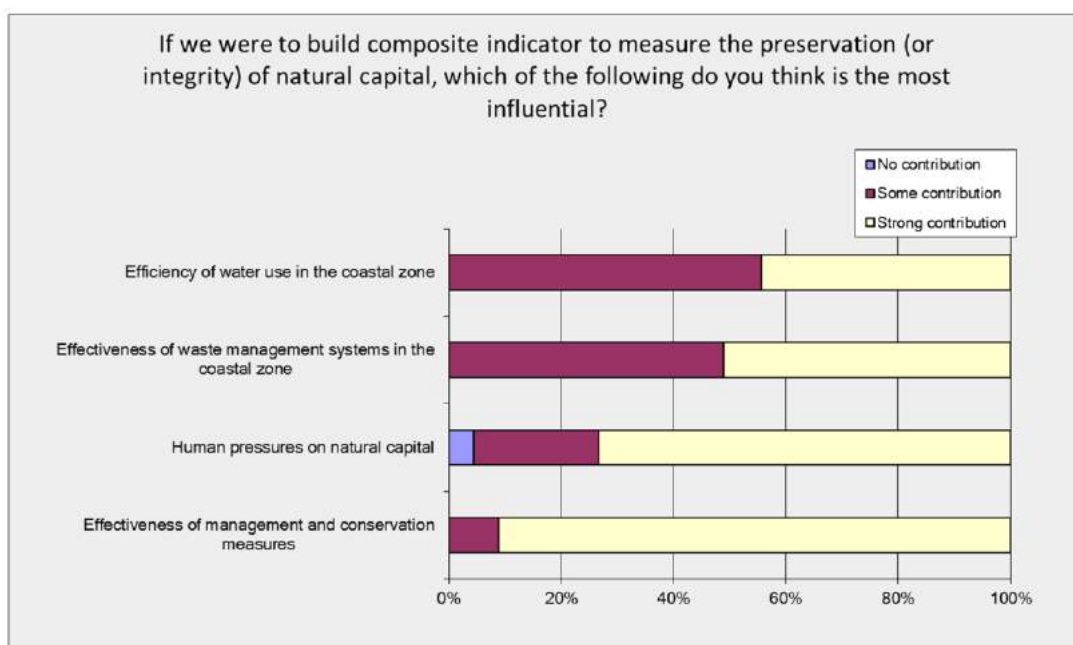


Figure 5.3b: Characterising preservation of natural capital

The prominence of governance issues in this list is consistent with the findings of the group work that emphasised the role of planning, institutional stability and regulatory frameworks. If we are to use these results to build, then we need to establish the major uncertainties that surround them, thus the questionnaire invited people to identify the factors that were controllable and uncontrollable under a 'best' and 'worse' case scenario. The questionnaire framed the notion of best case in exactly the same way as in the workshop and the same definition of what constituted 'controllability'. The results are shown in Figures 5.4 and 5.5.

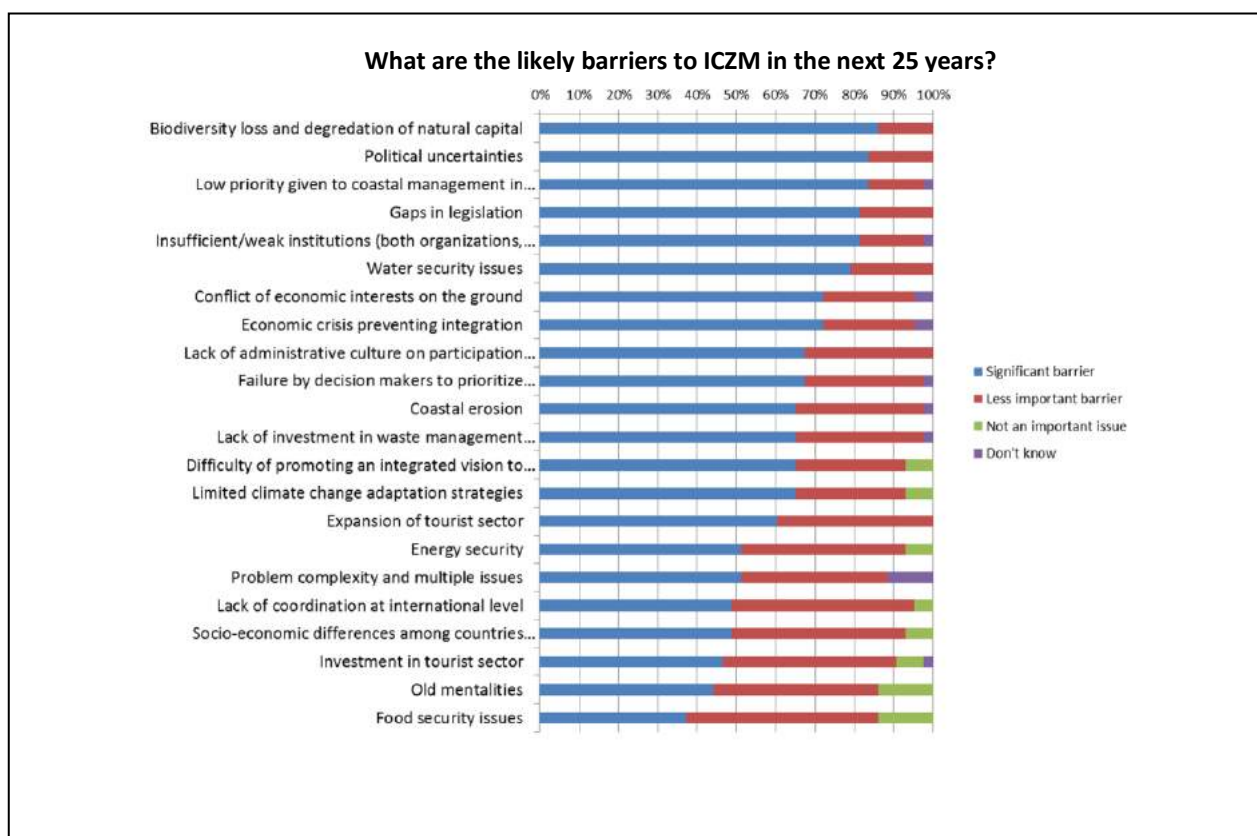


Figure 5.4: Identifying potential barriers to ICZM

The difference between Figures 5.4 & 5.5 is that in the latter the factors have been ranked in descending order according to the frequency people thought that they would be controllable under the worst case scenario. The purpose of looking at the gap between what people thought were controllable and uncontrollable factors was to gain an insight into some of the major uncertainties that might shape the future. One strategy for ICZM decision makers might be to focus on those elements that are potentially controllable under all circumstances and prioritise those actions, as being most likely to yield success. Inspection of the data shown in Figure 5.5 suggests that governance issues, together with control of the tourist sector would fall into this group of interventions.

Alternatively, one might consider a strategy based on the biggest gap between what is controllable and uncontrollable under different circumstances, and try to ensure that a trajectory towards the worst case is, so far as possible avoided. The results shown in Figure 5.5 suggest that issues here would include such factors as food and energy security, poor adaptation to climate change and political uncertainty. The Figure also shows that biodiversity loss and degradation of natural capital

are also factors that switch between controllability and uncontrollability between scenarios, however, this is more of an 'outcome' than a type of intervention, and so is rather different from the others in this category.

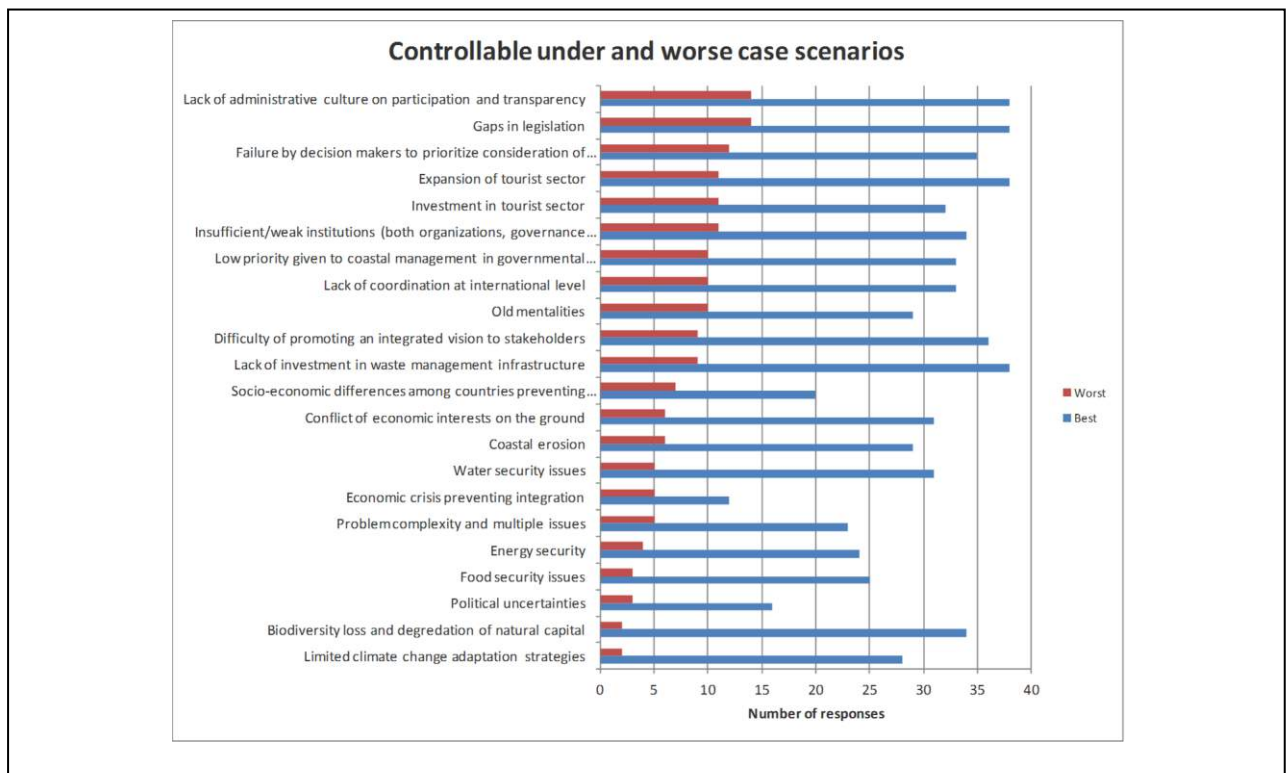


Figure 5.5: Characterising best and worst case scenarios

Building a Bayesian Belief Network: Operationalising Knowledge (Exercise 3)

The final exercise during the workshop combined the results from the questionnaire survey and the Bayesian Belief Network (BBN) prepared prior to the meeting. The BBN (Figure 5.6) was designed by a small group to explore how the ICZM indicators developed in PEGASO could be used to characterise and potentially measure the two policy goals of balanced urban development and preservation of natural capital. In creating this network it was recognised that it did not cover all factors affecting ICZM, and that it could be developed after the workshop. However, it was considered to be a useful starting point for discussion, and especially for the development of scenario thinking.

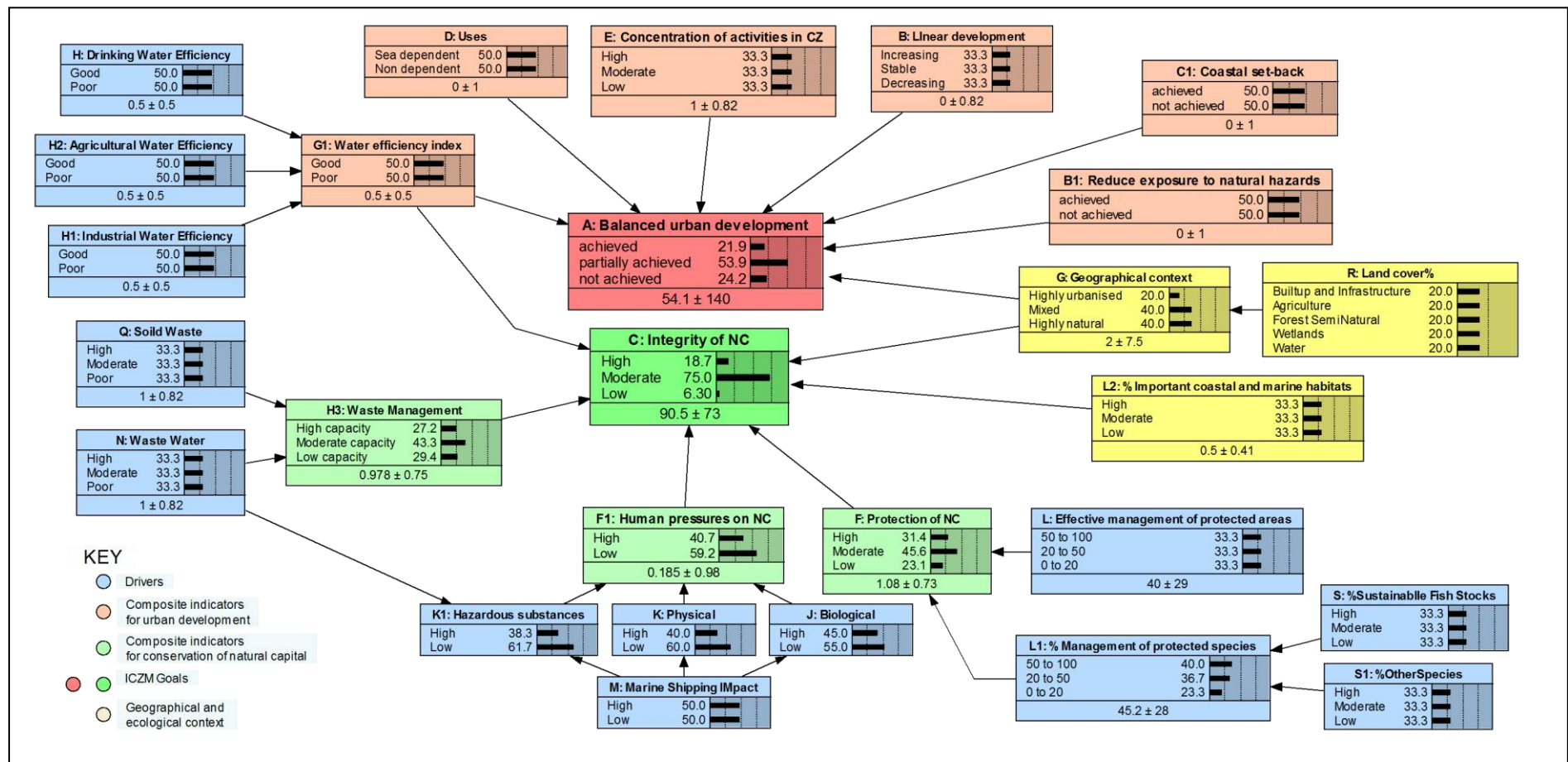


Figure 5.6: The pre-prepared BBN that formed the basis of the questionnaire exercise

The design logic for the BBN used to operationalise the scenario results was the same as that used to build the influence diagrams. The colour coding used in Figure 5.6 is also the same as that used in the presentation of the influence diagrams, above. The goal of Exercise 3 was to test the plausibility of the overall structure and to use the questionnaire results to calibrate the BBN with data on the beliefs held by the group so that they could use it to explore their implications.

Nodes A and C were the primary focus of the questionnaire exercise. The information on the importance of the various factors influencing balanced urban development and preservation of natural capital was used to calculate a series of 'weights' that could be used to express the strength of influence that each factor had. The data on the indicators feeding into A and C were treated separately. Each was set up as a continuous variable in NETICA, with discrete levels ('achieved', 'partially achieved', 'not achieve' etc.), and the outputs calculated as a function using a simple linear equation that weighted the inputs according to the importance derived from the questionnaire survey. Figure 5.6 shows the BBN as a set of 'belief bars', which express the probability of each node being in a particular state. The relationships between the drivers and the indicators were defined during the preparatory stage.

Following the presentation of the questionnaire results the BBN was presented to the group, and the logic what lies behind it was described. Since many people had not used BBNs before, the nature of these tools was also described. The groups were then encouraged to use the network and in particular explore how their best and worst case scenarios might play out using the calibrated model. To wrap-up the exercise, the groups were asked to report back on their experience and complete a short feedback sheet about the insights gained and the utility of the approach.

Many groups felt that there were major differences between the way the BBN represented the issues and the influence diagrams developed they developed in Exercise 1; this related both to the variables used and the links between them. An interesting suggestion was that in addition to naming the nodes, the links also should be labelled with the kind of relationships that existed between the valuables concerned. Although the extent to which they thought that either the BBN or their influence diagram needed to be updated is unclear, but issues of scale and data availability were highlighted as topics for further discussion. In terms of the sensitivity of the BBN to different kinds of intervention, one group felt that 'management efforts should have a larger effect than expected'. Another group reported that there was a 'difficult distinction between best and worst case' when using the BBN. These kinds of issue would need to be followed up in any 'plausibility tests' of the BBN. Unfortunately there was not time to do so at the workshop.

Some of the most detailed comments were provided in response to the question about the utility of the tool for decision support, and the implications for policy and management. There was a diversity of opinion amongst the participants at the workshop. While one group suggested that the BBN was not 'realistic' and too 'simple', another felt that the 'BBN was a useful and valuable tool that they would use and share with others'. The same group reported that 'they liked the fact that it gave a global vision in a clear and simple way'. Another group reported that BBN 'give insights on where to focus the management activities' and could therefore provide 'support for further action plans/visions'. They highlighted that it was useful to 'raise awareness' and provide information. The backcasting capability of the BBN was identified as particularly useful for raising awareness. Suggestions for further work included the idea that it could be used at local scales both for modelling

and in participatory work, and one thought that it would be useful to compare planning exercises based on BBN with those that made greater use of GIS.

5.4 Building on the Rabat Workshop

The Rabat workshop was an important event within the scenarios work programme, because it not only brought together the use of participatory methods with futures thinking, and but also started to look at the way multiple perspectives could be brought together and compared so that deeper insights could be developed within the user community. If the outcomes were to be used to inform the work of the ICZM Governance Platform beyond the lifetime of the project, it is clearly necessary to test the robustness of the findings. The first key question is whether we can generalise from the results of events such as that at Rabat across the two Sea Basins. A second question is how to further develop the participatory BBN tools so that wider engagement with stakeholder might be undertaken by the ICZM Governance Platform. These two questions are considered below.

Generalising from the workshop

Given the time and resources available to PEGASO, the number of workshops that we could organise has been limited, thus a key question for the future is whether we can generalise from the results of events such as that at Rabat across the two Sea Basins. As an initial test of the robustness of the findings from the Rabat workshop we have performed a content analysis of the reports made by the PEGASO CASES in 2013; the aim was to determine whether this backed up the results of the questionnaire survey at Rabat and what new issues they added to the list of drivers of change that needed to be considered. We also made a literature review to determine whether there was any further published evidence for coastlines along which the CASES were located. The analysis also enabled the differences between the CASES to be explored more deeply than was possible at the Rabat workshop, in terms of the number and combinations of issues that they were facing. The results are shown in Table 5.2.

Tab.5.2: Analyses of ICZM issues by CASE. Issues specifically mentioned are highlighted in blue; red indicates implied reference (Source: CEM, Nottingham)

Issue	1	2	3	4	5	6	7	8	9	10
	Morocco coast	Egyptian Mediterranean coast	Lebanese coast	Georgia	Turkish Mediterranean coast	Ukraine coast	Romanian coast	Greek coast	Italian coast	French Mediterranean coast
	Al Hoceima bay	Nile delta		Guria Coastal Region	Köyceğiz-Dalyan SPA	Sevastopol bay	Danube delta	Cyclades	North Adriatic	Bouches du Rhône
1 Biodiversity loss and degradation of NC										
2 Political uncertainties										
3 Low priority given to coastal management in										
4 Gaps in legislation										
5 Insufficient/weak institutions (both organizations, governance mechanisms)										
6 Water security issues										
7 Conflict of economic interests on the ground										
8 Economic crisis preventing integration										
9 Lack of administrative culture on participation and transparency										
10 Failure by decision makers to prioritize consideration of environmental issues										
11 Coastal Erosion										
12 Lack of investment in waste management										
13 Difficulty of promoting an integrated vision to										
14 Limited climate change adaptation strategies										
15 Expansion of tourist sector										
16 Energy security										
17 Problem complexity and multiple issues										
18 Lack of coordination at (national and) international level										
19 Socio-economic differences among countries										
20 Investment in tourist sector										
21 Old mentalities										
22 Food security issues										

The 22 issues listed in Table 5.2 have been ranked in the order of importance found at the Rabat workshop; these form the rows of the Table. The columns show the results of the content analysis and literature review for the PEGASO CASES. A blank cell means that the issue was not referred to in the material collected and no associated material was identified from the literature review. The light (blue) shaded cells highlight where an issue was explicitly referred to in the materials analysed. The dark shaded cells (red) are where the issue was indirectly or implicitly referred to; for example, where a report mentioned 'poor water quality' as a problem, we have inferred that a corresponding issue must include the fact that 'wastewater treatment was not addressed'.

Table 5.2 shows that there were considerable differences between the CASES in terms of the number and combination of issues identified. Thus the situations faced in Morocco (1), Egypt (2), Greece (8), Italy (9) and France (10) seem more complex than the others. Such results seem to argue, perhaps, in favour of a more tailored or targeted approach to scenario development that would allow particular combinations of issues to be considered in the context of broad scale drivers of change. **Thus our results suggest that an exploration of multi-scale scenario methods might be one fruitful avenue for future work, and that future participatory BBN tools might be designed with this feature in mind.**

Nevertheless, despite the diversity of issues across the CASES, the results of the analysis shown in Table 5.2 do confirm the feedback from the Rabat workshop and the generality of the outcomes. In terms of the coverage of issues, those given a higher ranking at the workshop tended to be mentioned more frequently in the documents generated by the CASES. Biodiversity loss and degradation of natural capital was indeed the most widely cited problem cited in the CASE materials and associated literature. Mo *et al.* (2011), for example, describe the plight of the Monk Seal in Morocco, while MoM (2009) describes the situation for this species in Greece. Political instability and lack of administrative culture on participation and transparency was widely emphasised in the material from the CASES, factors also confirmed as important by Tabet and Fanning (2012) for Egypt, and Deboudt (2012) for the French Mediterranean Coast. The latter specifically considers gaps in legislation and lack of administrative cultures that use participatory methods as issues.

Failure by decision makers to prioritize consideration of environmental issues was also widely acknowledged as important in the workshop and analyses of the material from the CASES (Table 5.2). Support for this view was also apparent in the associated literature. For example, El Mrini *et al.* (2012) noted the importance of coastal erosion partly exacerbated by uncontrolled development in Morocco, and Khouakhi *et al.* (2013) has gone on to emphasize the seriousness of the resulting risks to infrastructure in this area. Similar patterns have been noted in Greece. Tourism as a major driver of development has been emphasised for Greece by Ioppolo *et al.* (2013) and by Sayan *et al.* (2011) for Turkey. However, natural processes, such as isostatic change and/or sea level rise may also be a driver of erosion, as in the case of the Nile Delta (Bohannon, 2010); the situation in Greece is illustrated further in Box 1. Elsewhere, failure to prioritise environmental problems is emphasised in the literature in the context of the lack of adequate investment in water treatment (Shaban, 2008; and Nassif and Shaban, 2007) in the Lebanon. However, in some areas such as the Bay of Sevastopol, the situation is clearly improving (Wilson *et al.*, 2008).

As Table 5.2 shows, few of the PEGASO CASES appear to manifest a 'single problem' in relation to the coastal zone, and so the development of strategies to promote more 'integrated coastal zone management' (sic) would clearly be an objective of future scenario work (cf. Portman *et al.*, 2012).

Box 1: Predictive scenario on sea level rise: the Cyclades case study

(Source: HRMC)



Cyclades archipelago is a cluster of 220 islands located in South Aegean Sea (Greece) from which only 24 are inhabited. The economy of the islands is based mostly on tourism while agriculture and fisheries play important roles for income of the smaller communities. In terms of tourism, Cyclades have a lot to offer due to the high quality environment, pristine coasts and important archaeological and natural (NATURA 2000) sites. Annually it is estimated that 1.5-2 million tourists visit Cyclades islands creating an important source for local development.

Climatic changes are known today to be an important parameter to be considered in relation to infrastructure investments and sectoral development. This is especially important for

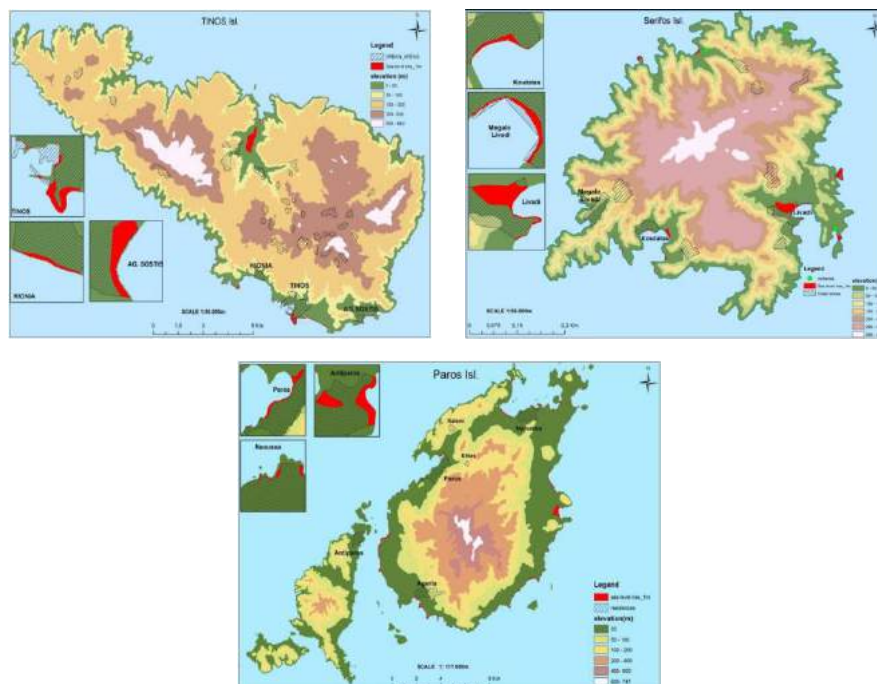
economic activities which are related to the natural environment and the coast such as tourism and fisheries (including aquaculture). Therefore, an important factor in marine spatial planning is to consider the possible hazards from climate changes and plan for the minimization of the possible negative effects on the coastal economy. Important effects from climate change are the sea level rise and the changes in temperature of the shallow coastal waters which can create extensive problems to the coastal infrastructure such as ports and urban areas below sea level as well as coastal wetlands, local ecosystem function and biodiversity.

Within PEGASO project it was decided that a case study example should be elaborated focusing on the possible effects of sea level rise based on a predictive scenario of a rise by 30 cm, 60 cm and 100 cm within the next 100 years and estimate as accurately as possible the monetary value of the land losses due to this phenomenon using ecosystem valuation techniques. In addition, this exercise also involved the application of participatory methods since it was conducted in cooperation with the local stakeholders. In its final form, it was submitted as a report to the South Aegean Region in order to be used as awareness raising material in relation to the issue and to be consulted in relation to ongoing or future public works on the coastline. The main study method was to use GIS techniques based on elevation contour data from the Geographic Service of the Hellenic Army. The study included 21 inhabited islands of the Cyclades archipelago.

The results of the study were overwhelming in terms of possible hazards since major tourism destinations of the islands (for example Psarou beach in Mykonos) and major ports and urban areas are within the hotspots recognised in the analysis as vulnerable locations of great touristic value. Examples include the total loss of Aigiali beach and Katapola port (main) on Amorgos, the main port of Gavrio and Batsi on Andros, 50% of the Mylopotamos town and Psathi beach on Ios, the main port of Ag. Georgios on Irakleia, Goupa Kara and Psathi beaches on Kimolos, several beaches on Kythnos, part of Adama port and beaches on Milos, many important beaches on Mykonos including Psarou, Platis Gialos, Kefelari and Ormos, the lagoon (airport), the port of Moutsouna, Apollonas port and

beach and several internationally known beaches of Naxos, Koutalas and Megalo Livadi beaches on Serifos, Platis Gialos in Sifnos, parts of the main port of Syros and Ag. Sostis beach on Tinos.

In terms of total area of land lost in Cyclades islands due to sea level rise, this was estimated to be 12.4-22.7 million m² or 0.58-1.15% of the total island area (on average) based on the scenario of sea level rise by 0.3-1.0 m. On average it was estimated a loss of 590.000-1.082.460 m² per island for sea level rise of 0.3-1.0 m. From the total area lost, the urban part is estimated to be between 2.5-4.6 million m² while the non-urban part, between 9.9-18.1 million m². Applying a simple valuation technique based on the Hellenic State land value for taxing purposes, it was estimated that the value of urban land lost is between 2.8-5.2 billion euros while the value of non-urban land lost, between 45.6-84.1 million euros. Considering that the current GDP of Greece is around 180 billion euros, the damage would be between 1.6 and 2.9% of the GDP.



This is also a key focus of the ecosystem approach when looked at from the perspective of ICZM (Haines-Young *et al.*, 2014a). In terms for the future scenario work undertaken by the ICZM Governance Platform, it would therefore seem that efforts could usefully be directed towards fostering discussion around the problem of how to achieve cross-sectoral approaches to the issues identified in Table 5.1. These clearly appear to be useful entry-points for discussion because they have some generality across the Mediterranean and Black Sea Basins.

New Participatory Scenario Tools

In order to support the more tailored and targeted approach to the analysis of drivers of change suggested in the last section, the future ICZM Governance Platform might also consider developing new tools to foster the kind of deliberative, participatory tools. As a result of the positive response to the BBN approach tried at the Rabat workshop, we have made a preliminary investigation of how such work might be undertaken. The aim here was to consider how some of the common drivers of

change could be handled in a spatially explicit way, and how greater use of the data resources available for the study area could be used.

Liquete *et al.* (2013) have made a model-based assessment of coastal protection as a service in Europe. Their work showed how biophysical and socio-economic variables from marine and terrestrial datasets could be combined to build a set of indicators for coastal protection capacity, coastal exposure and human demand for protection. The model developed here complements this work, and proposes a further indicator for risk to coastal water quality, based on BBN methods. The structure of the prototype network is shown in Figure 5.7.

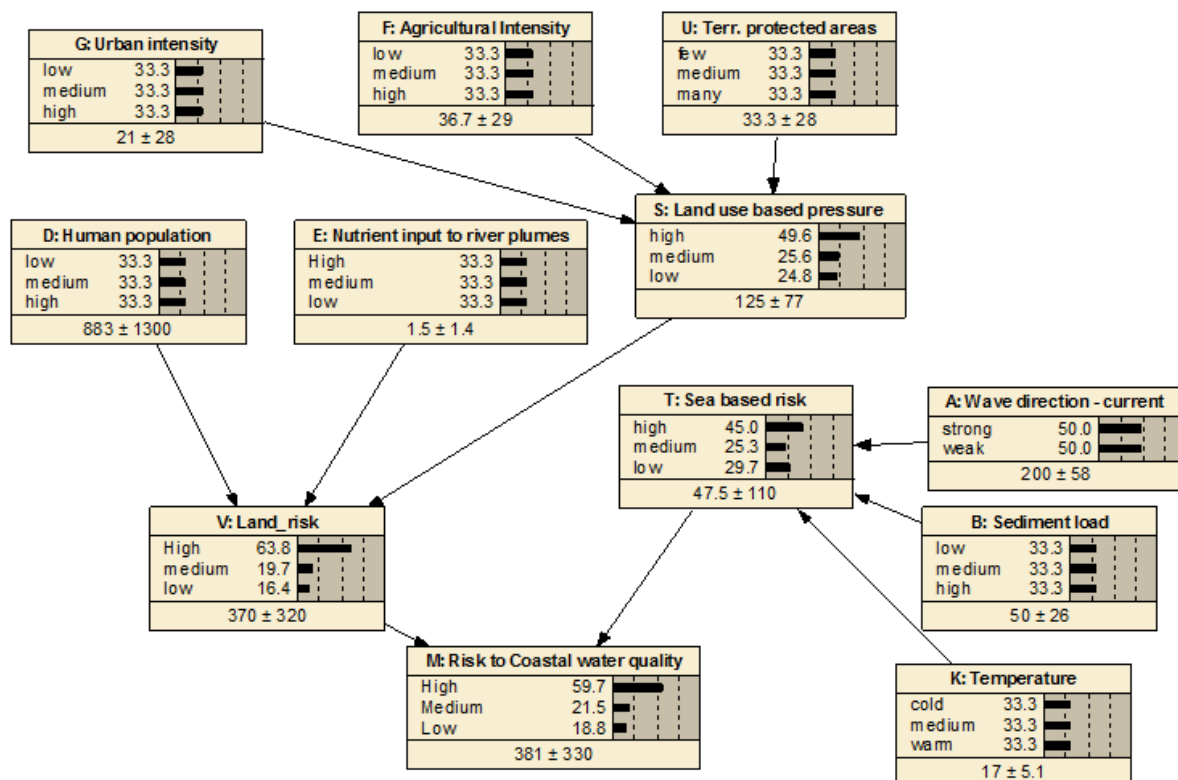


Fig. 5.7: BBN and node definition for modelling risk to coastal water quality

The key assumption on which the model shown in Figure 5.7 was constructed is that the risk to coastal water quality is dependent on risks generated from land and risk generated from the sea. The former are assumed to be controlled mainly by the intensity of urban and agricultural activities, measured by their areal extent, by the water quality of the rivers draining from the hinterland, and by population density. Sea-based risks are assumed to be dependent on the strength of coastal currents, sediment load and water temperature. The formal definitions for each of the nodes in the network are given in Table 5.3.

Table 5.3: BBN node definition for model of risk to coastal water quality

Land-Based factors

The following Land based factors, affecting coastal water quality in relation to the intensity of land use activities, were applied:

- G, Urban intensity: is the possible pressure exerted by urban residential, industrial and transport activities on coastal waters quality. It is expressed as range of values from 0 (minimum) to 100 (maximum). From 0 to 3, the pressure is considered low; from 3 to 10, medium; and from 10 to 100, high. The data source is the layer of per cent urban land contained per 1km x 1km grid cell from PEGASO land cover analysis made as part of the land accounting (T4.2).
- F, Agricultural intensity: is the possible pressure exerted by agricultural activities on coastal water quality. It is expressed in similar way to node G, on a scale from 0 to 100, but with different set of break points. From 0 to 15 the pressure is low; from 15 to 45, medium; and from 45 to 100, high. The data source is the layer of per cent agricultural land contained per 1km x 1km grid cell from PEGASO land cover analysis made as part of the land accounting (T4.2).
- U, protected areas coverage: captures estimate of the mitigation effect which protected areas may be providing to alleviate land-based pressures on the coastal waters. The factor is characterised numerically at a range of values, with 0, no protected areas, to maximum 76% coverage per unit of assessment. The node states are defined as follows: from 0% to 15% the mitigation effect is low; from 15% to 35%, intermediate; and, from 35% to 76%, high. The source of data input for assessing this factor is the 'World Database on Protected Areas'.
- S, The cumulative impact of the three land-use based factors per assessment unit: is estimated using the three nodes G, F and U. Higher land use pressures are assumed to be directly proportional to urban and agricultural intensity and inversely proportional to the number of protected areas. In general, the urban pressure is assumed to exert the dominant prevailing effect, or at least higher than the agricultural.
- D, Pressure from Human population density: reflects the average density of human population numbers per assessment unit. The estimates are derived from a data source on human population density for the EU27 states mapped by the European Environmental Agency, as number of persons per 1km x 1km grid cell. The values extracted per BBN assessment unit range from minimum – 2.3 persons per km² to 1700. From 2.3 to 100, the pressure is considered low; from 100 to 300, intermediate; and from 300 to 1700, high.
- E, Pressure from the Terrestrial nutrient inputs to river plumes, is assessed using a database developed by the Joint Research Centre of the European Commission (FATE Data Portal, <http://fate-gis.jrc.ec.europa.eu>). It provides estimates of phosphorus (P) and nitrogen (N) loads into the sea from the river catchments. The values are expressed in tons N and P per km². Average values were extracted for the assessment units applied in this exercise which range from 0.05 to 4.2. Low pressures would occur where the average values fall between 0.05 and 0.5; intermediate, between 0.5 and 1.5; and high from 1.5 to 4.2.
- V, Total Land-based pressure: is estimated from the values of nodes E, D and S applying the following formula: $V(D, E, S) = (D/10) + (E*10) + S$.

Sea-based factors

- A: Wave direction was taken into account to reflect on the capacity of the sea to disperse pollution and nutrients originating from the land, and the sea proper. High values are assumed to produce more of this effect. The factor is assessed using a dataset produced by the Joint Research Centre. Its values range from 112 to 293. Values within the range of 112 – 200 are assumed to provide weak dispersion effect and within 200 – 293, strong.
- B, Sediment load: is an estimate of the amount of suspended matter in the sea waters. The data source used is JRC's Diffuse Attenuation Coefficient (Kd490) at 4km x 4km resolution, derived from MODIS imagery and accessed from the EMIS, Environmental and Marine Information System (<http://emis.jrc.ec.europa.eu/>). The values range between 18 and 87; where from 18 to 40 is considered low sediment load; from 40 to 60, intermediate; and from 60 to 87 is high.
- K, Sea temperature: is assumed to play certain role water quality risks, with higher values accelerating a number of biological processes which may result in eutrophication and hence increased risks of degraded water quality. The data source is also derived from JRC EMIS viewer. Values range between 18 and 22 degrees. Cold are considered the water between 13 and 17 degrees C; medium between 17 and 19; and warm are the waters 19 and 22 degrees.
- T, Sea based pressure: was estimating from the values of the nodes A, B and K applying the formula: $T(A, B, K) = (B + (K * 1.5)) - (A / 10)$.
- **M, The final Risk to coastal water quality:** is calculated by summing up the land (node V) and sea-based risks (node T): $M(V, T) = V + T$

The coastal water quality risk BBN takes as input information about the conditions in each of the 'coastal units' that have already been defined as part of the work on Land and Ecosystem Accounting (LEAC) (Ivanov *et al.*, 2013). The boundaries of the administrative units defined in the World Administrative Divisions database were clipped by the landward 10km coastal buffer defined in the LEAC analysis. These initial units were then expanded using a further 10km buffer so that average conditions could be calculated for the sea-based factors. The LEAC data were used to estimate the extent of urban, agricultural land, and the cover of protected areas in each coastal unit. Data on nutrient plumes, coastal currents, sediment and temperature were provided by the Joint research Centre (JRC).

Using the 'process cases' tool in NETICA, the available data for each of the coastal units were read in to the BBN, and the probability that the unit was at high risk estimated. The values were then transferred then ARCMAP. An example of the output produced by the model is shown in Figure 5.8.

The key difference between the BBN in this exercise and that used in the Rabat workshop is that it uses empirical, modelled as well as expert-based knowledge. As a result it can be used to make a prediction of the conditions at a given location, based on the available data, which could then be further refined using local knowledge about the other drivers. At present the mapping shown in Figure 5.7 is for 'the present'. However, in the context of scenarios, different assumptions about the intensity of urban growth or agricultural development, or population density can be made so as to explore the effects of potential future change. The mapping shown in Figure 5.8 highlights the risks associated with the north Mediterranean coasts, and northern Adriatic and the Bosphorus Strait.

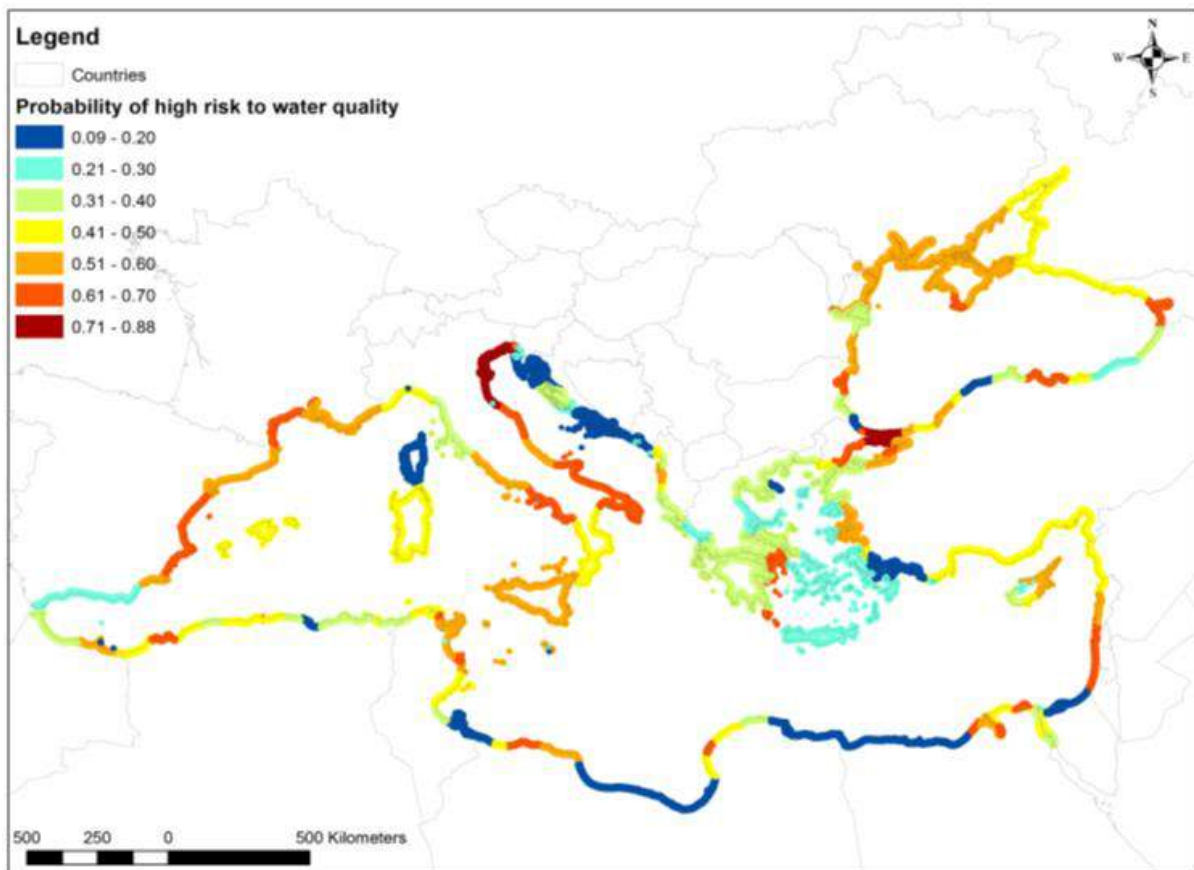


Fig. 5.8: Model output for risk to coastal water quality (Source: CEM, Nottingham)

Although the mapping shown in Figure 5.8 is plausible, the preliminary nature of these outputs must be emphasised. Further deliberative work is required to elicit the appropriate ranges for the state labels used to characterise the nodes. Such work could usefully tie up with further work on indicators and associated monitoring that might be undertaken by the ICZM Governance Platform, cumulative impact mapping and any further work on the Regional Assessment.

One approach to testing the plausibility of the results from the risk to coastal water quality BBN is illustrated by Figure 5.9 a, b & c. In this analysis the data for each of the PEGASO CASES has been read into the model and an estimate of the risk made for each. The graphs show the probabilities for low, medium and high risk for each CASE for the land (Figure 5.9.a) and sea (Figure 5.9.b). Figure 5.9.c shows the overall estimate. In each case, the CASES have been ranked in order of the probability of a high risk to coastal water quality. These data predict that the CASE at highest risk is the North Adriatic. Those that appear to be at the lowest risk are the Moroccan Coast, the Cyclades in Greece and the Dalyan-Köyceğiz Special Protected Area, area in Turkey.

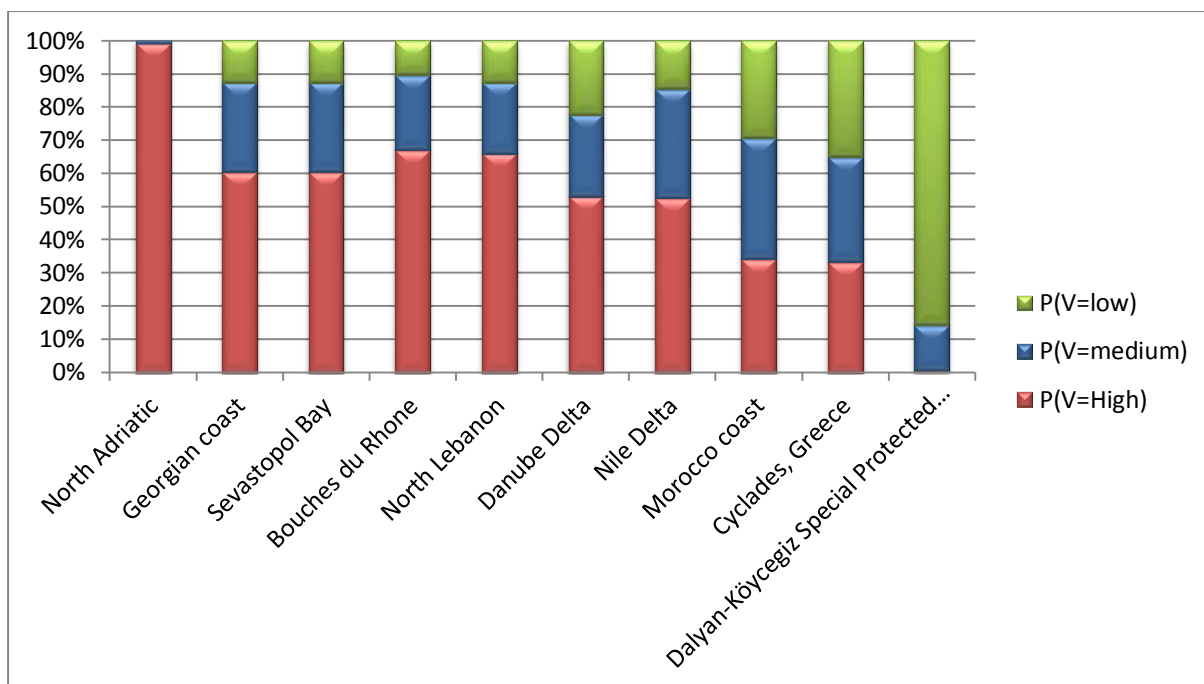


Fig. 5.9.a: Land based risk (Source: CEM, Nottingham)

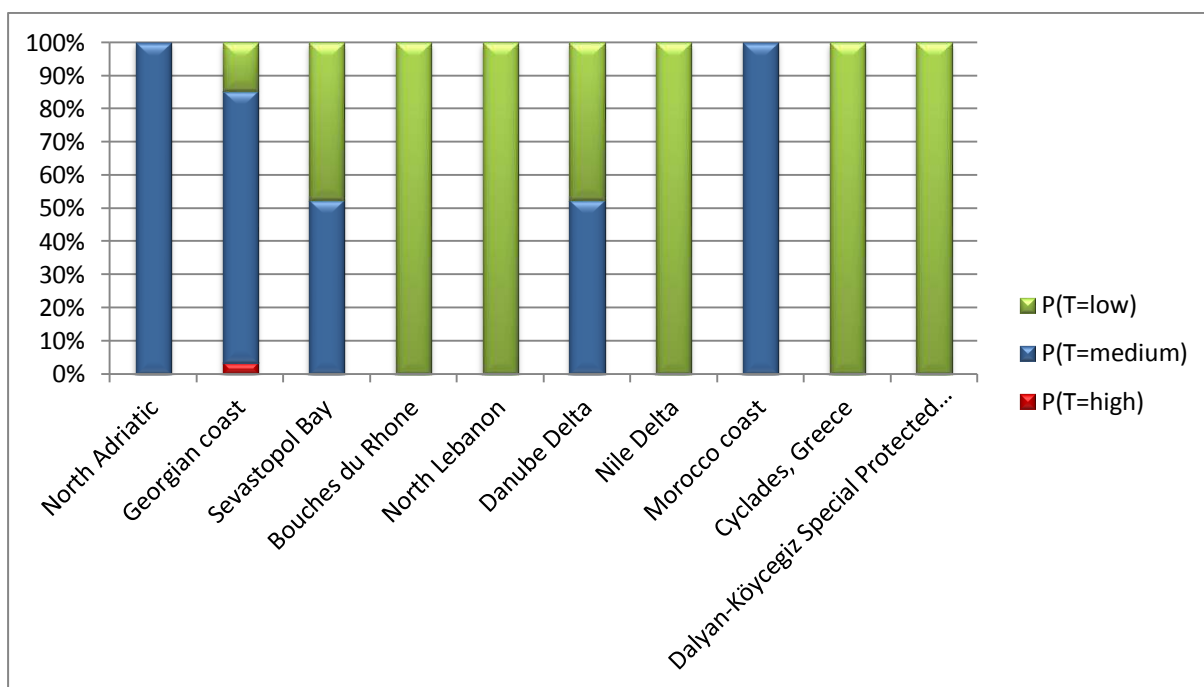


Fig. 5.9.b: Sea Based risk (Source: CEM, Nottingham)

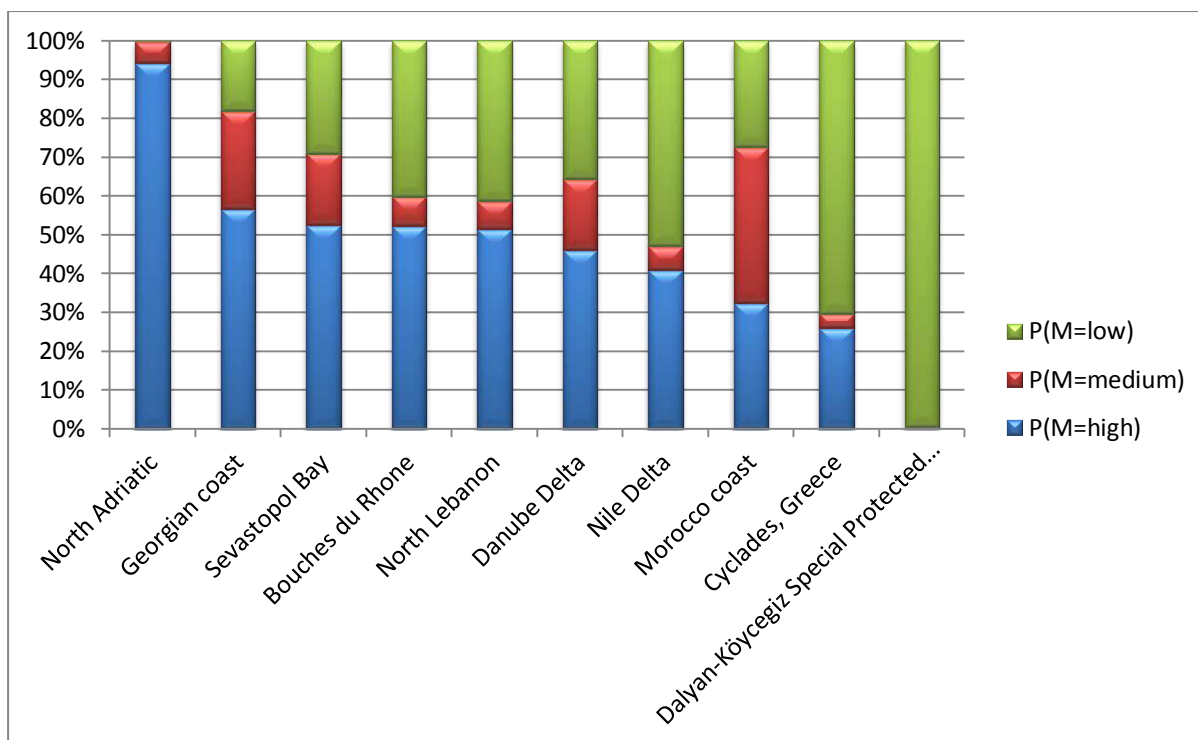


Fig.5.9.c: Overall Risk to coastal water quality (Source: CEM, Nottingham)

The estimates made here are provisional, and it is suggested that they could be used in the future with expert-based groups to test and refine the model. An advantage of the BBN approach is that it can combine both empirical data and expert knowledge, a feature that could usefully be exploited by the ICZM Governance Platform. Once the calibration is assured, the model could then be used either to make regional assessments, as in Figure 5.8, or as the basis of more locally focussed discussion. Local experts and stakeholders could consider how the risk factors are likely to change over time, and how this might impact on land and sea-based risk. The regional model might then be extended by adding further nodes that are considered relevant to cover a wide range of drivers of change. Such work might usefully draw on other empirical trend data such as that being developed by Plan Bleu, for instance.

6. Conclusions and recommendations for future work and the ICZM Governance Platform

While scenarios have been widely used and discussed as decision support tools, the charge made by Wilkinson and Eidinow (2008) that often “...*environmental scenarios are produced with enthusiasm but deployed with limited effect*” remains a valid criticism. In the PEGASO work on scenarios we have therefore attempted to build on what has already been achieved in relation to ICZM issues, and to focus on both *practical* and *useful* outcomes. The goal has been to help overcome the type of problems that arise in relation to implementing ICZM identified by the EEA (2013), namely lack of commonly agreed objectives and timeframes.

The work during PEGASO has clarified the kind of contribution that scenarios can most usefully make to current debates about ICZM. While it is always useful to make analyses of the implications of future trends and assumptions about the drivers of change, and therefore use scenarios in an exploratory way, it is clear that the principles underpinning measures such as the ICZM Protocol define a broad vision for the future. They can therefore be used to create a normative family of scenarios that can be used to help us better understand the steps that need to be taken to realise that vision.

The questions that people consulted are asking about the future in the Mediterranean and Black Sea Basins are not so much about what needs to be done – *but how to do it*. There is widespread agreement amongst those we consulted about the desire for sustainable outcomes in the coastal zone. While the detail of what this means still needs to be worked through, our participatory work has shown that there is a good deal of agreement about what the barriers to achieving progress are, what risks and opportunities exist. **Moreover, there is some consensus that these issues need to be looked at in the short to medium term (15 to 20 years) rather than over longer periods of time (50-60 years).**

In our participatory work we have sought both to develop new methods for engaging with stakeholders and to use them to develop better understandings of the barriers, risks and opportunities themselves. The extension of these types of activities will be key tasks for the ICZM Governance Platform delivered by PEGASO.

The participatory scenario work had three major outcomes:

- **In terms of better understanding the factors that need to be considered in relation to the policy goals of ‘balanced urban development’ and the ‘preservation of natural capital’, issues of governance stood out as being of paramount importance.** This finding suggested that interventions and efforts to ensure more effective institutional capacity and deeper political commitment are probably essential. **The results also seem to suggest that the indicators proposed by PEGASO are likely to be useful ways by which the outcomes of better governance might be assessed.**
- **In the context of exploring how participatory methods can be used to analyse issues related to balanced urban development and the preservation of natural capital in an interactive way, the influence diagram method appeared to work well.** There was some success in using BBN models as a focus for discussions about the future, and hence in using them as a mechanism for further participatory scenario development. Our workshops showed that the extent to which the distinction between normative and other types of scenario was fully understood by

participants is unclear, and so probably further work needs to be done on the design of the exercises to make this point more evident. Much useful feedback was, however, gained from participants about the design of the questionnaires and other approaches, and there are a number of ways in which methods can be modified to take this kind of work forward. Despite the limitations noted by participants at the scenario workshops, it was recognised that influence diagrams and BBN could be effective decision support tools, and useful ways of engaging with stakeholders. **The fact that several groups are, as a result of the scenario work undertaken in PEGASO, now applying these methods in their research, albeit with expert support, indicates the success of this component of the Project⁵.**

- **The participatory scenarios work has shown how different tools developed within PEGASO could be linked and integrated.** Given the limited time available for the workshop events this was the most difficult aspect to accomplish. Nevertheless, the participatory activities made a strong connection to the work in PEGASO on ICZM indicators (Santoro *et al.*, 2011) the articulation of the principles underlying ICZM (Haines-Young *et al.*, 2014a), and participatory methods (Soriani *et al.*, 2014); the findings will also inform the discussion of the Integrated Regional Assessment made in PEGASO (Santoro *et al.*, 2014), and cumulative impact assessment (F. Morrissey in Ivanov *et al.*, 2014).

We recommend therefore that on the basis of our investigation, it would now be profitable to undertake further work on how spatially explicit data can be used as an input into the development of influence diagrams and BBN models, especially in the context of better understanding how outcomes would be different in different geographical situations. It would seem desirable, therefore, if such activities could feed into the work programme of the ICZM Governance Platform for the Mediterranean and Black Sea Basins in order to stimulate interactions between different groups and interests. A body of regional scale data is already available to support this work, as a result of the PEGASO work on environmental accounting, and this could be usefully extended in for developing local scenarios by using the kinds of trend analysis initiated by Plan Bleu.

The aim of the Task 4.3 in PEGASO has been to develop scenarios so that different national policy and planning authorities can use to explore the policy and management implications of possible futures for the coastal zones of the Mediterranean and Black Sea Basins. The work has shown that given the normative character of ICZM principles, the most useful approach has been to use stakeholder-based, deliberative methods to identify the barriers and opportunities in relation to this goal. **We recommend that this approach is taken further by any future ICZM Governance Platform.** If it is accepted that ICZM principles are used in this normative way, then participatory scenario tools can then be used effectively to look at the feasibility of achieving such a vision under different assumptions about the major drivers and pressures. We have shown that while participatory methods require considerable preparatory work, they can be highly effective in building shared understandings and visions. This issue is especially critical at local scales. **Nevertheless, there is a prospect of overcoming some of these barriers by further developing internet-based resources and BBN tools through such mechanisms as an ICZM Governance Platform. We recommend that these opportunities are now considered.**

⁵ For example, participatory work using BBN methods have been undertaken for the North Lebanon Coastal Zone, under the Marine Resources and Coastal Zone Management Program by the Institute of the Environment, University of Balamand.

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Appendix 1:

Scenario Review

Internal deliverable D4.3.1

Provided by University of Nottingham

ID 4.3.1

Deliverable title

V1.0_0602.2012

Dissemination Level*	✓ PU	PP	RE	✓ CO
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Project number	Acronym / PEGASO	244170
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Project title	People for Ecosystem based Governance in Assessing Sustainable development of Ocean and coast.
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***PU:** Public; **PP:** Restricted to other programme participants (including the Commission Services);
RE: Restricted to a group specified by the Consortium (including the Commission Services);
CO: Confidential, only for members of the Consortium (including the Commission Services).

Authorisation

Prepared by	Marion Potschin, Roy Haines-Young, James Patterson and Emil Ivanov (UNOTT)
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Approved by	N/A yet (for internal consultation)
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Approved for released by	N/A yet (for internal consultation)
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Date	NA yet
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Document Information

Project

Project Acronym	PEGASO	Grant agreement nº	244170
Project full title	People for Ecosystem based Governance in Assessing Sustainable development of Ocean and coast		
Funding scheme	Collaborative large-scale integrating project		
Project start date	February 1, 2010	Project duration	48 months
Call topic	ENV.2009.2.2.1.4 Integrated Coastal Zone Management		
Web site	www.pegasoproject.eu		

Document

Deliverable number	ID4.3.1	Due date	Month 18	Submission date	Dd/mm/yyyy
Deliverable title	Review of existing scenario studies				
Authors	Marion Potschin, Roy Haines-Young, James Patterson and Emil Ivanov (UNOTT)				
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Work Package	WP4 Multi-scale tools, methods and models for integrate assessment				
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Preface

Preliminary work on the development and role of scenarios in PEGASO (Scenario Project Plan and Briefing Paper) suggested that they have to fulfil several different purposes. At the broad strategic level they are, for example, a potentially important input into the Regional Assessment (T5.2). While Assessments are primarily designed to take stock of the current situation, they are also designed to help decision makers think about the significance of long term trends, and how present policies might shape the future, given different assumptions about the impacts of different drivers of change. This is the type of role that scenarios played on global assessments such as the Millennium Ecosystem Assessment (MA, 2005)⁶, or in national work such as the UK National Ecosystem Assessment (UK NEA, 2011)⁷. By contrast, at the local, case study level, scenario methods like the *Imagine* tool kit developed by Plan Bleu⁸ can be used to help stakeholders come together and understand the different views and visions for a particular area and what pressures might shape its future.

Clearly the two strands of scenario work that we have identified will be linked, because people at the local scale might be asked to think about and react to the impact of global drivers. Similarly, the kinds of vision developed at local scales can be used to develop broader perspectives that might be expressed in regional or global scenarios. Nevertheless it is helpful to disentangle these different strands of thinking in order to review what is available and identify the kinds of contribution that PEGASO can make in different kinds of context. **This document is focussed at the global and regional scale. Its purpose is to review existing scenario studies and make an evaluation of them given the aims and objectives of PEGASO.** Although few of the studies look specifically at the coastal zone, the drivers that identify as relevant and the different projections that are made about their potential future impact are relevant to our work. Indeed it might well be that an important original contribution of PEGASO would be to identify and articulate the issues affecting integrated coastal zone management that arise from such work, so that decision makers can see more clearly the challenges and opportunities that face them. These kinds of output would clearly be a potentially valuable part of the PEGASO Regional Assessment (Task 5.2). In the conclusion to this paper we ask whether there is sufficient existing work to use existing scenario studies as the basis for a regional assessment or whether additional, original work needs to be done.

More generally, this review is also relevant to the indicators work (Task 4.1) that is being undertaken in PEGASO, in that it can potentially provide information that might be used to understand how these indicators can change in the future, given different assumptions about the direct and indirect drivers of change. Furthermore, it may also support the use of ecosystem accounting methods (Task 4.2), by providing a framework in which decision makers might explore how the present day stocks of natural capital might change, and what the impacts on the flow of ecosystem services might be; the latter also link strongly to the economic valuation work that is being attempted in PEGASO (T4.5). Finally, the review of scenarios at global and regional scales is valuable in its own right, and can be viewed as a valuable part of the PEGASO methodological platform. In shaping their ICZM strategies, stakeholders at all scales need to be

⁶ MA (2005): Ecosystems and Human Well Being. Island Press.

⁷ Haines-Young, R.; Paterson, J. and Potschin, M. (2011): The UK NEA Scenarios: Development of storylines and analysis of outcomes. In: *The UK National Ecosystem Assessment Technical Report*. UK National Ecosystem Assessment, UNEP-WCMC, Cambridge, 1195-1264. Download at: www.nottingham.ac.uk/CEM

⁸ <http://www.planbleu.org/methodologie/approchelocaleuk.html>

aware of the factors that drive change and the range of plausible futures that might confront them. While scenario studies cannot predict what will happen, they can help us plan.

On the basis of this review the following questions are these:

1. Has the scope of the review been sufficiently comprehensive to properly inform the further development of the PRGASO work scenario programme? Have important studies been overlooked?
2. Does the analysis of direct and indirect drivers of change cover all the factors that need to be considered in developing storylines relevant to the implementation of ICZM across a range of plausible futures?
3. Does the 'four storyline model' (World Markets, Global Sustainability, National Enterprise and Local Stewardship) provide a suitable framework for looking at the impact of different plausible futures on the implementation of ICZM? Would it be helpful to develop the kind of analysis shown in Table 2 for all the scenario storylines?
4. How can the outputs from this analysis best be tailored to suit the needs of the Regional Assessment?
5. What contribution might the PEGASO cases and wider stakeholder community play in and developing the relevance of these broad-scale scenarios for the Mediterranean and Black Sea Basins and in making an assessment of the potential impacts of these global and regional studies for the coastal zone?

Executive Summary

The aim of this draft document (including a spread sheet) is to provide a review of the available scenarios that explore the future of the Mediterranean and Black Sea Basins. It summarises information on existing scenario studies that are focussed on either or both regions, or provide useful and pertinent material from different regions that can inform future work. It also includes a review of a number of relevant documents that provide background material for scenario creation or projections of future environmental states that can form an input into the Regional Assessment that is planned as part of PEGASO.

The document includes a collation of the most frequently used drivers of change (both indirect and direct) for both regions, as well as the most commonly used indicators of change for each scenario. The construction techniques of each scenario are also reviewed. The work suggests that a ‘four story line model’ is the most common one to be identified in existing studies. They present strongly contrasting plausible futures involving:

- strong, libertarian, free-market worlds with most environmental protection deregulated (e.g., World Market);
- a vision with a global outlook pursuing sustainable (and climate change) policies, community involvement in regional planning, strong technological development and greener natural resource management (e.g., Global Sustainability);
- a world described by a nationalistic, trade-barrier, self-sufficient storyline, where competition for resources results in greater levels of resource efficiency but little or no trans-boundary exchange and a lower level of habitat/biodiversity management (National Enterprise); and finally,
- another ‘green’ model but with lower economic output due to an advancement in regional autonomy, small-scale production for local markets, less trade and sustainable resource management (Local Stewardship).

The review found that coastal zone issues are not very well covered in many of the scenarios but that the general storylines could provide a fairly good start for a PEGASO to explore how the ICZM objectives might play out in these different and contrasting worlds.

2

3 1. Introduction

4

5 This document is intended to accompany the spreadsheet review of studies that present scenario exercises,
6 environmental projections or useful background material pertinent to the PEGASO project.

7 The remit of this study was to collate and review a range of scenario studies relating to the future of marine
8 and coastal ecosystems in the Mediterranean and Black Sea regions of Europe. The ultimate aim is to aid
9 the creation of plausible scenarios, which will help produce 'efficient and easy to use tools for making
10 sustainability assessments in the coastal zone'. To this end, additional reference material that has been
11 considered useful for the creation of scenarios has been assessed: these include a range of materials
12 examining future projections of environmental, socio-economic or geo-political policy forecasts (e.g., the
13 effects of climate change on Mediterranean biodiversity). Some publications with broad overviews of the
14 main drivers of environmental change are also included.

15 The document is structured in two parts: this written guide; and, a spreadsheet that contains summarised
16 information on 49 scenarios, projections and reference documents. This document contains a guide to
17 interpreting the spreadsheet as well as a brief summary review of the main aspects with notes on drivers or
18 other issues that frequently arise in many of the studies. Each reviewed study is given an individual
19 worksheet, which will print out, on one side of A4; a master worksheet with hyperlinks to each summary
20 sheet (which will automatically update as new information is added to the master sheet) is included.

21

22 2. Methodology

23 2.1. Search Tools

24

25 The data collated for this review have been collected from two main internet search engines: the academic
26 tool [Scopus](#), which allows for detailed and precise searches and provides results that can be ordered by
27 date, relevance etc; and, using Google which is a useful tool for 'grey' literature and government agency
28 reports. A range of search terms were used, individually as well in combinations; these included:
29 'Mediterranean', 'Black Sea', 'Caucasus', 'scenario', 'projection', 'forecast', 'foresight', 'prospective',
30 'future', 'drivers of change', 'marine', 'coastal' and 'environment'; a wider search on similar topics was
31 included but with different geographical focus (i.e., 'Europe' and 'Global').

32 Relevant publications and studies were downloaded to a reference library ('Papers' for Mac, Mекentosj
33 Software), which allowed the user to organise references (and pdfs) of each study in to appropriate folders
34 as well as provide a versatile pdf search function. A shortlist of the most useful or relevant studies was
35 created; these studies were reviewed and the main content and structural aspects noted in a spread sheet
36 document (see attached document).

3 The following section describes the content of the spread sheet and how to interpret it.

4

5 2.2. Matrix Construction

6 The accompanying spread sheet matrix summarises the main projects and publications surveyed so far. It
7 includes not only scenarios but also projects that have used projections of some environmental change
8 (e.g., the effects of climate change on biodiversity). The spread sheet contains a master sheet with a large
9 amount of data (50 columns x 52 rows); each study (column A in the master sheet) is hyperlinked to a
10 separate worksheet where the information is provided in a more readable format (and one that can be easily
11 printed). Updating the master sheet will automatically update the summary sheets (each cell is also
12 hyperlinked).

13 The contents of the worksheets are described below. Each header represents an important aspect that is
14 usually quite crucial to the creation of a scenario (e.g., an understanding of drivers of change is a normal
15 prerequisite). The columns describe the content of each study but also review how the study (in the case of
16 the scenarios) was carried out.

17 **Project affiliation**⁹ allows the user to see if there are several studies under the aegis of the same project;
18 often large projects provide a number of documents covering different aspects of environmental
19 assessments, some of which are included here. The type of study is indicated under the
20 **Scenario/Projection/Reference** column; non-scenario studies may be included because they provide
21 pertinent information on drivers of change, environmental, energy or transport policy or even forecasts of
22 environmental change. Justification of their inclusion is given under the **Reference point?** header.

23 The next groupings of columns address the drivers of change examined in each study. The first set
24 addresses the **Indirect Drivers of Change**, which are grouped into five main drivers: Demographic,
25 Economic, Socio-political, Cultural and Behavioural, Science and Technology. Any one of these criteria were
26 checked if they were explicitly or implicitly (i.e., suggested by the inclusion of a direct driver) included in the
27 text of each study.

28 The **Direct Drivers of Change** are included because often many of these studies focus on very specific
29 factors; the list are inevitably subsets of the **Indirect drivers** (often more than one) and although they
30 represent the main drivers, are not exhaustive, (indeed, there may be others that may be suggested). The
31 drivers are **Habitat Change** which covers any form of land use change, including from agriculture,
32 urbanisation energy infrastructure, port activities and land reclamation; **Pollution and Nutrient Enrichment**
33 which can be derived from agriculture, transport, tourism, atmospheric pollution, sewage etc; **Over-**
34 **exploitation of Resources**, which relates mainly to over-fishing, mineral extraction, hunting and
35 unsustainable farming techniques; **Climate Variability and Change** which can be expressed by changes in
36 temperature, precipitation, sea-level or incidences of extreme events; and, **Invasive Species** which is
37 includes any form of study examining the role of pest plants or animals as a disrupter in natural or human
38 ecological systems.

39

⁹ Bolt reflects the headings of the columns in table in appendix 1.

3 **Indicators or Output focus** describe the main focus of each study or scenario. **Climate** indicates whether
4 the outcome of a forecast or scenario including the impacts of climate change or possibly mitigation or
5 adaptation activity. **Environmental** is a broad category designed to inform the reader if the main theme of
6 the study includes issues such as sustainability, nature conservation, energy conservation, habitat
7 restoration etc.; **Biodiversity** more specifically includes studies that address species or habitat outputs.

8 **Marine** any output concerning marine environments (can be human or natural); likewise **Coastal** reflects
9 the changes to, or impacts on coastal zones. Land use indicates an output such as land use change. **Water**
10 mainly concerns water management including drought adaptation, irrigation, flooding and salinisation of
11 fresh water; **Geopolitical** relates to outcomes that address political and trans-boundary issues; **Health &**
12 **Welfare** concerns human health (often related to climate change outcomes) and standard of living whilst
13 **Socio-economic** outputs relate to GDP, and other measures of wealth. **Planning** includes any study that
14 considers the wider implications of locating land use types, such as urban growth, road networks, etc.
15 **Agriculture** includes any output, whether it relates to land use, crop or livestock yield changes, techniques
16 in management or external outputs (e.g., eutrophication from nutrient loads).

17 **Fisheries** considers products from commercial fishing and aquaculture and their impact on the
18 environment; **Telecommunications** includes anything that addresses the infrastructure as well as the
19 societal consequences of telecommunication networks. **Energy** covers the production and
20 transmission/transport of all energy systems including renewables as well as the possible socio-political
21 issues surrounding trans-boundary energy transmission; **Transport** includes road, rail, air as well as marine
22 shipping impacts and type. Studies that include some explicit mention of any type **Ecosystem Service** are
23 included in this column. **Tourism** provides information on changes to the tourism industry (often related to
24 seasonal as well as location changes due to climate change) as well as the impacts of tourism on the
25 environment. Finally, some studies include changes to local or regional human populations in their outputs,
26 which is covered under the **Demographics** column.

27 **Geographic area** is simply the main focus of each study, they are mostly either Mediterranean or Black Sea,
28 some are European in scale and a few are global; if the studies were not based on Mediterranean or Black
29 Sea, the **If non Med or BS, sufficient detail?** column asks if they include these regions amongst their
30 greater geographical focus. **Timeline** considers the year(s) that the scenario study focuses on, or the end
31 point of some of the projection studies (which are themselves usually based on scenarios such as SRES).

32 The **Scenario construction** grouping focuses on the approach that each study team used to create their
33 scenarios. **Complexity** is based on the (possibly subjective) interpretation of the methodology and the
34 individual scenario detail outlined in each study; some studies provide very brief narratives describing each
35 storyline (i.e., Low), others provide numerous pages encompassing multiple aspects of each future. Some
36 studies provide only two contrasting visions of the future; some provide more complex and nuanced
37 alternatives - these are summarised under the **Number of storylines** column. **Participation** relates to the
38 scenario creation process and whether the authors included different expert judgement and even
39 'stakeholder' input - usually greater participation leads to greater 'legitimacy' of the scenarios. The nature
40 of the scenario outputs can either be **Qualitative or Quantitative**, qualitative refers to a purely written
41 description of the storyline, quantitative provides (often model-derived) numerical outputs in tables,
42 figures or graphs. Either is valid and can provide strength and ease interpretation for the reader.

43

3 **Legitimacy** is a subjective assessment of the scenario creation process and assesses the transparency as
4 well as the degree of fairness of the participation element. Scenarios are inherently biased by their authors
5 so stakeholder or expert participation is considered an important element in their creation. If scenarios are
6 designed to provide alternative visions of the future for a community or region, it makes sense to allow
7 that community to participate in their creation (the fairness aspect). **Credibility** reflects the how believable
8 each scenario is; it is concerned with scientific (or policy, or societal) reality but as scenarios are often set
9 50 or 100 years hence, our interpretation of how science will evolve and develop is often critical issue here.
10 This element is often the most contentious and debated. **Saliency** refers to the relevance and
11 comprehensibility of the scenarios for political decision-makers; there is, after all, no point creating
12 scenarios if nobody uses them (this again is based on a subjective assessment, it is difficult to gauge
13 saliency truly if you do not have data on uptake and usage).

14 **Wildcard** scenarios are scenarios that describe the effects of low-probability high-impact events;, i.e.,
15 extreme events that are rare but cause significant economic or environmental damage. The can be very
16 useful for assessing the resilience of a system. **Quality of data** examines if each study has been peer-
17 reviewed, uses expert judgement or uses other sources of credible data.

18 Finally, a brief **Summary** of each study has been included outlining the main message or use for PEGASO; a
19 **'Usefulness to PEGASO'** rating, which is based on the author's experience of creating scenarios, and using
20 numerous sources in their design so is inevitably quite subjective.

21

3. Preliminary discussion

This review included 49 (so far) studies that were deemed pertinent to the creation of a set of scenarios for PEGASO; of these, 27 contain or are scenarios (Appendix 1, Table 1a), the rest are useful background documents outlining projections (Appendix 1, Table 1b), policy ‘visions’, geopolitical reviews or coastal or marine environmental issues in the Mediterranean or Black Sea regions (Appendix 1, Table 1c).

Most studies include (mostly explicitly but sometimes implicitly) sections on the drivers of environmental change in their scenarios or environmental reviews. Of the indirect drivers, Cultural and Behavioural drivers were the most common (in 77% of the studies), Scientific and technological were the least used (61%). Twenty-six studies incorporated all five indirect drivers. The breakdown of the direct drivers is a little more variable; climate change was the most common and used in 82% of the studies, whilst invasive species was only mentioned in 24% of them.

Clearly, given the focus of the PEGASO project, the majority of the studies had a Mediterranean (17), Black Sea (6) or European focus (14) but there were five global studies that were deemed worthy of inclusion.

Not surprisingly, given that climate change was a common driver, climate change impacts or strategies featured highly among the outputs of the studies (in 67% of them); this was followed by environmental (65%) and biodiversity (57%), socio-economic 53% and agriculture 49%, land use, water and geopolitical (all 47%) whilst the least common were health & welfare, ecosystem services and tele-communications (all featured in fewer than 20% of the studies). Marine (37%) and coastal (39%) featured in surprisingly few, perhaps reflecting the bias towards most studies focussing on terrestrial ecosystems.

3.1. Scenarios

Of the scenarios that explicitly describe storylines, 41% followed the traditional 2x2 format and created four storylines, 36% used three storylines (often two contrasting storylines and a ‘baseline’ or ‘trend’ storyline), 18% used only two contrasting storylines and 5% used just one vision of the future.

Most scenario studies had medium or highly complex scenarios and the vast majority (68%) used both qualitative and quantitative descriptions of the storylines. Only three studies included a wildcard scenario and most studies adopted expert judgement in their creation. The storyline timelines are mostly short-term visions of the future of either 2020 or 2030 and 2050; only four extend the timeline beyond 2070 (the longest to 2100). These scenarios all explore visions centred around the endpoint of the timeline rather than explore their development from now until the end point; in this sense they are mostly ‘snapshot’ alternative visions of the future.

As outline above, the crucial aspects of any scenario can be considered legitimacy, credibility and saliency; inevitably, in this review these criteria are assessed somewhat subjectively although it is hoped the experience of the authors in scenario production allows for some degree of expertise in this judgement. Legitimacy varied considerably among the scenario studies reviewed. Some offered no evidence of stakeholder or expert participation in their methodology and thus scored lowly in this regard; others went into great detail and provided a comprehensive summary of their approach using participatory methods, workshops and feedback sessions to refine their storylines. Twelve of the 27 scenarios scored 5 out of 5 for legitimacy suggesting that for these studies at least their approach to creating the scenarios was taken very

seriously. Credibility is perhaps somewhat easier to assess and in most of these studies the scientific justification and basis was very high. Finally, saliency is difficult to assess without knowing how well each study has they have been used by policy-makers so our assessment is based on our own judgement of their value; again, in this review most seem to score highly.

3.2. Forecast

The forecast or projection themed papers addressed here are only a small sample selected from numerous that examine the future trends; some of them are based on SRES climate change scenarios to model the impacts of future climate change on, for example, species distribution changes in the Mediterranean. These studies (Appendix 2) were chosen (and are by no means an exhaustive collection) because they represent a range of environmental issues important to both regions in the PEGASO study. Indeed, given the range of expertise in the PEGASO team, it is likely that they will not provide any additional or new information to the body of work already accumulated by PEGASO. Rather, they have been included in this study to represent the value and importance of these types of research for the creation of scenarios. In particular, they often highlight (by virtue of the fact that they follow existing trends) the likely outcome for 'Business as Usual' type storylines but they also provide a comparison for contrasts in creating the more sustainable or 'green' storylines. Hence, in this review we have included papers examining the future of agriculture, water management, invasive species, marine biodiversity, urban expansion, governance, peace, security and economic development - all topics that would help create a comprehensive, salient, legitimate and credible set of scenarios.

3.3. Scenarios Reference material

The reference material is included for similar reasons as the projection documents - they provide a baseline data for various environmental, socio-political and cultural drivers that provide context and background detail for the scenarios (and hence lending to credibility). They also provide a good summary of the consensus of the main issues and drivers of change in the Mediterranean and Black Sea regions (i.e., pollution, climate change, water stress, geo-politics, land use change, urbanisation, population change) that provide a starting point to addressing the most important indirect and direct drivers of change for the scenarios. Finally, there are a few documents that highlight integrated coastal zone management is in the region.

4. Creating a regional assessment: is there enough to start with?

The range of studies includes scenarios, policy papers, projections and environmental reviews; they all relate, in one way or another to the aims of this project. Between the studies presented here there is a wealth of useful information to aid in the creation of pertinent and plausible scenarios for PEGASO. However, in order to go from this stage to creating a 'regional assessment' a number of issues need to be considered.

The 'scenario structure variables' need to be addressed first. The main indirect drivers in these studies are very similar to both the Mediterranean and Black Sea regions; however, one notable difference arises in perhaps that geo-politics and security issues are more explored in the documents relating to the Black Sea (not surprising given the recent history there and the current exploitation of natural resources). There are also discussions highlighting differences between southern Mediterranean countries and their European counterparts (mainly to do with resource issues, water for example). Overall though, many of the main drivers of change are fairly consistent across both regions; this is partly because indirect drivers are often derived at global scales and hence will be the same on most parts of the world, but also because the both regions share similar physical and geographical characteristics. The direct drivers are more diverse although they are also fairly well covered in both regions.

The number of scenario storylines to create is an important aspect that will become more obvious as the development process evolves. It varies considerably in the scenarios reviewed here and if any pattern emerges it is from the most common approach (four storylines), which mostly have a strong correspondence between the storylines. The common pattern emerging is of a storyline that presents a strong, libertarian, free-market world with most environmental protection deregulated (e.g., World Market); a contrasting vision with a global outlook pursuing sustainable (and climate change) policies, community involvement in regional planning, strong technological development and greener natural resource management (e.g., Global Sustainability); thirdly, a nationalistic, trade-barrier, self-sufficient storyline where competition for resources results in greater levels of resource efficiency but little or no trans-boundary exchange and a lower level of habitat/biodiversity management (National Enterprise); and finally, a another 'green' model but with lower economic output due to an advancement in regional autonomy, small-scale production for local markets, less trade and sustainable resource management (Local Stewardship).

Despite the fact that coastal zone issues are not very well covered in many of the scenarios these four types of storyline should provide a fairly good start for a PEGASO set of scenarios (see Appendix 1, Table 2, which explores the ICZM objectives might play out in the context of the most interesting existing scenarios). for an interpretation of them set against ICZM principles); and, if nothing else, they will offer basis for further discussion. If anything, their main value is in describing the wider context of a world around each alternative vision of the future - with the accompanying reference material it should be a feasible task to tweak and mould these storylines to versions that directly affect marine and coastal issues in the Mediterranean and Black Sea regions.

5. List of studies included

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Appendix A1.1

Table A1: Scenario Summary

Project or paper name	Indirect drivers of change					Direct drivers of change					Geography	Timeline	Scenarios							Project or paper name	Relevance to Pegaso
	Demographic	Economic	Socio-political	Cultural Behavioural & Scientific technology	Habitat Change	Pollution and Nutrient Enrichment	Overexploitation of Resources	Climate Variability and Change	Invasive Species	Mediterranean, Black Sea, Europe, global		Complexity	No. of storylines	Participatory	Qualitative or Quantitative	Legitimacy	Credibility	Saliency			
Amelung and Viner. Mediterranean Tourism: Exploring the Future with the Tourism Climatic Index. Journal of Sustainable Tourism (2006) vol. 14 (4) pp. 349-366	yes	yes	no	yes	no	no	no	Main focus	no	Medi terra nean	2020s, 2050s, 2080s	na	na	na	na	na	na	na	Increase in Spring and Autumnal tourism value; loss in summer. Some gains for biodiversity despite socioeconomic losses.	4	
Anav and Mariotti. Sensitivity of natural vegetation to climate change in the Euro-Mediterranean area. Climate Research (2011) vol. 46 (3) pp. 277-292	no	no	yes	yes	no	no	no	no	no	Medi terra nean	na	na	na	na	na	na	na	na	Good review of CC impacts on biodiversity in MEd region	1	

Andaloussi and Pouffary. Energy, Climate change and the Building sector in the Mediterranean: Regional Prospects. (2011) pp. 1-93	yes	yes	yes	yes	yes	no	no	no	yes, main theme	no	Med	2030	med	2	unclear	both	2	4	4	Provides good review of threat to coastal zones from creeping urbanisation and energy demands. two scenarios are provided, trend and 'rupture' (a green vision). Very detailed breakdown of scenarios and section on methods to achieve rupture	4
Araujo. Protected areas and climate change in Europe. (2009) pp. 1-29	no	no	yes	yes	no	Acknowledged	no	no	Main focus	no	Europe	Numerous 21st century time slots	na	na	na	na	na	na	na	Long-term management planning is required for protected areas; they need to be adaptive too which may result in changes to size and location of protected areas. Integrative management of the wider countryside essential to this as is consideration of biodiversity in other sectoral plans.	3
Audsley et al. What can scenario modelling tell us about future European scale agricultural land use, and what not?. Environmental Science and Policy (2006) vol. 9 (2) pp. 148-162	no	yes, crop prices, variables, labour and machinery	no	no	Yes, advances in crop yield etc	no	no	no	yes, strong emphasis	no	All Europe	2050	Medium	4	Use of expert judgement	Mainly Quantitative	5	5	4	Crop yield decreases in the Mediterranean regions and the southwest Balkans	2

Barbosa et al. Land cover model inputs and efficient data model with possibilities to be updated. EnviroGRIDS (2010) pp. 1-82 AND Ivanov and Barbosa. Existing scenarios and data compilation on integrated scenarios using demographic, climatic, land cover from global and Black Sea Basin studies. (2010) pp. 1-72	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	Black Sea	2020, 2050	medium	3	yes	both	3, so far	4	4	Developed specifically for the Black Sea region; work in progress but potentially very useful due to incorporation of modelling outputs	4
Blue Plan Notes. Energy sector in the Mediterranean region, situation and prospective 2025. (2010) pp. 1-4	yes	yes	yes	yes	yes	no	no	no	no	no	Med	2025	low	2	unclear	both	1	4	5	Looks at a number of drivers and pressures on energy prod and use in Med region; concludes that consumption needs require increased energy supply involving structural investment for the long term. Outlines two contrasting scenarios each with different approaches to energy use and consequences for the environment.	5

Blue Plan Papers. A practioner's guide to 'Imagine' - The systematic and prospective sustainability analysis. (2005) pp. 1-57 AND Coudert and Larid. IMAGINE: A set of tools and methods to assist integrated coastal zone management in the Mediterranean. (yes	yes	yes	yes	yes	yes	yes	yes	yes	no	Med	2025	high	2	yes, very	both	5	4	4	Useful methodology for Med region scenario creation.	3
Carpenter, S.R, Pingalis, P. L, Bennett, E, M & Zurek, M. B. Ecosystems and Human Well-being: Scenarios, Volume 2. (2005). Millennium Ecosystem Assessment, Island Press, Washington D.C.	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	Glob al	2050 and 2100	Very high	4	Yes, fully	both	5	5	5	Very thorough and comprehensive outline of 4 scenarios and their possible impact on ecosystems.	4
Carpenter, S.R, Pingalis, P. L, Bennett, E, M & Zurek, M. B. Ecosystems and Human Well-being: Scenarios, Volume 2. (2005). Millennium Ecosystem Assessment, Island Press, Washington D.C.	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	Glob al	2050 and 2100	Very high	4	Yes, fully	both	5	5	5	Extremely thorough and comprehensive set of scenarios with strong emphasis on biodiversity, ecosystems and the consequences of management on ecosystem services. Very useful guide to creating new scenarios	4

de Vries. European Territories Confronted with Climate Change: Awaiting the Events or Timely Preparation?. Futures (2010)	no	yes	yes	yes	yes	no	no	no	Main theme	no	Europe	2030	fairly low, scenarios are easily drawn out and explained	2	no	qualitative	not very apparent, 2	5	5	These scenarios provide a useful summary of two extreme approaches to CC response in Europe. Both strategies challenge and provide a useful insight into potential options; they also highlight the need to change behaviour now.	4
Eickhout and Prins. EURURALIS 2.0 - Technical background and indicator documentation. (2008) pp. 1-88 AND Klijn et al. The EURURALIS study: Technical document. (2005) pp. 1-215 AND Westhoek et al. Scenario development to explore the future of Europe's r	yes	yes	yes	yes	yes	no	no	yes	yes	no	Europe	2030-40	high	4	not clear	both	2	5	5	Although not explicitly relevant for Marine or Coastal environs, EURURALIS is a very well developed summary of future European scenarios taking in major socio-economic drivers and policy changes	3
ESPON. Spatial Visions and Scenarios – Thematic Study of INTERREG and ESPON activities. (2006) pp. 1-112 AND Lennert and Robert. The Territorial Futures of Europe: Trends Competition' or Cohesion'. Futures (2010)	yes	yes	yes	yes	yes	no	yes	yes	yes	no	Europe	2030	med	3	no mention	mostly qualitative, some quantitative trend scenario	1	3	4	Strong emphasis on socio-economic future of Europe; thorough and comprehensive storylines may be of use	2

Kok et al. Multi-scale participatory local scenario development: Using Mediterranean scenarios as boundary conditions. Bridging Scales and Epistemologies workshop, Millennium Ecosystem Assessment, Alexandria, Egypt. (2004) AND Kok et al. Multi-scale narra	yes	yes	yes	yes	yes	no	no	no	yes	no	Medi terra nean	2030	med	3	yes, very	Qualitative	5	5	3	Perhaps most of use because it provides a good example of participatory scenario making in the Mediterranean region.	3
Langmead et al. European Lifestyles and Marine Ecosystems: Exploring challenges for managing Europe's seas. University of Plymouth Marine Institute (2007) pp. 1-46	yes	yes	yes	yes	yes	yes, coast al devel opm ent	yes, strong empha sis	yes, particular emphasis on over fishing	yes	yes, very strong empha sis	Black sea and Medi terra nean	2020- 30	low	4	not apparent	Qualitative	1	4	4	Focuses mainly on a set of well defined direct drivers: Industrial discharge, Fishing effort, Urban waste water treatment, Agricultural activity, Fossil fuel en. gen., Shipping activity and Livestock prod. But very focussed on marine fish consequences in the five scenarios	5
Margat and Vallee. Water Vision Mediterranean. (2000) pp. 1-66	yes	yes	yes	yes	yes	no	yes	yes	yes	no	Med	2025	high	3	unclear, but unlikely	both	1	3	4	Provides three very comprehensive scenarios outlining the future of water use in the coastal areas of the Med	5
Nakicenovic. IPCC Special Report on Emissions Scenarios. Cambridge University Press (2009) pp. 27	yes	yes	yes	yes	yes	no	yes	yes, fossil fuels	Yes, Main them e	no	Glob al	2020, 2050, 2080	mediu m	4	yes	both	5	5	5	Highly developed Climate change emissions scenarios, useful for including global factors in Mediterranean or Black Sea scenario creation; also good for incorporating CC mitigation or adaptation aspects	3

Nakicenovic. IPCC Special Report on Emissions Scenarios. Cambridge University Press (2009) pp. 27	yes	yes	yes	yes	yes	no	yes	yes, fossil fuels	Yes, Main theme	no	Global	2020, 2050, 2080	medium	4	yes	both	5	5	5	Highly developed Climate change emissions scenarios, useful for including global factors in Mediterranean or Black Sea scenario creation; also good for incorporating CC mitigation or adaptation aspects	3
Reinks, W. The future of rural Europe An anthology based on the results of the Eururalis 2.0 scenario study. (2008) pp. 1-56	yes	yes, particularly includes global inputs	yes	yes	yes	yes, through changes in agri	implicit	implicit	Yes, strong emphasis	no	Europe, can narrow down to region	2030	Quite high, use of online tool enables multiple factors to be adjusted	4	Academic led,	both	3	5	5	Examines future of rural Europe by allowing users to adjust a number of drivers such as biofuel policy, technology, impact of policy measures on the CAP using four scenarios.	2
Rotmans et al. Visions for a sustainable Europe. Futures (2000) vol. 32 (9) pp. 809-831	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	Europe	2020, 2050	High	Ten, filtered down to three	Heavy use of stakeholders	qualitative	5	3	4	Review of scenario construction is useful, the final storylines may be of use also	2
Smith and Dubois. The Wild Cards' of European Futures: Planning for Discontinuities?. Futures (2010)	yes	yes	yes	yes	yes	no	yes	yes	yes	no	Europe	2030	med	3	no mention	mostly qualitative, some quantitative	1	3	4	Strong emphasis on socio-economic future of Europe; thorough and comprehensive storylines may be of use	3

Spangenberg. Integrated scenarios for assessing biodiversity risks. Sustainable Development (2007) vol. 15 (6) pp. 329 - 396	yes	yes	yes	yes	yes	yes, mainly fragmentation	Strong emphasis	strong emphasis	strong emphasis	strong emphasis	Europe	2050	high	3	yes, scenario team plus stakeholder consultation	both	5	5	3	Strong focus on direct drivers of change AS well as indirect drivers (examination of policy is good); not much detail on outcomes, of more use for examining drivers really.	2
Stocker et al. The Socio-economic Modelling for the ALARM Project: Process and Results. SERI Working Papers (2007) pp. 1-30	yes	Main emphasis	Main emphasis	yes	yes	no	yes	yes	yes	yes	Europe, some focus on Italy	2050	high	3	yes, scenario team plus stakeholder consultation	both	5	5	3	Mainly of use to explore socio-economic drivers of change and the variation in output in these sectors for three different storylines.	3
UNEP and RIVM. Four Scenarios for Europe: Based on UNEP's third Global Environment Outlook. (2003) pp. 1-32 AND UNEP. Chapter 4: Outlook 2002-32. Global Environment Outlook 3 Past, present and future perspectives (2002) pp. 1-82	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	Europe	2030 and 2050	Med	4	development through scenario groups	both	3	4	4	Provides four well drawn scenarios with a focus on European environmental futures. Main use as a reference for scenario structure for Europe. Also very useful description of the main drivers.	3
Volkery. Land use scenarios for Europe — Qualitative and quantitative analysis on a European scale. PRELUDE (2007) pp. 1-78	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	Europe	2035	na	5	yes, fully	both	5	4	5	Mainly land use but has some pertinent aspects for PEGASO; good review of drivers and scenarios are well constructed	3

<p>Weiß et al. Model-based scenarios of Mediterranean droughts. <i>Advances in Geosciences</i> (2007) vol. 12 pp. 145-151</p>	no	no	yes	yes	yes	no	no	no	yes	no	Med	2070s	na	2	na	quantitative	5	5	4	<p>Provides projections of drought incidence in Mediterranean region; whilst not directly pertinent for marine ecosystems it may be useful for coastal zone land use change scenarios</p>	1
<p>Xenidis. Cambio climático y cambio social (Rural community in the Mediterranean Region in 2030: Projections and future scenarios. <i>Climate Change and Social Change</i>). (2010)</p>	yes	yes	yes	yes	no	no	no	no	Main theme	no	Mediterranean	2030-50s	low	2	unclear	qualitative	1	3	2	<p>Could be useful to help pad out scenarios - provides a description of rural life for two storylines</p>	3

Table A2: Projection Studies Summary

Project or paper name	Reference point?	Geography	Main conclusion	Usefulness to PEGASO scenario development (ranked 1, low to 5 high)
	Main Use (to provide a useful tool for future scenario studies)	Mediterranean, Black Sea, Europe, Global		
Blue Plan Notes. Mediterranean agriculture: toward adaptation to climate change. (2009) pp. 1-4	Outlines impacts of CC on agri in the next 90 years	Med and parts of BS region	Highlights pressures on the future of Med region agriculture as well as the main adaptation strategies (with an emphasis on socio-economic capacity as well as technological).	4
Blue Plan Notes. Strategies for integrated water and energy resources management to address climate change. (2008) pp. 1-4	Policy document outlining future water issues in the Med region.	Mediterranean	Describes increasing pressure on water demands and supply in Med region; outlines consequences of this including energy generation then provides an adaptation strategy. Useful for scenario creation.	5
Blue Plan Notes. The future of the Mediterranean will depend largely on cities. (2008) pp. 1-4	Highlights growth in cities in the next few years in Med region; provides strategy for sustainable development	Med	Describes demographic driver of change in urban growth; provides a strategy for managing the acceleration of urbanisation in the Southern and Eastern Mediterranean, focusing on environmental limits and sustainable development, Useful for scenario creation	4

Boudouresque and Verlaque. Biological pollution in the Mediterranean Sea: Invasive versus introduced macrophytes. Marine Pollution Bulletin (2002) vol. 44 (1) pp. 32-38	Thorough review of existing invasive species with a rough guide to likely outcomes in 20 years time	Mediterranean	Authors estimate the number of introduced species will increase by about 80 species over the next 20 years. Although they don't (and can't) predict which species will become invasive, they expect that 5–10 spp will be invasive, with accompanying ecological and/or economical dire consequences. Authors suggest implementing national legislation control measures.	2
Commission on the Black Sea. A 2020 Vision for the Black Sea. (2010) pp. 1-72 (see also *)	Review and outlook of peace and security, economic development and welfare, democratic institutions and governance, and regional cooperation in Black Sea region	Black Sea	Black Sea Commission focuses on four areas: peace and security, economic development and welfare, democratic institutions and good governance and, finally, regional cooperation. It then presents policy recommendations for all stakeholders.	4
Dimadama and Timotheou. Greening the Black Sea: Overcoming Inefficiency and Fragmentation through Environmental Governance. (2010) pp. 1-36	outlines environmental issues in BS region; provides useful	Black Sea	Good review of main environmental threats to BS region; followed by useful policy advice on improving governance, communications, policy co-ordination and financing to tackle these issues.	4
Margat. Are water shortages a long-range outlook in Mediterranean Europe?. (2002) pp. 1-18	Focus on water stress in Med region now and in next 40 years	Med	Review of water demands in Europe and likely trends	2

Philippart et al. Impacts of climate change on European marine ecosystems: Observations, expectations and indicators. Journal of Experimental Marine Biology and Ecology (2011) vol. 400 (1-2) pp. 52-69	Includes chapters on Med and Black Sea; very good review	Europe	Summaries affects of CC on both Med and BS, highlights ecological problems and suggests adaptation measures.	4
Velkavrh. The pan-European environment: glimpses into an uncertain future. (2007) pp. 1-82	Very useful guide to future environmental problems in Europe; also reviews future drivers of change	Europe	Very useful review of future environmental issues in Europe; provides good list of trends in different sectors and even reviews a long list of forward looking studies including scenarios	5

8.

9. Table A3: Reference Studies Summary

Project or paper name	Reference point? Main Use (to provide a useful tool for future scenario studies)	Geography	If not Med or BS, sufficient detail?	Main conclusion or summary of scenario outcomes	Usefulness to PEGASO scenario development (ranked 1, low to 5 high)
Aydin. Geographical blessing versus geopolitical curse: Great power security agendas for the Black Sea region and a Turkish alternative. Journal of Southeast European and Black Sea (2009) vol. 9 (3) pp. 271-285	Outlines history and potential of geopolitical relations in the BS	Black Sea	no	Useful reference point for Black Sea political agendas	2
Blue Plan Papers. The Blue Plan's sustainable development outlook for the Mediterranean. (2008) pp. 1-32	Reviews recent environmental trends, looks ahead to 2025, provides green policies for sustainable development. Strong section on marine environs.	Med	no	Very useful review of Mediterranean environmental issues; provides good section on marine to as well as prescriptions for future sustainable development policy	5
CAIMED. Governance, competitiveness and networks in the euro-Mediterranean region: transports, energy and	Useful review of energy, telecommunications and transport	Euro-African Mediterranean	no	Reviews spatial configuration and governance of the Euro-Mediterranean transport, energy and telecommunication	3

telecommunications. (2006) pp. 1-98	networks around Mediterranean Europe and north Africa			systems.	
CIESM. Climate warming and related changes in Mediterranean marine biota. CIESM Workshop Monographs (2008) pp. 1-21	Review of CC impacts on marine life in Mediterranean	Mediterranean	no	Thorough overview of main impacts to date of CC on marine biodiversity in the Mediterranean	3
EAA. Chapter 5 Marine and coastal environment. Europe's environment - The fourth assessment,. (2007) pp. 1-44	Very comprehensive overview of environmental issues facing Europe. The chapter on Marine & coastal environments is excellent	Europe	yes, numerous mentions of both regions	Very useful review of main drivers of change for marine and coastal environmental change.	5
EEA. The European environment — state and outlook 2010: synthesis. (2011) pp. 1-228	Comprehensive state of the environmental review of Europe; useful also for outlook section	Europe	yes, numerous mentions of both regions	Good review, would be very useful to help create a baseline or business as usual scenario	4
Greenpeace. Mediterranean Marine Governance. (2009) pp. 1-16	Critique of current env. governance in Med and solutions to improving short, medium, and long-term governance.	Mediterranean	no	Could be useful document for helping to design a green storyline - outlines issues with current governance and proposes solutions.	4

Maior and Matei. The Black Sea region in an enlarged Europe: Changing patterns, changing politics. Mediterranean Quarterly (2005) vol. 16 (1) pp. 33-51	Useful background into geopolitics of BS region with a strategy laid out for future security	Black Sea	no	Succinct and readable document on Black Sea politics that may be useful background for future scenario creation.	2
NRC. Framework and Implementation for a National Cooperative Approach to Integrated Coastal Zone Management. (2006) pp. 1-57	Despite the focus on Australian coastal zones, it provides an excellent review of coastal pressures and outlines ICZM plans	Australia	no, habitat specific (coastal zones)	Highlights coastal zone biodiversity issues and pressures and provides detailed ICZM plan; useful reference point.	3
Ramsar Convention Secretariat. Coastal management: Wetland issues in Integrated Coastal Zone Management. Ramsar handbooks for the wise use of wetlands, 3rd edition, vol. 10. Ramsar Convention Secretariat, Gland, Switzerland. (2007) pp. 1-50	Guide on ensuring ICZM incorporates the proper management of wetlands	Global	lots of ref to Med	Outlines importance of wetlands to coastal environment; provides 8 main principles explaining rationale behind this	3
Triantaphyllou. The 'security paradoxes' of the Black Sea region. Journal of Southeast European and Black Sea (2009) vol. 9 (3) pp. 225-241	Highlights political and governance issues in BS region	Black Sea	no	Good review of main governance issue in BS region; useful for scenario construction	2

UNEP. Chapter 2: State of the Environment and Policy Retrospective: 1972–2002 - Coastal and marine areas. Global Environment Outlook 3 Past, present and future perspectives (2002) pp. 1-30	Useful chapter on European marine and coastal environmental drivers of change as well as policy	Global	section on European seas	Provides outline of main marine environmental threats but also discusses it down to regional level	2
UNEP. Mediterranean strategy for sustainable development. (2006) pp. 1-68	Useful policy document outlining sustainable options for Mediterranean countries' futures	Mediterranean	non on Black Sea	Main use as a policy document is that it outlines the main environmental and sustainable development challenges of the Med region (lists priority actions) as well as providing as status of current action and a blueprint for implementing future sus dev.	5
UNEP. Sustainable Coastal tourism - An integrated planning and management approach. (2009) pp. 1-87	Highlights impacts of tourism on coastal zones; outlines ICZM tenets	Global	lots of focus on Med	Excellent review of tourism impact on coastal areas; provides good breakdown of ICZM and way forward blueprints	4
Velkavrh. Catalogue of forward-looking indicators from selected sources; A contribution to the forward-looking component of a shared environmental information system (SEIS/Forward). (2008) pp. 1-204	Useful guide to trends and future indicators in various sectors.	Europe	references to Med	Good review, would be very useful to help create a baseline or business as usual scenario	4

Table A4: Two scenarios set against IZCM objectives

		IZCM objectives - Mediterranean region						
Scenario	Storyline names	Facilitate, through the rational planning of activities, the sustainable development of coastal zones by ensuring that the environment and landscapes are taken into account in harmony with economic, social and cultural development	Preserve coastal zones for the benefit of current and future generations	Ensure the sustainable use of natural resources, particularly with regard to water use	Ensure preservation of the integrity of coastal ecosystems, landscapes and geomorphology	Prevent and/or reduce the effects of natural hazards and in particular of climate change, which can be induced by natural or human activities	Achieve coherence between public and private initiatives and between all decisions by the public authorities, at the national, regional and local levels, which affect the use of the coastal zone	Emerging contrasts between northern and southern Mediterranean countries
UNEP GEO-3	Markets First	Ignores objective, tourism and urbanisation extend beyond current levels; environmental standards are largely ignored. Transport growth results in expansion of ports too.	Costal zones are developed without regard for future generations except in areas of affluence where scenic vistas are required to appease affluent locals or tourists	Agriculture, through advancing technology is more water efficient although demand increases. Forest and scrub ecosystems are degraded leading to greater soil erosion. Salinization is major problem	Largely neglected; ecosystem functioning is not considered a priority	In the traditional affluent resorts along the coast, engineered solutions to combat the effects to climate change are maintained and improved (mainly for storm damage).	Use of coastal zones is largely at the whim of the free market; state-managed land has been sold off to private enterprise, planning control is diminished too. Local or regional communities have little influence on decision-making	Tourism is largely no-existent in the south Med region dues to climate change; however zones in some areas are increasingly being developed for energy production or transmission - sustainable management of these areas is even more nonexistent than in the north. There is little or no attempt to adapt to climate change hazards.

Scenario	Storyline names	ICZM objectives - Mediterranean region						Emerging contrasts between northern and southern Mediterranean countries
		Facilitate, through the rational planning of activities, the sustainable development of coastal zones by ensuring that the environment and landscapes are taken into account in harmony with economic, social and cultural development	Preserve coastal zones for the benefit of current and future generations	Ensure the sustainable use of natural resources, particularly with regard to water use	Ensure preservation of the integrity of coastal ecosystems, landscapes and geomorphology	Prevent and/or reduce the effects of natural hazards and in particular of climate change, which can be induced by natural or human activities	Achieve coherence between public and private initiatives and between all decisions by the public authorities, at the national, regional and local levels, which affect the use of the coastal zone	
	Policy First	<p>Much of the costal zone is safeguarded for nature and ecosystem service provision.</p> <p>Agricultural production declines (shifts further north) and leaves areas abandoned which are afforested for CC mitigation and soil erosion programmes.</p>	<p>This objective is mostly adhered to; although tourism still increases, it is managed sustainably and increasingly it remains the preserve of the affluent. Land abandonment results in the recreation of semi-natural coastal habitats.</p>	<p>A high priority in this storyline; water, soil and habitats are accorded high value for the ecosystem services they provide. As climate change mitigation and adaptation are high policy objectives, this corresponds well with natural resource management</p>	<p>Also a high priority; 'integrity' in itself is a means to an end, i.e., for climate change adaptation and mitigation</p>	<p>Also a high priority; particular emphasis on maintaining ecosystem integrity to as an ecosystem-based adaptation strategy</p>	<p>Strong partnerships exists through encouragement of environmentally-friendly business and industrial practice. This results in local and regional communities having a strong voice in decision-making affecting coastal zones.</p>	<p>More basic adoption of environmental policy s adopted in southern Mediterranean countries although it still exists.</p> <p>There is a stronger emphasis on renewable energy production in the south though (helps maintain countries' climate change obligations) and a lot of energy is sold to the north.</p>

		ICZM objectives - Mediterranean region						
Scenario	Storyline names	Facilitate, through the rational planning of activities, the sustainable development of coastal zones by ensuring that the environment and landscapes are taken into account in harmony with economic, social and cultural development	Preserve coastal zones for the benefit of current and future generations	Ensure the sustainable use of natural resources, particularly with regard to water use	Ensure preservation of the integrity of coastal ecosystems, landscapes and geomorphology	Prevent and/or reduce the effects of natural hazards and in particular of climate change, which can be induced by natural or human activities	Achieve coherence between public and private initiatives and between all decisions by the public authorities, at the national, regional and local levels, which affect the use of the coastal zone	Emerging contrasts between northern and southern Mediterranean countries
	Security First	<p>Agriculture is subsidised and intensified which results in some loss of coastal habitat to farmland.</p> <p>Environmental policies give way to a further development of industrial and tourist infrastructure.</p>	<p>Development continues unabated. Industry and tourism are deemed more important than leaving a legacy. The economy of most Mediterranean countries isn't strong so preservation isn't a top priority.</p>	<p>Resource use efficiency increases as countries increasingly have to become more self-sufficient. technology and science are heavily funded to meet environmental resource challenges.</p>	<p>Largely neglected; ecosystem functioning is not considered a priority; technology, rather than sustainable management is seen as the panacea.</p>	<p>Climate change adaptation is a major issue and policy is designed to help improve this area. This includes mostly technological and engineering solutions rather than ecosystem-based adaptation.</p>	<p>Strong governmental policy over-rides public/private partnerships. National and regional governance is strengthened although this does include community involvement.</p>	<p>Increasing tensions between southern Mediterranean neighbours provide numerous conflicts over resources (water being the main issue). Whilst trans-boundary issues are common too in the north, they are managed through diplomacy rather than fighting.</p>

		ICZM objectives - Mediterranean region						
Scenario	Storyline names	Facilitate, through the rational planning of activities, the sustainable development of coastal zones by ensuring that the environment and landscapes are taken into account in harmony with economic, social and cultural development	Preserve coastal zones for the benefit of current and future generations	Ensure the sustainable use of natural resources, particularly with regard to water use	Ensure preservation of the integrity of coastal ecosystems, landscapes and geomorphology	Prevent and/or reduce the effects of natural hazards and in particular of climate change, which can be induced by natural or human activities	Achieve coherence between public and private initiatives and between all decisions by the public authorities, at the national, regional and local levels, which affect the use of the coastal zone	Emerging contrasts between northern and southern Mediterranean countries
	Sustainability First	Fully adopts this principle, even more so than Policy First. Society is part and parcel of a governmental drive towards sustainable development.	A main tenet of this storyline.	A main tenet of this storyline.	A main tenet of this storyline.	A main tenet of this storyline. Adopts ecosystem-based adaptation policies more than technological solutions.	There is less direct partnership between government and business (government increases in size) but community involvement is at the heart of governance at all levels.	Less contrast than the other storylines - the pervasive approach to managing the environment

		ICZM objectives - Mediterranean region						
Scenario	Storyline names	Facilitate, through the rational planning of activities, the sustainable development of coastal zones by ensuring that the environment and landscapes are taken into account in harmony with economic, social and cultural development	Preserve coastal zones for the benefit of current and future generations	Ensure the sustainable use of natural resources, particularly with regard to water use	Ensure preservation of the integrity of coastal ecosystems, landscapes and geomorphology	Prevent and/or reduce the effects of natural hazards and in particular of climate change, which can be induced by natural or human activities	Achieve coherence between public and private initiatives and between all decisions by the public authorities, at the national, regional and local levels, which affect the use of the coastal zone	Emerging contrasts between northern and southern Mediterranean countries
Water Vision Mediterranean	Trend	This objective is followed in some locations; however, overall widespread adoption is low and continuing pressures result in more loss of coastal habitats.	In parts of western European Mediterranean countries coastal zone preservation is managed well; in other parts of the Med, other priorities over-rule sustainable management and some coastal habitats are lost	Advancing technology results in greater resource use efficiency; however, increasing population pressure takes its toll and water pressure increases as does the 'mis-management' of semi-natural habitats.	This objective is more likely to be achieved in western European Mediterranean countries; in the south, this is largely ignored	Mixed bag; some adaptation through technology and engineering solutions in wealthier countries. In the south this is largely ignored.	Some involvement, public involvement not always explicit even of policy dictates it should be.	Continued exacerbation of water demand and supply contrast between north and south (i.e., the south struggles with water stress). The south continues to struggle in socio-economic development.

		ICZM objectives - Mediterranean region						
Scenario	Storyline names	Facilitate, through the rational planning of activities, the sustainable development of coastal zones by ensuring that the environment and landscapes are taken into account in harmony with economic, social and cultural development	Preserve coastal zones for the benefit of current and future generations	Ensure the sustainable use of natural resources, particularly with regard to water use	Ensure preservation of the integrity of coastal ecosystems, landscapes and geomorphology	Prevent and/or reduce the effects of natural hazards and in particular of climate change, which can be induced by natural or human activities	Achieve coherence between public and private initiatives and between all decisions by the public authorities, at the national, regional and local levels, which affect the use of the coastal zone	Emerging contrasts between northern and southern Mediterranean countries
	Mediterranean in Crisis	Somewhat similar to Markets First; this storyline adopts a free-market approach to resource management	Free market ideology rules. Private ownership of land increase but restrictions on land management and planning reduce. Preservation is not an important goal.	The 'tragedy of the commons' is the main outcome in this storyline. Competition for resources is fierce and the strong, affluent and wealthy win out at the expense of the poor and the environment.	This objective is largely ignored.	Reliance on technology to reduce effects of climate change is rife. In some areas, hazards occur unchallenged and management of local and regional disasters are under-funded.	Greater involvement of private initiatives	Extreme contrasts; whilst the north is declining in economic performance, the south is falling faster which increases tensions in and between countries. Poverty is a major issue and access to basic natural resources is difficult.

		ICZM objectives - Mediterranean region						
Scenario	Storyline names	Facilitate, through the rational planning of activities, the sustainable development of coastal zones by ensuring that the environment and landscapes are taken into account in harmony with economic, social and cultural development	Preserve coastal zones for the benefit of current and future generations	Ensure the sustainable use of natural resources, particularly with regard to water use	Ensure preservation of the integrity of coastal ecosystems, landscapes and geomorphology	Prevent and/or reduce the effects of natural hazards and in particular of climate change, which can be induced by natural or human activities	Achieve coherence between public and private initiatives and between all decisions by the public authorities, at the national, regional and local levels, which affect the use of the coastal zone	Emerging contrasts between northern and southern Mediterranean countries
	Sustainable Mediterranean	Fully adopts this objective	Part of the policy objective of this storyline; lots of environmental legislation maintains coastal zone integrity	A prime tenet: in particular the management (and sharing) of water resources. Trans-boundary solutions are part of this approach	A main tenet of this storyline.	A main tenet of this storyline.	Strong public/private partnerships exist across industrial sectors and publicly managed coastal land. Community involvement is strong	A more balanced harmonious relationship exists between all Mediterranean countries. Problems are tackled in partnership, resource management is trans-boundary; sustainable technologies are shared and overall environmental problems are managed more successfully throughout the region

Appendix A1.2: Individual Scenario studies

Project or publication name		Audsley et al. What can scenario modelling tell us about future European scale agricultural land use, and what not?. Environmental Science and Policy (2006) vol. 9 (2) pp. 148-162			
Project affiliation		ACCELERATES			
Type of project		Scenario			
If reference, why?		na			
Geography		All Europe			
If non Med or BS, sufficient detail?		Includes breakdown of European Mediterranean countries			
Indirect drivers	Demographic	no	Direct drivers of change	Habitat Change	no
	Economic	yes, crop prices, variables, labour and machinery		Pollution and Nutrient Enrichment	no
	Socio-political	no		Overexploitation of Resources	no
	Cultural & Behavioural	no		Climate Variability and Change	yes, strong emphasis
	Scientific and technology	Yes, advances in crop yield etc		Invasive Species	no
Output Focus or Indicators	Climate	Yes	Scenario construction	Timeline	2050
	Environmental	no		Complexity	Medium
	Biodiversity	no		No. of storylines	4, World Market (WM), Regional Enterprise (RE), Global Sustainability (GS) and Local Stewardship
	Marine	no		Participatory	Use of expert judgement
	Land use	Yes, in terms of agricultural land		Qualitative or Quantitative	Mainly quantitative
	Water	no		Legitimacy	5
	Geopolitical	Yes		Credibility	5
	Health & Welfare	no		Saliency	4
	Socio-economic	Yes		Wildcard scenario? (low-probability high-impact events)	no
	Planning	no		Internally consistent?	yes
	Agriculture	Yes, main theme	Quality of data	Peer review	yes

	Fisheries	no		Expert Judgement	-
	Telecommunications	no		Grey Literature	-
	Energy	no	Summary	Crop yield decreases in the Mediterranean regions and the southwest Balkans	
	Transport	no			
	Ecosystem Services	no			
	Coastal	no			
	Tourism	no			
	Demographics	no	Usefulness to PEGASO		2

Project or publication name		Spangenberg. Integrated scenarios for assessing biodiversity risks. Sustainable Development (2007) vol. 15 (6) pp. 329 - 396			
Project affiliation		ALARM			
Type of project		Scenario			
If reference, why?		na			
Geography		Europe			
If non Med or BS, sufficient detail?		non			
Indirect drivers	Demographic	yes	Direct drivers of change	Habitat Change	yes, mainly fragmentation
	Economic	yes		Pollution and Nutrient Enrichment	Strong emphasis
	Socio-political	yes		Overexploitation of Resources	strong emphasis
	Cultural & Behavioural	yes		Climate Variability and Change	strong emphasis
	Scientific and technology	yes		Invasive Species	strong emphasis
Output Focus or Indicators	Climate	no	Scenario construction	Timeline	2050
	Environmental	yes, main theme		Complexity	high
	Biodiversity	yes, main theme		No. of storylines	3, SEDG, BAMBU, GRAS
	Marine	no		Participatory	yes, scenario team plus stakeholder consultation
	Land use	no		Qualitative or Quantitative	both
	Water	no		Legitimacy	5
	Geopolitical	yes		Credibility	5
	Health & Welfare	no		Saliency	3
	Socio-economic	yes		Wildcard scenario? (low-probability high-impact events)	3 added to each storyline
	Planning	no		Internally consistent?	yes
	Agriculture	yes	Quality of data	Peer review	yes, for some outputs
	Fisheries	no		Expert Judgement	yes
	Telecommunications	no		Grey Literature	-

	Energy	no	Summary	Strong focus on direct drivers of change AS well as indirect drivers (examination of policy is good); not much detail on outcomes, of more use for examining drivers really.	
	Transport	no			
	Ecosystem Services	no			
	Coastal	no			
	Tourism	no			
	Demographics	yes	Usefulness to PEGASO		2

Project or publication name		Stocker et al. The Socio-economic Modelling for the ALARM Project: Process and Results. SERI Working Papers (2007) pp. 1-30			
Project affiliation		ALARM			
Type of project		Scenario			
If reference, why?		na			
Geography		Europe, some focus on Italy			
If non Med or BS, sufficient detail?		not really, more of use for a good review of socio-economic pressures on biodiversity			
Indirect drivers	Demographic	yes	Direct drivers of change	Habitat Change	no
	Economic	Main emphasis		Pollution and Nutrient Enrichment	yes
	Socio-political	Main emphasis		Overexploitation of Resources	yes
	Cultural Behavioural &	yes		Climate Variability and Change	yes
	Scientific technology and	yes		Invasive Species	yes
Output Focus or Indicators	Climate	no	Scenario construction	Timeline	2050
	Environmental	some mention		Complexity	high
	Biodiversity	no		No. of storylines	3, SEDG, BAMBU, GRAS
	Marine	no		Participatory	yes, scenario team plus stakeholder consultation
	Land use	no		Qualitative or Quantitative	both
	Water	no		Legitimacy	5
	Geopolitical	strong emphasis		Credibility	5

	Health & Welfare	no		Saliency		3
	Socio-economic	Main focus		Wildcard scenario? (low-probability high-impact events)		3 added to each storyline
	Planning	no		Internally consistent?		yes
	Agriculture	some mention	Quality of data	Peer review		yes, for some outputs
	Fisheries	no		Expert Judgement		yes
	Telecommunications	no		Grey Literature		-
	Energy	some mention	Summary	Mainly of use to explore socio-economic drivers of change and the variation in output in these sectors for three different storylines.		
	Transport	some mention				
	Ecosystem Services	no				
	Coastal	no				
	Tourism	no				
	Demographics	yes				
		Usefulness to PEGASO		3		
Project or publication name		CAIMED. Governance, competitiveness and networks in the euro-Mediterranean region: transports, energy and telecommunications. (2006) pp. 1-98				
Project affiliation		CAIMED				
Type of project		Reference				
If reference, why?		Useful review of energy, telecommunications and transport networks around Mediterranean Europe and north Africa				
Geography		Euro-African Mediterranean				
If non Med or BS, sufficient detail?		no				
Indirect drivers	Demographic	no	Direct drivers of change	Habitat Change	no	
	Economic	no		Pollution and Nutrient Enrichment	no	
	Socio-political	no		Overexploitation of Resources	no	
	Cultural & Behavioural	no		Climate Variability and Change	no	
	Scientific and technology	no		Invasive Species	no	
Output Focus or Indicators	Climate	no	Scenario construction	Timeline	na	
	Environmental	no		Complexity	na	
	Biodiversity	no		No. of storylines	na	
	Marine	no		Participatory	na	

	Land use	no		Qualitative or Quantitative	na
	Water	no		Legitimacy	na
	Geopolitical	yes		Credibility	na
	Health & Welfare	no		Saliency	na
	Socio-economic	yes		Wildcard scenario? (low-probability high-impact events)	na
	Planning	no		Internally consistent?	na
	Agriculture	no	Quality of data	Peer review	-
	Fisheries	no		Expert Judgement	yes
	Telecommunications	Main focus		Grey Literature	-
	Energy	Main Focus	Summary	Reviews spatial configuration and governance of the Euro-Mediterranean transport, energy and telecommunication systems.	
	Transport	Main focus			
	Ecosystem Services	no			
	Coastal	no			
	Tourism	no			
	Demographics	no		Usefulness to PEGASO	
					3

Project or publication name		CIESM. Climate warming and related changes in Mediterranean marine biota. CIESM Workshop Monographs (2008) pp. 1-21			
Project affiliation		CIESM			
Type of project		Reference			
If reference, why?		Review of CC impacts on marine life in Mediterranean			
Geography		Mediterranean			
If non Med or BS, sufficient detail?		no			
Indirect drivers	Demographic	no	Direct drivers of change	Habitat Change	no
	Economic	no		Pollution and Nutrient Enrichment	no
	Socio-political	no		Overexploitation of Resources	no
	Cultural & Behavioural	no		Climate Variability and Change	Main focus
	Scientific and technology	no		Invasive Species	no
Output Focus or Indicators	Climate	yes	Scenario construction	Timeline	na
	Environmental	no		Complexity	na
	Biodiversity	Main focus		No. of storylines	na
	Marine	Main focus		Participatory	na
	Land use	no		Qualitative or Quantitative	na
	Water	no		Legitimacy	na
	Geopolitical	no		Credibility	na
	Health & Welfare	no		Saliency	na
	Socio-economic	no		Wildcard scenario? (low-probability high-impact events)	na
	Planning	no		Internally consistent?	na
	Agriculture	no	Quality of data	Peer review	-
	Fisheries	no		Expert Judgement	-
	Telecommunications	no		Grey Literature	-

	Energy	no	Summary	Thorough overview of main impacts to date of CC on marine biodiversity in the Mediterranean	
	Transport	no			
	Ecosystem Services	no			
	Coastal	no			
	Tourism	no			
	Demographics	no	Usefulness to PEGASO		3

Project or publication name		Commission on the Black Sea. A 2020 Vision for the Black Sea. (2010) pp. 1-72 (see also *)			
Project affiliation		Commission on the Black Sea			
Type of project		Projection, reference			
If reference, why?		Review and outlook of peace and security, economic development and welfare, democratic institutions and governance, and regional cooperation in Black Sea region			
Geography		Black Sea			
If non Med or BS, sufficient detail?		no			
Indirect drivers	Demographic	yes	Direct drivers of change	Habitat Change	no
	Economic	yes		Pollution and Nutrient Enrichment	no
	Socio-political	yes		Overexploitation of Resources	Yes, particularly gas
	Cultural & Behavioural	yes		Climate Variability and Change	yes, briefly
	Scientific and technology	no		Invasive Species	no
Output Focus or Indicators	Climate	no	Scenario construction	Timeline	2020
	Environmental	yes		Complexity	na
	Biodiversity	no		No. of storylines	just one vision
	Marine	no		Participatory	na
	Land use	no		Qualitative or Quantitative	Qualitative
	Water	no		Legitimacy	na
	Geopolitical	yes, major aspect		Credibility	3
	Health & Welfare	Welfare is a major component		Saliency	4
	Socio-economic	Perhaps main theme of document		Wildcard scenario? (low-probability high-impact events)	discusses role of regional security and risk of clashes
	Planning	no		Internally consistent?	yes
	Agriculture	no	Quality of data	Peer review	-
	Fisheries	no		Expert Judgement	yes
	Telecommunications	no		Grey Literature	-

	Energy	Main theme, particular emphasis on energy security	Summary	Black Sea Commission focuses on four areas: peace and security, economic development and welfare, democratic institutions and good governance and, finally, regional cooperation. It then presents policy recommendations for all stakeholders.	
	Transport	Major theme			
	Ecosystem Services	no			
	Coastal	no			
	Tourism	no			
	Demographics	no	Usefulness to PEGASO		4

Project or publication name		NRC. Framework and Implementation for a National Cooperative Approach to Integrated Coastal Zone Management. (2006) pp. 1-57			
Project affiliation		Commonwealth of Australia			
Type of project		Reference			
If reference, why?		Despite the focus on Australian coastal zones, it provides an excellent review of coastal pressures and outlines ICZM plans			
Geography		Australia			
If non Med or BS, sufficient detail?		no, habitat specific (coastal zones)			
Indirect drivers	Demographic	yes	Direct drivers of change	Habitat Change	yes, strong emphasis
	Economic	yes, industry particularly		Pollution and Nutrient Enrichment	yes, strong emphasis
	Socio-political	yes		Overexploitation of Resources	yes, strong emphasis
	Cultural & Behavioural	yes		Climate Variability and Change	yes, strong emphasis
	Scientific and technology	no		Invasive Species	yes, strong emphasis
Output Focus or Indicators	Climate	yes	Scenario construction	Timeline	na
	Environmental	yes		Complexity	na
	Biodiversity	yes		No. of storylines	na
	Marine	yes		Participatory	na
	Land use	no		Qualitative or Quantitative	na
	Water	yes, quality		Legitimacy	na
	Geopolitical	no		Credibility	na
	Health & Welfare	no		Saliency	na
	Socio-economic	no		Wildcard scenario? (low-probability high-impact events)	na
	Planning	yes, strong emphasis		Internally consistent?	na
	Agriculture	no	Quality of data	Peer review	-
	Fisheries	yes		Expert Judgement	-

	Telecommunications	no		Grey Literature	-
	Energy	no	Summary	Highlights coastal zone biodiversity issues and pressures and provides detailed ICZM plan; useful reference point.	
	Transport	no			
	Ecosystem Services	no			
	Coastal	Main theme			
	Tourism	no			
	Demographics	yes	Usefulness to PEGASO		3

Project or publication name		Boudouresque and Verlaque. Biological pollution in the Mediterranean Sea: Invasive versus introduced macrophytes. Marine Pollution Bulletin (2002) vol. 44 (1) pp. 32-38			
Project affiliation		EC Life			
Type of project		Reference, projection			
If reference, why?		Thorough review of existing invasive species with a rough guide to likely outcomes in 20 years time			
Geography		Mediterranean			
If non Med or BS, sufficient detail?		no			
Indirect drivers	Demographic	no	Direct drivers of change	Habitat Change	no
	Economic	no		Pollution and Nutrient Enrichment	no
	Socio-political	no		Overexploitation of Resources	no
	Cultural & Behavioural	no		Climate Variability and Change	no
	Scientific and technology	no		Invasive Species	no
Output Focus or Indicators	Climate	no	Scenario construction	Timeline	na
	Environmental	yes		Complexity	na
	Biodiversity	yes		No. of storylines	na
	Marine	yes		Participatory	na
	Land use	no		Qualitative or Quantitative	na
	Water	no		Legitimacy	na
	Geopolitical	no		Credibility	na
	Health & Welfare	no		Saliency	na
	Socio-economic	no		Wildcard scenario? (low-probability high-impact events)	na
	Planning	no		Internally consistent?	na
	Agriculture	no	Quality of data	Peer review	yes
	Fisheries	no		Expert Judgement	-
	Telecommunications	no		Grey Literature	-
	Energy	no	mar >	Authors estimate the number of introduced species will increase by	

	Transport	no		about 80 species over the next 20 years. Although they don't (and can't) predict which species will become invasive, they expect that 5–10 spp will be invasive, with accompanying ecological and/or economical dire consequences. Authors suggest implementing national legislation control measures.	
	Ecosystem Services	no			
	Coastal	no			
	Tourism	no			
	Demographics	no	Usefulness to PEGASO		2

Project or publication name		EEA. Chapter 5 Marine and coastal environment. Europe's environment - The fourth assessment (2007) pp. 1-44			
Project affiliation		EEA			
Type of project		Reference			
If reference, why?		Very comprehensive overview of environmental issues facing Europe. The chapter on Marine & coastal environments is excellent			
Geography		Europe			
If non Med or BS, sufficient detail?		yes, numerous mentions of both regions			
Indirect drivers	Demographic	yes	Direct drivers of change	Habitat Change	yes
	Economic	yes		Pollution and Nutrient Enrichment	yes
	Socio-political	yes		Overexploitation of Resources	yes
	Cultural & Behavioural	yes		Climate Variability and Change	yes
	Scientific and technology	yes		Invasive Species	yes
Output Focus or Indicators	Climate	yes	Scenario construction	Timeline	na
	Environmental	yes		Complexity	na
	Biodiversity	yes		No. of storylines	na
	Marine	yes		Participatory	na
	Land use	yes		Qualitative or Quantitative	na
	Water	yes		Legitimacy	na
	Geopolitical	no		Credibility	na
	Health & Welfare	no		Saliency	na
	Socio-economic	no		Wildcard scenario? (low-probability high-impact events)	na
	Planning	yes		Internally consistent?	na
	Agriculture	yes	Quality of data	Peer review	-
	Fisheries	yes		Expert Judgement	yes
	Telecommunications	no		Grey Literature	-
	Energy	no	mar >	Very useful review of main drivers of change for marine and coastal	

	Transport	no		environmental change.	
	Ecosystem Services	yes, albeit brief			
	Coastal	yes			
	Tourism	no			
	Demographics	no	Usefulness to PEGASO		5

Project or publication name		EEA. The European environment — state and outlook 2010: synthesis. (2011) pp. 1-228			
Project affiliation		EEA			
Type of project		Reference			
If reference, why?		Comprehensive state of the environmental review of Europe; useful also for outlook section			
Geography		Europe			
If non Med or BS, sufficient detail?		yes, numerous mentions of both regions			
Indirect drivers	Demographic	yes	Direct drivers of change	Habitat Change	yes
	Economic	yes		Pollution and Nutrient Enrichment	yes
	Socio-political	yes		Overexploitation of Resources	yes
	Cultural & Behavioural	yes		Climate Variability and Change	yes
	Scientific and technology	yes		Invasive Species	yes
Output Focus or Indicators	Climate	yes	Scenario construction	Timeline	na
	Environmental	yes		Complexity	na
	Biodiversity	yes		No. of storylines	na
	Marine	yes		Participatory	na
	Land use	no		Qualitative or Quantitative	na
	Water	no		Legitimacy	na
	Geopolitical	no		Credibility	na
	Health & Welfare	no		Saliency	na
	Socio-economic	no		Wildcard scenario? (low-probability high-impact events)	na
	Planning	no		Internally consistent?	na
	Agriculture	no	Quality of data	Peer review	-
	Fisheries	no		Expert Judgement	-
	Telecommunications	no		Grey Literature	-
	Energy	no	Summary	Good review, would be very useful to help create a baseline or business as usual scenario	
	Transport	no			
	Ecosystem Services	no			

	Coastal	no			
	Tourism	no			
	Demographics	no	Usefulness to PEGASO		4

Project or publication name		Velkavrh. Catalogue of forward-looking indicators from selected sources; A contribution to the forward-looking component of a shared environmental information system (SEIS/Forward). (2008) pp. 1-204			
Project affiliation		EEA			
Type of project		Reference			
If reference, why?		Useful guide to trends and future indicators in various sectors.			
Geography		Europe			
If non Med or BS, sufficient detail?		references to Med			
Indirect drivers	Demographic	no	Direct drivers of change	Habitat Change	yes
	Economic	yes		Pollution and Nutrient Enrichment	yes
	Socio-political	yes		Overexploitation of Resources	yes
	Cultural & Behavioural	no		Climate Variability and Change	yes
	Scientific and technology	no		Invasive Species	no
Output Focus or Indicators	Climate	yes	Scenario construction	Timeline	na
	Environmental	yes		Complexity	na
	Biodiversity	yes		No. of storylines	na
	Marine	no		Participatory	na
	Land use	yes		Qualitative or Quantitative	na
	Water	yes		Legitimacy	na
	Geopolitical	yes		Credibility	na
	Health & Welfare	no		Saliency	na
	Socio-economic	yes		Wildcard scenario? (low-probability high-impact events)	na
	Planning	no		Internally consistent?	na
	Agriculture	yes	Quality of data	Peer review	-
	Fisheries	no		Expert Judgement	-
	Telecommunications	no		Grey Literature	-
	Energy	yes	Summary	Good review, would be very useful to help create a baseline or business as usual scenario	
	Transport	yes			

	Ecosystem Services	no			
	Coastal	no			
	Tourism	yes			
	Demographics	no	Usefulness to PEGASO		4

Project or publication name		Velkavrh. The pan-European environment: glimpses into an uncertain future. (2007) pp. 1-82			
Project affiliation		EEA			
Type of project		Reference, projection			
If reference, why?		Very useful guide to future environmental problems in Europe; also reviews future drivers of change			
Geography		Europe			
If non Med or BS, sufficient detail?		some detail on Med			
Indirect drivers	Demographic	yes	Direct drivers of change	Habitat Change	yes
	Economic	yes		Pollution and Nutrient Enrichment	yes
	Socio-political	yes		Overexploitation of Resources	yes
	Cultural & Behavioural	yes		Climate Variability and Change	yes
	Scientific and technology	yes		Invasive Species	yes
Output Focus or Indicators	Climate	yes	Scenario construction	Timeline	na
	Environmental	yes		Complexity	na
	Biodiversity	yes		No. of storylines	na
	Marine	no		Participatory	na
	Land use	yes		Qualitative or Quantitative	na
	Water	no		Legitimacy	na
	Geopolitical	yes		Credibility	na
	Health & Welfare	no		Saliency	na
	Socio-economic	yes		Wildcard scenario? (low-probability high-impact events)	na
	Planning	no		Internally consistent?	na
	Agriculture	yes	Quality of data	Peer review	-
	Fisheries	yes		Expert Judgement	-
	Telecommunications	no		Grey Literature	-
	Energy	yes	mar >	Very useful review of future environmental issues in Europe; provides	

	Transport	yes		good list of trends in different sectors and even reviews a long list of forward looking studies including scenarios	
	Ecosystem Services	no			
	Coastal	no			
	Tourism	yes			
	Demographics	yes	Usefulness to PEGASO		5

Project or publication name		Volkery. Land use scenarios for Europe — Qualitative and quantitative analysis on a European scale. PRELUDE (2007) pp. 1-78			
Project affiliation		EEA			
Type of project		scenario			
If reference, why?		na			
Geography		Europe			
If non Med or BS, sufficient detail?		some detail on Med			
Indirect drivers	Demographic	yes	Direct drivers of change	Habitat Change	yes
	Economic	yes		Pollution and Nutrient Enrichment	yes
	Socio-political	yes		Overexploitation of Resources	yes
	Cultural & Behavioural	yes		Climate Variability and Change	yes
	Scientific and technology	yes		Invasive Species	yes
Output Focus or Indicators	Climate	yes	Scenario construction	Timeline	2035
	Environmental	yes		Complexity	na
	Biodiversity	yes		No. of storylines	5, Great Escape, Evolved Society, Clustered Networks, Lettuce Surprise U, Big Crisis
	Marine	no		Participatory	yes, fully
	Land use	yes, main theme		Qualitative or Quantitative	both
	Water	some		Legitimacy	5
	Geopolitical	no		Credibility	4
	Health & Welfare	no		Saliency	5
	Socio-economic	yes		Wildcard scenario? (low-probability high-impact events)	na
	Planning	no		Internally consistent?	yes
	Agriculture	yes	Quality of data	Peer review	yes
	Fisheries	no		Expert Judgement	yes

	Telecommunications	no		Grey Literature	-
	Energy	no	Summary	Mainly land use but has some pertinent aspects for PEGASO; good review of drivers and scenarios are well constructed	
	Transport	no			
	Ecosystem Services	no			
	Coastal	no			
	Tourism	no			
	Demographics	no	Usefulness to PEGASO		3

Project or publication name		de Vries. European Territories Confronted with Climate Change: Awaiting the Events or Timely Preparation?. Futures (2010)			
Project affiliation		ESPON			
Type of project		scenario			
If reference, why?		Examines two contrasting adaptation and mitigation scenarios for Europe			
Geography		Europe			
If non Med or BS, sufficient detail?		a number of references to Med landscapes			
Indirect drivers	Demographic	no	Direct drivers of change	Habitat Change	no
	Economic	yes		Pollution and Nutrient Enrichment	no
	Socio-political	yes		Overexploitation of Resources	no
	Cultural & Behavioural	yes		Climate Variability and Change	Main theme
	Scientific and technology	yes		Invasive Species	no
Output Focus or Indicators	Climate	adaptation and mitigation	Scenario construction	Timeline	2030
	Environmental	yes		Complexity	fairly low, scenarios are easily drawn out and explained
	Biodiversity	yes		No. of storylines	2, 'Be prepared for the worst' and 'Deal with things as they happen'
	Marine	no		Participatory	no
	Land use	yes		Qualitative or Quantitative	qualitative
	Water	yes, flooding and droughts		Legitimacy	not very apparent, 2
	Geopolitical	yes		Credibility	5
	Health & Welfare	yes		Saliency	5
	Socio-economic	yes		Wildcard scenario? (low-probability high-impact events)	no
	Planning	yes		Internally consistent?	yes
	Agriculture	yes	ity of	Peer review	yes

	Fisheries	no		Expert Judgement	-
	Telecommunications	no		Grey Literature	-
	Energy	yes	Summary	These scenarios provide a useful summary of two extreme approaches to CC response in Europe. Both strategies challenge and provide a useful insight into potential options; they also highlight the need to change behaviour now.	
	Transport	no			
	Ecosystem Services	no			
	Coastal	yes			
	Tourism	yes			
	Demographics	no	Usefulness to PEGASO		4
Project or publication name		ESPON. Spatial Visions and Scenarios – Thematic Study of INTERREG and ESPON activities. (2006) pp. 1-112 AND Lennert and Robert. The Territorial Futures of Europe: Trends Competition'or Cohesion'. Futures (2010)			
Project affiliation		ESPON			
Type of project		Scenario			
If reference, why?		na			
Geography		Europe			
If non Med or BS, sufficient detail?		a number of references to Med and BS			
Indirect drivers	Demographic	yes	Direct drivers of change	Habitat Change	no
	Economic	yes		Pollution and Nutrient Enrichment	yes
	Socio-political	yes		Overexploitation of Resources	yes
	Cultural & Behavioural	yes		Climate Variability and Change	yes
	Scientific and technology	yes		Invasive Species	no
Output Focus or Indicators	Climate	yes, mainly adaptation	Scenario construction	Timeline	2030
	Environmental	yes		Complexity	med
	Biodiversity	yes		No. of storylines	3, one baseline,
	Marine	no		Participatory	no mention
	Land use	yes		Qualitative or Quantitative	mostly qualitative, some quan for trend scenario
	Water	yes, droughts		Legitimacy	1
	Geopolitical	no		Credibility	3

	Health & Welfare	yes		Saliency	4
	Socio-economic	yes		Wildcard scenario? (low-probability high-impact events)	no
	Planning	no		Internally consistent?	yes
	Agriculture	yes	Quality of data	Peer review	yes
	Fisheries	no		Expert Judgement	yes
	Telecommunications	no		Grey Literature	-
	Energy	yes	Summary	Strong emphasis on socio-economic future of Europe; thorough and comprehensive storylines may be of use	
	Transport	yes			
	Ecosystem Services	no			
	Coastal	yes			
	Tourism	yes			
	Demographics	yes			
			Usefulness to PEGASO		2

Project or publication name		Smith and Dubois. The Wild Cards' of European Futures: Planning for Discontinuities?. Futures (2010)			
Project affiliation		ESPON			
Type of project		Scenario			
If reference, why?		na			
Geography		Europe			
If non Med or BS, sufficient detail?		a number of references to Med and BS			
Indirect drivers	Demographic	yes	Direct drivers of change	Habitat Change	no
	Economic	yes		Pollution and Nutrient Enrichment	yes
	Socio-political	yes		Overexploitation of Resources	yes
	Cultural & Behavioural	yes		Climate Variability and Change	yes
	Scientific and technology	yes		Invasive Species	no
Output Focus or Indicators	Climate	yes, mainly adaptation	Scenario construction	Timeline	2030
	Environmental	yes		Complexity	med
	Biodiversity	yes		No. of storylines	3, one baseline,
	Marine	no		Participatory	no mention
	Land use	yes		Qualitative or Quantitative	mostly qualitative, some quan for trend scenario
	Water	yes, droughts		Legitimacy	1
	Geopolitical	no		Credibility	3
	Health & Welfare	yes		Saliency	4
	Socio-economic	yes		Wildcard scenario? (low-probability high-impact events)	Yes, adds to above
	Planning	no		Internally consistent?	yes
	Agriculture	yes	Quality of data	Peer review	yes
	Fisheries	no		Expert Judgement	yes
	Telecommunications	no		Grey Literature	-

	Energy	yes	Summary	Strong emphasis on socio-economic future of Europe; thorough and comprehensive storylines may be of use	
	Transport	yes			
	Ecosystem Services	no			
	Coastal	yes			
	Tourism	yes			
	Demographics	yes	Usefulness to PEGASO		3

Project or publication name		Philippart et al. Impacts of climate change on European marine ecosystems: Observations, expectations and indicators. Journal of Experimental Marine Biology and Ecology (2011) vol. 400 (1-2) pp. 52-69			
Project affiliation		European Science Foundation			
Type of project		Reference, projection			
If reference, why?		Includes chapters on Med and Black Sea; very good review			
Geography		Europe			
If non Med or BS, sufficient detail?		Yes, chapters on both			
Indirect drivers	Demographic	no	Direct drivers of change	Habitat Change	no
	Economic	no		Pollution and Nutrient Enrichment	no
	Socio-political	no		Overexploitation of Resources	no
	Cultural & Behavioural	no		Climate Variability and Change	yes
	Scientific and technology	no		Invasive Species	no
Output Focus or Indicators	Climate	no	Scenario construction	Timeline	na
	Environmental	no		Complexity	na
	Biodiversity	yes		No. of storylines	na
	Marine	yes		Participatory	na
	Land use	no		Qualitative or Quantitative	na
	Water	no		Legitimacy	na
	Geopolitical	no		Credibility	na
	Health & Welfare	no		Saliency	na
	Socio-economic	no		Wildcard scenario? (low-probability high-impact events)	na
	Planning	no		Internally consistent?	na
	Agriculture	no	Quality of data	Peer review	yes
	Fisheries	no		Expert Judgement	yes
	Telecommunications	no		Grey Literature	-
	Energy	no	Summary	Summaries affects of CC on both Med and BS, highlights ecological problems and suggests adaptation measures.	
	Transport	no			

	Ecosystem Services	no			
	Coastal	no			
	Tourism	no			
	Demographics	no	Usefulness to PEGASO		4

Project or publication name		Eickhout and Prins. EURURALIS 2.0 - Technical background and indicator documentation. (2008) pp. 1-88 AND Klijn et al. The EURURALIS study: Technical document. (2005) pp. 1-215 AND Westhoek et al. Scenario development to explore the future of Europe's r			
Project affiliation		EURURALIS			
Type of project		scenario			
If reference, why?		Provides useful storylines of a future Europe even if it isn't very relevant to marine or coastal ecosystems			
Geography		Europe			
If non Med or BS, sufficient detail?		no			
Indirect drivers	Demographic	yes	Direct drivers of change	Habitat Change	no
	Economic	yes		Pollution and Nutrient Enrichment	no
	Socio-political	yes		Overexploitation of Resources	yes
	Cultural & Behavioural	yes		Climate Variability and Change	yes
	Scientific and technology	yes		Invasive Species	no
Output Focus or Indicators	Climate	yes	Scenario construction	Timeline	2030-40
	Environmental	yes		Complexity	high
	Biodiversity	yes		No. of storylines	4, Global Economy, Continental Markets, Global co-operation, Regional Communities
	Marine	no		Participatory	not clear
	Land use	yes		Qualitative or Quantitative	both
	Water	yes		Legitimacy	2
	Geopolitical	no		Credibility	5
	Health & Welfare	no		Saliency	5
	Socio-economic	yes		Wildcard scenario? (low-probability high-impact events)	no
	Planning	no		Internally consistent?	yes
	Agriculture	main thrust	Quality of data	Peer review	yes
	Fisheries	no		Expert Judgement	yes

	Telecommunications	no		Grey Literature	-
	Energy	no	Summary	Although not explicitly relevant for Marine or Coastal environs, EURURALIS is a very well developed summary of future European scenarios taking in major socio-economic drivers and policy changes	
	Transport	no			
	Ecosystem Services	no			
	Coastal	no			
	Tourism	no			
	Demographics	yes	Usefulness to PEGASO		3
Project or publication name		Reinks, W. The future of rural Europe An anthology based on the results of the Eururalis 2.0 scenario study. (2008) pp. 1-56			
Project affiliation		EURURALIS			
Type of project		Scenario			
If reference, why?		na			
Geography		Europe, can narrow down to region			
If non Med or BS, sufficient detail?		no			
Indirect drivers	Demographic	yes	Direct drivers of change	Habitat Change	yes, through changes in agri
	Economic	yes, particularly includes global inputs		Pollution and Nutrient Enrichment	implicit
	Socio-political	yes		Overexploitation of Resources	implicit
	Cultural & Behavioural	yes		Climate Variability and Change	Yes, strong emphasis
	Scientific and technology	yes		Invasive Species	no
Output Focus or Indicators	Climate	no	Scenario construction	Timeline	2030
	Environmental	Main		Complexity	Quite high, use of online tool enables multiple factors to be adjusted
	Biodiversity	Main		No. of storylines	4, Global Economy, Continental Markets, Global Co-operation, Regional Communities
	Marine	no		Participatory	Academic led,
	Land use	Main		Qualitative or Quantitative	both
	Water	no		Legitimacy	3
	Geopolitical	no		Credibility	5
	Health & Welfare	no		Saliency	5

	Socio-economic	no		Wildcard scenario? (low-probability high-impact events)	no
	Planning	no		Internally consistent?	yes
	Agriculture	farm income, structure, abandonment, livestock and biofuels	Quality of data	Peer review	yes, a few publications
	Fisheries	no		Expert Judgement	yes
	Telecommunications	no		Grey Literature	yes
	Energy	no	Summary	Examines future of rural Europe by allowing users to adjust a number of drivers such as biofuel policy, technology, impact of policy measures on the CAP using four scenarios.	
	Transport	no			
	Ecosystem Services	no			
	Coastal	no			
	Tourism	no			
	Demographics	no			
			Usefulness to PEGASO		2

Project or publication name		Langmead et al. European Lifestyles and Marine Ecosystems: Exploring challenges for managing Europe's seas. University of Plymouth Marine Institute (2007) pp. 1-46			
Project affiliation		FP6			
Type of project		scenario			
If reference, why?		na			
Geography		Black sea and Mediterranean			
If non Med or BS, sufficient detail?		no			
Indirect drivers	Demographic	yes	Direct drivers of change	Habitat Change	yes, coastal development
	Economic	yes		Pollution and Nutrient Enrichment	yes, strong emphasis
	Socio-political	yes		Overexploitation of Resources	yes, particular emphasis on over fishing
	Cultural & Behavioural	yes		Climate Variability and Change	yes
	Scientific and technology	yes		Invasive Species	yes, very strong emphasis
Output Focus or Indicators	Climate	yes	Scenario construction	Timeline	2020-30
	Environmental	yes		Complexity	low
	Biodiversity	yes, strong emphasis		No. of storylines	4 plus a baseline, National Enterprise, Local Responsibility, World Markets, Global Community.
	Marine	main theme		Participatory	not apparent
	Land use	yes, but less so		Qualitative or Quantitative	Qualitative
	Water	yes		Legitimacy	1
	Geopolitical	yes		Credibility	4
	Health & Welfare	no		Saliency	4
	Socio-economic	yes		Wildcard scenario? (low-probability high-impact events)	no
	Planning	yes, coastal		Internally consistent?	yes
	Agriculture	yes	Quality of data	Peer review	-
	Fisheries	Main theme		Expert Judgement	yes
	Telecommunications	no		Grey Literature	yes
	Energy	yes	mar >	Focuses mainly on a set of well defined direct drivers: Industrial	

	Transport	yes		discharge, Fishing effort, Urban waste water treatment, Agricultural activity, Fossil fuel en. gen., Shipping activity and Livestock prod. But very focussed on marine fish consequences in the five scenarios	
	Ecosystem Services	no			
	Coastal	yes			
	Tourism	yes			
	Demographics	no	Usefulness to PEGASO		5

Project or publication name		UNEP. Chapter 2: State of the Environment and Policy Retrospective: 1972–2002 -Coastal and marine areas. Global Environment Outlook 3 Past, present and future perspectives (2002) pp. 1-30			
Project affiliation		GEO-3			
Type of project		Reference			
If reference, why?		Useful chapter on European marine and coastal environmental drivers of change as well as policy			
Geography		Global			
If non Med or BS, sufficient detail?		section on European seas			
Indirect drivers	Demographic	no	Direct drivers of change	Habitat Change	yes
	Economic	no		Pollution and Nutrient Enrichment	main thrust
	Socio-political	no		Overexploitation of Resources	yes
	Cultural & Behavioural	no		Climate Variability and Change	yes
	Scientific and technology	no		Invasive Species	yes
Output Focus or Indicators	Climate	no	Scenario construction	Timeline	na
	Environmental	yes		Complexity	na
	Biodiversity	yes		No. of storylines	na
	Marine	yes		Participatory	na
	Land use	no		Qualitative or Quantitative	na
	Water	no		Legitimacy	na
	Geopolitical	no		Credibility	na
	Health & Welfare	no		Saliency	na
	Socio-economic	no		Wildcard scenario? (low-probability high-impact events)	na
	Planning	no		Internally consistent?	na
	Agriculture	no	Quality of data	Peer review	-
	Fisheries	yes		Expert Judgement	-
	Telecommunications	no		Grey Literature	-
	Energy	no	Summary	Provides outline of main marine environmental threats but also discusses it down to regional level	
	Transport	no			
	Ecosystem Services	no			
	Coastal	yes			
	Tourism	no			

	Demographics	no	Usefulness to PEGASO	2
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Project or publication name		UNEP and RIVM. Four Scenarios for Europe: Based on UNEP's third Global Environment Outlook. (2003) pp. 1-32 AND UNEP. Chapter 4: Outlook 2002–32. Global Environment Outlook 3 Past, present and future perspectives (2002) pp. 1-82			
Project affiliation		GEO-3			
Type of project		Scenarios			
If reference, why?		na			
Geography		Europe			
If non Med or BS, sufficient detail?		no			
Indirect drivers	Demographic	yes	Direct drivers of change	Habitat Change	yes
	Economic	yes		Pollution and Nutrient Enrichment	yes
	Socio-political	yes		Overexploitation of Resources	yes
	Cultural & Behavioural	yes		Climate Variability and Change	yes
	Scientific and technology	yes		Invasive Species	no
Output Focus or Indicators	Climate	no	Scenario construction	Timeline	2030 and 2050
	Environmental	Main theme, particularly pollution impacts and soil erosion		Complexity	Mediterranean
	Biodiversity	Main theme		No. of storylines	4, Markets First, Policy First, Security First, Sustainability First
	Marine	no		Participatory	development through scenario groups
	Land use	Main theme, infrastructure expansion		Qualitative or Quantitative	both
	Water	Water stress main theme		Legitimacy	3
	Geopolitical	no		Credibility	4
	Health & Welfare	no		Saliency	4
	Socio-economic	no		Wildcard scenario? (low-probability high-impact events)	no
	Planning	no		Internally consistent?	yes
	Agriculture	yes	Quality of data	Peer review	-
	Fisheries	no		Expert Judgement	yes

	Telecommunications	no		Grey Literature	yes
	Energy	yes	Summary	Provides four well drawn scenarios with a focus on European environmental futures. Main use as a reference for scenario structure for Europe. Also very useful description of the main drivers.	
	Transport	yes			
	Ecosystem Services	no			
	Coastal	no			
	Tourism	no			
	Demographics	no	Usefulness to PEGASO		3

Project or publication name		Greenpeace. Mediterranean Marine Governance. (2009) pp. 1-16			
Project affiliation		Greenpeace			
Type of project		Reference			
If reference, why?		Critique of current env. governance in Med and solutions to improving short, medium, and long-term governance.			
Geography		Mediterranean			
If non Med or BS, sufficient detail?		no			
Indirect drivers	Demographic	no	Direct drivers of change	Habitat Change	no
	Economic	no		Pollution and Nutrient Enrichment	no
	Socio-political	no		Overexploitation of Resources	no
	Cultural & Behavioural	no		Climate Variability and Change	no
	Scientific and technology	no		Invasive Species	no
Output Focus or Indicators	Climate	yes	Scenario construction	Timeline	na
	Environmental	yes		Complexity	na
	Biodiversity	yes		No. of storylines	na
	Marine	yes		Participatory	na
	Land use	no		Qualitative or Quantitative	na
	Water	no		Legitimacy	na
	Geopolitical	no		Credibility	na
	Health & Welfare	no		Saliency	na
	Socio-economic	no		Wildcard scenario? (low-probability high-impact events)	na
	Planning	yes		Internally consistent?	na
	Agriculture	no	Quality of data	Peer review	-
	Fisheries	yes		Expert Judgement	-
	Telecommunications	no		Grey Literature	-
	Energy	no	Summary	Could be useful document for helping to design a green storyline - outlines issues with current governance and proposes solutions.	
	Transport	no			
	Ecosystem Services	no			
	Coastal	yes			
	Tourism	no			
	Demographics	no	Usefulness to PEGASO		4

Project or publication name		Dimadama and Timotheou. Greening the Black Sea: Overcoming Inefficiency and Fragmentation through Environmental Governance. (2010) pp. 1-36			
Project affiliation		International Centre for Black Sea Studies (ICBSS)			
Type of project		Reference, policy brief			
If reference, why?		outlines environmental issues in BS region; provides useful			
Geography		Black Sea			
If non Med or BS, sufficient detail?		no			
Indirect drivers	Demographic	yes	Direct drivers of change	Habitat Change	yes, strong emphasis
	Economic	yes		Pollution and Nutrient Enrichment	yes, strong emphasis
	Socio-political	yes		Overexploitation of Resources	yes, strong emphasis
	Cultural & Behavioural	yes		Climate Variability and Change	yes, strong emphasis
	Scientific and technology	no		Invasive Species	no
Output Focus or Indicators	Climate	no	Scenario construction	Timeline	na
	Environmental	no		Complexity	na
	Biodiversity	no		No. of storylines	na
	Marine	no		Participatory	na
	Land use	no		Qualitative or Quantitative	na
	Water	no		Legitimacy	na
	Geopolitical	Main theme: outlines policy towards greater environmental governance		Credibility	na
	Health & Welfare	no		Saliency	na
	Socio-economic	no		Wildcard scenario? (low-probability high-impact events)	na
	Planning	yes		Internally consistent?	na
	Agriculture	no	Quality of data	Peer review	-
	Fisheries	no		Expert Judgement	yes
	Telecommunications	no		Grey Literature	-
	Energy	no	Summary	Good review of main environmental threats to BS region; followed by useful policy advice on improving governance, communications, policy co-ordination and financing to tackle these issues.	
	Transport	no			
	Ecosystem Services	no			

	Coastal	no			
	Tourism	no			
	Demographics	no	Usefulness to PEGASO		4

Project or publication name		Triantaphyllou. The 'security paradoxes' of the Black Sea region. Journal of Southeast European and Black Sea (2009) vol. 9 (3) pp. 225-241			
Project affiliation		International Centre for Black Sea Studies (ICBSS)			
Type of project		Reference			
If reference, why?		Highlights political and governance issues in BS region			
Geography		Black Sea			
If non Med or BS, sufficient detail?		no			
Indirect drivers	Demographic	no	Direct drivers of change	Habitat Change	no
	Economic	no		Pollution and Nutrient Enrichment	no
	Socio-political	no		Overexploitation of Resources	no
	Cultural & Behavioural	no		Climate Variability and Change	no
	Scientific and technology	no		Invasive Species	no
Output Focus or Indicators	Climate	no	Scenario construction	Timeline	na
	Environmental	no		Complexity	na
	Biodiversity	no		No. of storylines	na
	Marine	no		Participatory	na
	Land use	no		Qualitative or Quantitative	na
	Water	no		Legitimacy	na
	Geopolitical	Main theme		Credibility	na
	Health & Welfare	no		Saliency	na
	Socio-economic	yes		Wildcard scenario? (low-probability high-impact events)	na
	Planning	no		Internally consistent?	na
	Agriculture	no	Quality of data	Peer review	-
	Fisheries	no		Expert Judgement	-
	Telecommunications	no		Grey Literature	-
	Energy	Main theme	Summary	Good review of main governance issue sin BS region; useful for scenario construction	
	Transport	no			
	Ecosystem Services	no			
	Coastal	no			
	Tourism	no			

	Demographics	no	Usefulness to PEGASO	2
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Project or publication name		Kok et al. Multi-scale participatory local scenario development: Using Mediterranean scenarios as boundary conditions. Bridging Scales and Epistemologies workshop, Millennium Ecosystem Assessment, Alexandria, Egypt. (2004) AND Kok et al. Multi-scale narra			
Project affiliation		MedAction			
Type of project		Scenario			
If reference, why?		Provides a good summary of three Med scenarios and their drivers of change			
Geography		Mediterranean			
If non Med or BS, sufficient detail?		no			
Indirect drivers	Demographic	yes	Direct drivers of change	Habitat Change	no
	Economic	yes		Pollution and Nutrient Enrichment	no
	Socio-political	yes		Overexploitation of Resources	no
	Cultural & Behavioural	yes		Climate Variability and Change	yes
	Scientific and technology	yes		Invasive Species	no
Output Focus or Indicators	Climate	yes	Scenario construction	Timeline	2030
	Environmental	yes		Complexity	med
	Biodiversity	no		No. of storylines	3, Knowledge is King, Convulsive Change, and Big is Beautiful?
	Marine	no		Participatory	yes, very
	Land use	no		Qualitative or Quantitative	Qualitative
	Water	yes		Legitimacy	5
	Geopolitical	yes		Credibility	5
	Health & Welfare	no		Saliency	3
	Socio-economic	yes, main theme		Wildcard scenario? (low-probability high-impact events)	no
	Planning	no		Internally consistent?	yes
	Agriculture	yes	Quality of data	Peer review	-
	Fisheries	no		Expert Judgement	yes
	Telecommunications	yes		Grey Literature	-
	Energy	yes	Summary	Perhaps most of use because it provides a good example of participatory scenario making in the Mediterranean region.	
	Transport	yes			

	Ecosystem Services	no			
	Coastal	no			
	Tourism	yes			
	Demographics	yes	Usefulness to PEGASO		3

Project or publication name		Amelung and Viner. Mediterranean Tourism: Exploring the Future with the Tourism Climatic Index. Journal of Sustainable Tourism (2006) vol. 14 (4) pp. 349-366			
Project affiliation		none			
Type of project		Scenario			
If reference, why?		na			
Geography		Mediterranean			
If non Med or BS, sufficient detail?		Case study on Balearics			
Indirect drivers	Demographic	yes	Direct drivers of change	Habitat Change	no
	Economic	yes		Pollution and Nutrient Enrichment	no
	Socio-political	no		Overexploitation of Resources	no
	Cultural & Behavioural	yes		Climate Variability and Change	Main focus
	Scientific and technology	no		Invasive Species	no
Output Focus or Indicators	Climate	Examines role of climate change using 'Tourism Climatic Indices'	Scenario construction	Timeline	2020s, 2050s, 2080s
	Environmental	no		Complexity	na
	Biodiversity	no		No. of storylines	na
	Marine	no		Participatory	na
	Land use	no		Qualitative or Quantitative	na
	Water	no		Legitimacy	na
	Geopolitical	no		Credibility	na
	Health & Welfare	no		Saliency	na
	Socio-economic	no		Wildcard scenario? (low-probability high-impact events)	na
	Planning	no		Internally consistent?	na
	Agriculture	no	Quality of data	Peer review	yes
	Fisheries	no		Expert Judgement	-
	Telecommunications	no		Grey Literature	-
	Energy	no	mar >	Increase in Spring and Autumnal tourism value; loss in summer. Some	

	Transport	no		gains for biodiversity despite socioeconomic losses.	
	Ecosystem Services	no			
	Coastal	no			
	Tourism	Main focus, CC effects on seasonal adjustments			
	Demographics	no	Usefulness to PEGASO		4

Project or publication name		Anav and Mariotti. Sensitivity of natural vegetation to climate change in the Euro-Mediterranean area. Climate Research (2011) vol. 46 (3) pp. 277-292			
Project affiliation		none			
Type of project		Scenario/Projection/Reference			
If reference, why?		Explores major vegetation cover as well as NPP changes under A1b emissions scenario			
Geography		Mediterranean			
If non Med or BS, sufficient detail?		no			
Indirect drivers	Demographic	no	Direct drivers of change	Habitat Change	no
	Economic	no		Pollution and Nutrient Enrichment	no
	Socio-political	yes		Overexploitation of Resources	no
	Cultural & Behavioural	yes		Climate Variability and Change	no
	Scientific and technology	no		Invasive Species	no
Output Focus or Indicators	Climate	no	Scenario construction	Timeline	na
	Environmental	no		Complexity	na
	Biodiversity	no		No. of storylines	na
	Marine	no		Participatory	na
	Land use	no		Qualitative or Quantitative	na
	Water	no		Legitimacy	na
	Geopolitical	no		Credibility	na
	Health & Welfare	no		Saliency	na
	Socio-economic	no		Wildcard scenario? (low-probability high-impact events)	na
	Planning	no		Internally consistent?	na
	Agriculture	no	Quality of data	Peer review	-
	Fisheries	no		Expert Judgement	-
	Telecommunications	no		Grey Literature	-
	Energy	no	Summary	Good review of CC impacts on biodiversity in MEd region	
	Transport	no			
	Ecosystem Services	no			
	Coastal	no			
	Tourism	no			
	Demographics	no	Usefulness to PEGASO		1

Project or publication name		Araujo. Protected areas and climate change in Europe. (2009) pp. 1-29			
Project affiliation		none			
Type of project		Scenario/Projection/Reference			
If reference, why?		Reviews CC impacts on biodiversity in Europe			
Geography		Europe			
If non Med or BS, sufficient detail?		no specific focus on Med or BS			
Indirect drivers	Demographic	no	Direct drivers of change	Habitat Change	Acknowledged
	Economic	no		Pollution and Nutrient Enrichment	no
	Socio-political	yes		Overexploitation of Resources	no
	Cultural & Behavioural	yes		Climate Variability and Change	Main focus
	Scientific and technology	no		Invasive Species	no
Output Focus or Indicators	Climate	Impacts on protected biodiversity areas	Scenario construction	Timeline	Numerous 21st century time slots
	Environmental	no		Complexity	na
	Biodiversity	Main focus, nature reserves		No. of storylines	na
	Marine	Some inclusion		Participatory	na
	Land use	Acknowledged		Qualitative or Quantitative	na
	Water	no		Legitimacy	na
	Geopolitical	no		Credibility	na
	Health & Welfare	no		Saliency	na
	Socio-economic	no		Wildcard scenario? (low-probability high-impact events)	na
	Planning	In terms of Adaptation and Mitigation yes, also incorporation of better management of protected zones		Internally consistent?	na
	Agriculture	Some inclusion	Quality of data	Peer review	yes
	Fisheries	Some inclusion		Expert Judgement	-

	Telecommunications	no		Grey Literature	some, mostly government studies
	Energy	no	Summary	Long-term management planning is required for protected areas; they need to be adaptive too which may result in changes to size and location of protected areas. Integrative management of the wider countryside essential to this as is consideration of biodiversity in other sectoral plans.	
	Transport	no			
	Ecosystem Services	no			
	Coastal	Some inclusion			
	Tourism	Some inclusion			
	Demographics	no	Usefulness to PEGASO		3

Project or publication name		Aydin. Geographical blessing versus geopolitical curse: Great power security agendas for the Black Sea region and a Turkish alternative. Journal of Southeast European and Black Sea (2009) vol. 9 (3) pp. 271-285			
Project affiliation		none			
Type of project		Reference			
If reference, why?		Outlines history and potential of geopolitical relations in the BS			
Geography		Black Sea			
If non Med or BS, sufficient detail?		no			
Indirect drivers	Demographic	no	Direct drivers of change	Habitat Change	no
	Economic	no		Pollution and Nutrient Enrichment	no
	Socio-political	no		Overexploitation of Resources	no
	Cultural & Behavioural	no		Climate Variability and Change	no
	Scientific and technology	no		Invasive Species	no
Output Focus or Indicators	Climate	no	Scenario construction	Timeline	na
	Environmental	no		Complexity	na
	Biodiversity	no		No. of storylines	na
	Marine	no		Participatory	na
	Land use	no		Qualitative or Quantitative	na
	Water	no		Legitimacy	na
	Geopolitical	no		Credibility	na
	Health & Welfare	no		Saliency	na
	Socio-economic	no		Wildcard scenario? (low-probability high-impact events)	na
	Planning	no		Internally consistent?	na
	Agriculture	no	Quality of data	Peer review	-
	Fisheries	no		Expert Judgement	-
	Telecommunications	no		Grey Literature	-
	Energy	no	Summary	Useful reference point for Black Sea political agendas	
	Transport	no			
	Ecosystem Services	no			
	Coastal	no			
	Tourism	no			

	Demographics	no	Usefulness to PEGASO	2
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Project or publication name		Maior and Matei. The Black Sea region in an enlarged Europe: Changing patterns, changing politics. Mediterranean Quarterly (2005) vol. 16 (1) pp. 33-51			
Project affiliation		none			
Type of project		Reference			
If reference, why?		USeful background into geopolitics of BS region with a strategy laid out for future security			
Geography		Black Sea			
If non Med or BS, sufficient detail?		no			
Indirect drivers	Demographic	no	Direct drivers of change	Habitat Change	no
	Economic	no		Pollution and Nutrient Enrichment	no
	Socio-political	no		Overexploitation of Resources	no
	Cultural & Behavioural	no		Climate Variability and Change	no
	Scientific and technology	no		Invasive Species	no
Output Focus or Indicators	Climate	no	Scenario construction	Timeline	na
	Environmental	no		Complexity	na
	Biodiversity	no		No. of storylines	na
	Marine	no		Participatory	na
	Land use	no		Qualitative or Quantitative	na
	Water	no		Legitimacy	na
	Geopolitical	Main theme		Credibility	na
	Health & Welfare	no		Saliency	na
	Socio-economic	no		Wildcard scenario? (low-probability high-impact events)	na
	Planning	no		Internally consistent?	na
	Agriculture	no	Quality of data	Peer review	-
	Fisheries	no		Expert Judgement	-
	Telecommunications	no		Grey Literature	-
	Energy	no	Summary	Succinct and readable document on Black Sea politics that may be useful background for future scenario creation.	
	Transport	no			
	Ecosystem Services	no			
	Coastal	no			
	Tourism	no			

	Demographics	no	Usefulness to PEGASO	2
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Project or publication name		Weiß et al. Model-based scenarios of Mediterranean droughts. Advances in Geosciences (2007) vol. 12 pp. 145-151			
Project affiliation		none			
Type of project		Scenario-based projections			
If reference, why?		Provides output on drought incidence in future for Med region			
Geography		Mediterranean			
If non Med or BS, sufficient detail?		no			
Indirect drivers	Demographic	no	Direct drivers of change	Habitat Change	no
	Economic	no		Pollution and Nutrient Enrichment	no
	Socio-political	yes		Overexploitation of Resources	no
	Cultural & Behavioural	yes		Climate Variability and Change	yes
	Scientific and technology	yes		Invasive Species	no
Output Focus or Indicators	Climate	yes	Scenario construction	Timeline	2070s
	Environmental	yes		Complexity	na
	Biodiversity	no		No. of storylines	2, SRES A2 and B2
	Marine	no		Participatory	na
	Land use	yes		Qualitative or Quantitative	quantitative
	Water	Drought main theme		Legitimacy	5
	Geopolitical	no		Credibility	5
	Health & Welfare	no		Saliency	4
	Socio-economic	no		Wildcard scenario? (low-probability high-impact events)	no
	Planning	no		Internally consistent?	yes
	Agriculture	yes	Quality of data	Peer review	yes
	Fisheries	no		Expert Judgement	-
	Telecommunications	no		Grey Literature	-
	Energy	no	Summary	Provides projections of drought incidence in Mediterranean region; whilst not directly pertinent for marine ecosystems it may be useful for coastal zone land use change scenarios	
	Transport	no			
	Ecosystem Services	no			
	Coastal	no			

	Tourism	no			
	Demographics	no	Usefulness to PEGASO		1

Project or publication name		Xenidis. Cambio climático y cambio social (Rural community in the Mediterranean Region in 2030: Projections and future scenarios. Climate Change and Social Change). recolecta.net (2010)			
Project affiliation		none			
Type of project		Scenario			
If reference, why?		Scenarios focus on CC impacts on a 'rural Mediterranean community' - discusses 'lines of conflict' that will affect communities			
Geography		Mediterranean			
If non Med or BS, sufficient detail?		no			
Indirect drivers	Demographic	yes	Direct drivers of change	Habitat Change	no
	Economic	yes		Pollution and Nutrient Enrichment	no
	Socio-political	yes		Overexploitation of Resources	no
	Cultural & Behavioural	yes		Climate Variability and Change	Main theme
	Scientific and technology	no		Invasive Species	no
Output Focus or Indicators	Climate	yes	Scenario construction	Timeline	2030-50s
	Environmental	no		Complexity	low
	Biodiversity	yes		No. of storylines	2, SRES A1 B2
	Marine	no		Participatory	unclear
	Land use	no		Qualitative or Quantitative	qualitative
	Water	no		Legitimacy	1
	Geopolitical	yes		Credibility	3
	Health & Welfare	no		Saliency	2
	Socio-economic	no		Wildcard scenario? (low-probability high-impact events)	no
	Planning	no		Internally consistent?	na
	Agriculture	no	Quality of data	Peer review	yes
	Fisheries	no		Expert Judgement	-
	Telecommunications	no		Grey Literature	-
	Energy	Main theme	Summary	Could be useful to help pad out scenarios - provides a description of rural life for two storylines	
	Transport	no			
	Ecosystem Services	no			
	Coastal	yes			

	Tourism	yes			
	Demographics	no	Usefulness to PEGASO		3

Project or publication name		Andaloussi and Pouffary. Energy, Climate change and the Building sector in the Mediterranean: Regional Prospects. (2011) pp. 1-93			
Project affiliation		Plan Bleu			
Type of project		References and Scenario			
If reference, why?		Very comprehensive review of energy use and demand in building sector in relation to CC; provides 2 scenarios			
Geography		Mediterranean			
If non Med or BS, sufficient detail?		no			
Indirect drivers	Demographic	yes	Direct drivers of change	Habitat Change	no
	Economic	yes		Pollution and Nutrient Enrichment	no
	Socio-political	yes		Overexploitation of Resources	no
	Cultural & Behavioural	yes		Climate Variability and Change	yes, main theme
	Scientific and technology	yes		Invasive Species	no
Output Focus or Indicators	Climate	yes	Scenario construction	Timeline	2030
	Environmental	yes		Complexity	med
	Biodiversity	no		No. of storylines	2, trend and 'rupture'
	Marine	no		Participatory	unclear
	Land use	yes, through urbanisation		Qualitative or Quantitative	both
	Water	no		Legitimacy	2
	Geopolitical	yes		Credibility	4
	Health & Welfare	no		Saliency	4
	Socio-economic	yes		Wildcard scenario? (low-probability high-impact events)	no
	Planning	yes		Internally consistent?	yes
	Agriculture	no	Quality of data	Peer review	yes
	Fisheries	no		Expert Judgement	yes
	Telecommunications	yes		Grey Literature	-
	Energy	yes	Summary	Provides good review of threat to coastal zones from creeping urbanisation and energy demands. two scenarios are provided, trend and 'rupture' (a green vision). Very detailed breakdown of sceanrios and section on methods to achieve rupture	
	Transport	no			
	Ecosystem Services	yes, mitigation of CC			
	Coastal	no			

	Tourism	yes, main issue for planning			
	Demographics	yes	Usefulness to PEGASO		4

Project or publication name		Blue Plan Notes. Energy sector in the Mediterranean region, situation and prospective 2025. (2010) pp. 1-4			
Project affiliation		Plan Bleu			
Type of project		Reference and projection and scenario			
If reference, why?		Provides summary of energy issues in Mediterranean (supply, demand and transmission); also uses two scenarios to explore future			
Geography		Mediterranean			
If non Med or BS, sufficient detail?		no			
Indirect drivers	Demographic	yes	Direct drivers of change	Habitat Change	no
	Economic	yes		Pollution and Nutrient Enrichment	no
	Socio-political	yes		Overexploitation of Resources	no
	Cultural & Behavioural	yes		Climate Variability and Change	no
	Scientific and technology	yes		Invasive Species	no
Output Focus or Indicators	Climate	no	Scenario construction	Timeline	2025
	Environmental	yes		Complexity	low
	Biodiversity	no		No. of storylines	2, baseline and 'alternative'
	Marine	no		Participatory	unclear
	Land use	yes		Qualitative or Quantitative	both
	Water	no		Legitimacy	1
	Geopolitical	no		Credibility	4
	Health & Welfare	no		Saliency	5
	Socio-economic	yes		Wildcard scenario? (low-probability high-impact events)	no
	Planning	no		Internally consistent?	seemingly
	Agriculture	no	Quality of data	Peer review	-
	Fisheries	no		Expert Judgement	yes
	Telecommunications	no		Grey Literature	yes
	Energy	Yes, main theme	Summary	Looks at a number of drivers and pressures on energy prod and use in Med region; concludes that consumption needs require increased energy supply involving structural investment for the long term. Outlines two contrasting scenarios each with different approaches to energy use and consequences for the environment.	
	Transport	yes			
	Ecosystem Services	no			
	Coastal	no			
	Tourism	no			

	Demographics	yes	Usefulness to PEGASO	5
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Project or publication name		Blue Plan Notes. Mediterranean agriculture: toward adaptation to climate change. (2009) pp. 1-4			
Project affiliation		Plan Bleu			
Type of project		Reference, projections			
If reference, why?		Outlines impacts of CC on agri in the next 90 years			
Geography		Mediterranean and parts of BS region			
If non Med or BS, sufficient detail?		no			
Indirect drivers	Demographic	no	Direct drivers of change	Habitat Change	yes
	Economic	no		Pollution and Nutrient Enrichment	yes
	Socio-political	yes		Overexploitation of Resources	yes
	Cultural & Behavioural	yes		Climate Variability and Change	Main theme
	Scientific and technology	yes		Invasive Species	no
Output Focus or Indicators	Climate	yes	Scenario construction	Timeline	up to 2100
	Environmental	no		Complexity	na
	Biodiversity	no		No. of storylines	na
	Marine	no		Participatory	na
	Land use	yes		Qualitative or Quantitative	na
	Water	yes, main issue		Legitimacy	na
	Geopolitical	no		Credibility	na
	Health & Welfare	no		Saliency	na
	Socio-economic	no		Wildcard scenario? (low-probability high-impact events)	na
	Planning	no		Internally consistent?	na
	Agriculture	yes, main issue	Quality of data	Peer review	yes
	Fisheries	no		Expert Judgement	yes
	Telecommunications	no		Grey Literature	yes
	Energy	no	Summary	Highlights pressures on the future of Med region agriculture as well as the main adaptation strategies (with an emphasis on socio-economic capacity as well as technological).	
	Transport	no			
	Ecosystem Services	no			
	Coastal	no			
	Tourism	no			

	Demographics	no	Usefulness to PEGASO	4
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Project or publication name			Blue Plan Notes. Strategies for integrated water and energy resources management to address climate change. (2008) pp. 1-4		
Project affiliation			Plan Bleu		
Type of project			Reference, projection		
If reference, why?			Policy document outlining future water issues in the Med region.		
Geography			Mediterranean		
If non Med or BS, sufficient detail?			no		
Indirect drivers	Demographic	yes	Direct drivers of change	Habitat Change	no
	Economic	yes		Pollution and Nutrient Enrichment	no
	Socio-political	no		Overexploitation of Resources	yes
	Cultural & Behavioural	yes		Climate Variability and Change	yes
	Scientific and technology	no		Invasive Species	no
Output Focus or Indicators	Climate	yes, main theme	Scenario construction	Timeline	2025
	Environmental	no		Complexity	na
	Biodiversity	no		No. of storylines	na
	Marine	no		Participatory	na
	Land use	no		Qualitative or Quantitative	na
	Water	yes, main theme		Legitimacy	na
	Geopolitical	no		Credibility	na
	Health & Welfare	no		Saliency	na
	Socio-economic	yes		Wildcard scenario? (low-probability high-impact events)	na
	Planning	no		Internally consistent?	na
	Agriculture	yes	Quality of data	Peer review	-
	Fisheries	no		Expert Judgement	yes
	Telecommunications	no		Grey Literature	yes
	Energy	yes, main theme	Summary	Describes increasing pressure on water demands and supply in Med region; outlines consequences of this including energy generation then provides an adaptation strategy. Useful for scenario creation.	
	Transport	no			
	Ecosystem Services	no			
	Coastal	no			

	Tourism	yes			
	Demographics	yes	Usefulness to PEGASO		5

Project or publication name		Blue Plan Notes. The future of the Mediterranean will depend largely on cities. (2008) pp. 1-4			
Project affiliation		Plan Bleu			
Type of project		Reference, projection			
If reference, why?		Highlights growth in cities in the next few years in Med region; provides strategy for sustainable development			
Geography		Mediterranean			
If non Med or BS, sufficient detail?		no			
Indirect drivers	Demographic	yes	Direct drivers of change	Habitat Change	yes
	Economic	yes		Pollution and Nutrient Enrichment	no
	Socio-political	no		Overexploitation of Resources	no
	Cultural & Behavioural	yes		Climate Variability and Change	no
	Scientific and technology	no		Invasive Species	no
Output Focus or Indicators	Climate	yes	Scenario construction	Timeline	2030
	Environmental	no		Complexity	na
	Biodiversity	no		No. of storylines	na
	Marine	no		Participatory	na
	Land use	yes, main theme		Qualitative or Quantitative	na
	Water	no		Legitimacy	na
	Geopolitical	no		Credibility	na
	Health & Welfare	no		Saliency	na
	Socio-economic	no		Wildcard scenario? (low-probability high-impact events)	na
	Planning	yes, main theme		Internally consistent?	na
	Agriculture	no	Quality of data	Peer review	-
	Fisheries	no		Expert Judgement	yes
	Telecommunications	no		Grey Literature	yes
	Energy	yes	Summary	Describes demographic driver of change in urban growth; provides a strategy for managing the acceleration of urbanisation in the Southern and Eastern Mediterranean, focusing on environmental limits and sustainable development, Useful for scenario creation	
	Transport	yes			
	Ecosystem Services	no			
	Coastal	yes			

	Tourism	no			
	Demographics	yes	Usefulness to PEGASO		4

Project or publication name		Blue Plan Papers. A practioner's guide to 'Imagine' - The systematic and prospective sustainability analysis. (2005) pp. 1-57 AND Coudert and Larid. IMAGINE: A set of tools and methods to assist integrated coastal zone management in the Mediterranean. (
Project affiliation		Plan Bleu			
Type of project		Scenario			
If reference, why?		Mainly a description of methodology for the scenarios created for the MAP coastal area management plan			
Geography		Mediterranean			
If non Med or BS, sufficient detail?		no			
Indirect drivers	Demographic	yes	Direct drivers of change	Habitat Change	yes
	Economic	yes		Pollution and Nutrient Enrichment	yes
	Socio-political	yes		Overexploitation of Resources	yes
	Cultural & Behavioural	yes		Climate Variability and Change	yes
	Scientific and technology	yes		Invasive Species	no
Output Focus or Indicators	Climate	yes	Scenario construction	Timeline	2025
	Environmental	yes		Complexity	high
	Biodiversity	yes		No. of storylines	2
	Marine	yes		Participatory	yes, very
	Land use	yes		Qualitative or Quantitative	both
	Water	yes		Legitimacy	5
	Geopolitical	yes		Credibility	4
	Health & Welfare	no		Saliency	4
	Socio-economic	yes		Wildcard scenario? (low-probability high-impact events)	no
	Planning	yes		Internally consistent?	na
	Agriculture	no	Quality of data	Peer review	-
	Fisheries	no		Expert Judgement	-
	Telecommunications	no		Grey Literature	yes
	Energy	no	Summary	Useful methodology for Med region scenario creation.	
	Transport	no			
	Ecosystem Services	no			
	Coastal	yes, main theme			

	Tourism	yes			
	Demographics	yes	Usefulness to PEGASO		3

Project or publication name		Blue Plan Papers. The Blue Plan's sustainable development outlook for the Mediterranean. (2008) pp. 1-32			
Project affiliation		Plan Bleu			
Type of project		Reference			
If reference, why?		Reviews recent environmental trends, looks ahead to 2025, provides green policies for sustainable development. Strong section on marine environ.			
Geography		Mediterranean			
If non Med or BS, sufficient detail?		no			
Indirect drivers	Demographic	yes	Direct drivers of change	Habitat Change	yes
	Economic	yes		Pollution and Nutrient Enrichment	yes
	Socio-political	yes		Overexploitation of Resources	yes
	Cultural & Behavioural	yes		Climate Variability and Change	yes
	Scientific and technology	yes		Invasive Species	yes
Output Focus or Indicators	Climate	yes	Scenario construction	Timeline	2025
	Environmental	yes		Complexity	na
	Biodiversity	yes		No. of storylines	na
	Marine	yes		Participatory	na
	Land use	yes		Qualitative or Quantitative	na
	Water	yes		Legitimacy	na
	Geopolitical	yes		Credibility	na
	Health & Welfare	yes		Saliency	na
	Socio-economic	yes		Wildcard scenario? (low-probability high-impact events)	na
	Planning	yes		Internally consistent?	na
	Agriculture	yes	Quality of data	Peer review	-
	Fisheries	yes		Expert Judgement	yes
	Telecommunications	no		Grey Literature	yes
	Energy	yes	Summary	Very useful review of Mediterranean environmental issues; provides good section on marine to as well as prescriptions for future sustainable development policy	
	Transport	yes			
	Ecosystem Services	yes, marine productivity			
	Coastal	yes			

	Tourism	yes			
	Demographics	yes	Usefulness to PEGASO		5

Project or publication name		Margat. Are water shortages a long-range outlook in Mediterranean Europe?. (2002) pp. 1-18			
Project affiliation		Plan Bleu			
Type of project		reference, projection			
If reference, why?		Focus on water stress in Med region now and in next 40 years			
Geography		Mediterranean			
If non Med or BS, sufficient detail?		no			
Indirect drivers	Demographic	yes	Direct drivers of change	Habitat Change	no
	Economic	yes		Pollution and Nutrient Enrichment	no
	Socio-political	yes		Overexploitation of Resources	no
	Cultural & Behavioural	yes		Climate Variability and Change	yes
	Scientific and technology	yes		Invasive Species	no
Output Focus or Indicators	Climate	yes	Scenario construction	Timeline	2050
	Environmental	yes		Complexity	na
	Biodiversity	no		No. of storylines	na
	Marine	no		Participatory	na
	Land use	no		Qualitative or Quantitative	na
	Water	Main theme		Legitimacy	na
	Geopolitical	no		Credibility	na
	Health & Welfare	no		Saliency	na
	Socio-economic	no		Wildcard scenario? (low-probability high-impact events)	na
	Planning	no		Internally consistent?	na
	Agriculture	no	Quality of data	Peer review	yes
	Fisheries	no		Expert Judgement	yes
	Telecommunications	no		Grey Literature	-
	Energy	no	Summary	Review of water demands in Europe and likely trends	
	Transport	no			
	Ecosystem Services	no			
	Coastal	yes			
	Tourism	no			

	Demographics	yes	Usefulness to PEGASO	2
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Project or publication name		Margat and Vallee. Water Vision Mediterranean. (2000) pp. 1-66			
Project affiliation		Plan Bleu			
Type of project		Scenario			
If reference, why?		Provides 3 scenarios exploring the future of water use and supply in Med region			
Geography		Mediterranean			
If non Med or BS, sufficient detail?		no			
Indirect drivers	Demographic	yes	Direct drivers of change	Habitat Change	no
	Economic	yes		Pollution and Nutrient Enrichment	yes
	Socio-political	yes		Overexploitation of Resources	yes
	Cultural & Behavioural	yes		Climate Variability and Change	yes
	Scientific and technology	yes		Invasive Species	no
Output Focus or Indicators	Climate	yes	Scenario construction	Timeline	2025
	Environmental	yes		Complexity	high
	Biodiversity	yes		No. of storylines	3, trend, Med in crisis, sustainable Med
	Marine	yes		Participatory	unclear, but unlikely
	Land use	no		Qualitative or Quantitative	both
	Water	Main theme		Legitimacy	1
	Geopolitical	yes		Credibility	3
	Health & Welfare	yes		Saliency	4
	Socio-economic	yes		Wildcard scenario? (low-probability high-impact events)	no
	Planning	yes		Internally consistent?	yes
	Agriculture	yes	Quality of data	Peer review	-
	Fisheries	no		Expert Judgement	yes
	Telecommunications	no		Grey Literature	yes
	Energy	yes	Summary	Provides three very comprehensive scenarios outlining the future of water use in the coastal areas of the Med	
	Transport	yes			
	Ecosystem Services	yes			
	Coastal	yes			
	Tourism	yes			

	Demographics	yes	Usefulness to PEGASO	5
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Project or publication name		Ramsar Convention Secretariat. Coastal management: Wetland issues in Integrated Coastal Zone Management. Ramsar handbooks for the wise use of wetlands, 3rd edition, vol. 10. Ramsar Convention Secretariat, Gland, Switzerland. (2007) pp. 1-50			
Project affiliation		RAMSAR			
Type of project		Reference			
If reference, why?		Guide on ensuring ICZM incorporates the proper management of wetlands			
Geography		Global			
If non Med or BS, sufficient detail?		lots of ref to Med			
Indirect drivers	Demographic	yes	Direct drivers of change	Habitat Change	yes
	Economic	yes		Pollution and Nutrient Enrichment	yes
	Socio-political	yes		Overexploitation of Resources	yes
	Cultural & Behavioural	yes		Climate Variability and Change	yes
	Scientific and technology	yes		Invasive Species	yes
Output Focus or Indicators	Climate	yes	Scenario construction	Timeline	na
	Environmental	yes		Complexity	na
	Biodiversity	Main theme		No. of storylines	na
	Marine	Main theme		Participatory	na
	Land use	no		Qualitative or Quantitative	na
	Water	yes		Legitimacy	na
	Geopolitical	no		Credibility	na
	Health & Welfare	no		Saliency	na
	Socio-economic	no		Wildcard scenario? (low-probability high-impact events)	na
	Planning	yes		Internally consistent?	na
	Agriculture	yes	Quality of data	Peer review	-
	Fisheries	yes		Expert Judgement	-
	Telecommunications	no		Grey Literature	-
	Energy	yes	Summary	Outlines importance of wetlands to coastal environment; provides 8 main principles explaining rationale behind this	
	Transport	yes			
	Ecosystem Services	yes			
	Coastal	yes, main theme			

	Tourism	yes			
	Demographics	no	Usefulness to PEGASO		3

Project or publication name		UNEP. Mediterranean strategy for sustainable development. (2006) pp. 1-68			
Project affiliation		UNEP			
Type of project		Reference			
If reference, why?		Useful policy document outlining sustainable options for Mediterranean countries' futures			
Geography		Mediterranean			
If non Med or BS, sufficient detail?		non on Black Sea			
Indirect drivers	Demographic	yes	Direct drivers of change	Habitat Change	Main theme
	Economic	yes		Pollution and Nutrient Enrichment	Main theme
	Socio-political	yes		Overexploitation of Resources	Main theme
	Cultural & Behavioural	yes		Climate Variability and Change	Main theme
	Scientific and technology	yes		Invasive Species	no
Output Focus or Indicators	Climate	One of the priority actions	Scenario construction	Timeline	na
	Environmental	no		Complexity	na
	Biodiversity	no		No. of storylines	na
	Marine	yes		Participatory	na
	Land use	no		Qualitative or Quantitative	na
	Water	One of the priority actions (water scarcity)		Legitimacy	na
	Geopolitical	no		Credibility	na
	Health & Welfare	no		Saliency	na
	Socio-economic	no		Wildcard scenario? (low-probability high-impact events)	na
	Planning	One of the priority actions (urban development)		Internally consistent?	na
	Agriculture	no	Quality of data	Peer review	-
	Fisheries	yes		Expert Judgement	-
	Telecommunications	no		Grey Literature	-
	Energy	no	Summary	Main use as a policy document is that it outlines the main environmental and sustainable development challenges of the Med region (lists priority actions) as well as providing as status of current	
	Transport	One of the priority actions			

	Ecosystem Services	no		action and a blueprint for implementing future sus dev.	
	Coastal	One of the priority actions (stopping degradation)			
	Tourism	One of the priority actions			
	Demographics	no	Usefulness to PEGASO		5

Project or publication name		UNEP. Sustainable Coastal tourism - An integrated planning and management approach. (2009) pp. 1-87			
Project affiliation		UNEP			
Type of project		Reference			
If reference, why?		Highlights impacts of tourism on coastal zones; outlines ICZM tenets			
Geography		Global			
If non Med or BS, sufficient detail?		lots of focus on Med			
Indirect drivers	Demographic	yes	Direct drivers of change	Habitat Change	yes
	Economic	yes		Pollution and Nutrient Enrichment	yes
	Socio-political	yes		Overexploitation of Resources	yes
	Cultural & Behavioural	yes		Climate Variability and Change	yes
	Scientific and technology	yes		Invasive Species	no
Output Focus or Indicators	Climate	yes	Scenario construction	Timeline	na
	Environmental	yes		Complexity	na
	Biodiversity	yes		No. of storylines	na
	Marine	yes		Participatory	na
	Land use	yes		Qualitative or Quantitative	na
	Water	yes		Legitimacy	na
	Geopolitical	yes		Credibility	na
	Health & Welfare	no		Saliency	na
	Socio-economic	yes		Wildcard scenario? (low-probability high-impact events)	na
	Planning	yes		Internally consistent?	na
	Agriculture	no	Quality of data	Peer review	-
	Fisheries	no		Expert Judgement	yes
	Telecommunications	no		Grey Literature	yes
	Energy	yes	Summary	Excellent review of tourism impact on coastal areas; provides good breakdown of ICZM and way forward blueprints	
	Transport	yes			
	Ecosystem Services	no			
	Coastal	Main theme			
	Tourism	Main theme			

	Demographics	yes	Usefulness to PEGASO	4
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Project or publication name		Rotmans et al. Visions for a sustainable Europe. Futures (2000) vol. 32 (9) pp. 809-831			
Project affiliation		VISIONS			
Type of project		Scenarios			
If reference, why?		na			
Geography		Europe			
If non Med or BS, sufficient detail?		Cases study on Venice			
Indirect drivers	Demographic	yes	Direct drivers of change	Habitat Change	yes
	Economic	yes		Pollution and Nutrient Enrichment	yes
	Socio-political	yes		Overexploitation of Resources	yes
	Cultural & Behavioural	yes		Climate Variability and Change	yes
	Scientific and technology	yes		Invasive Species	no
Output Focus or Indicators	Climate	no	Scenario construction	Timeline	2020, 2050
	Environmental	yes		Complexity	High
	Biodiversity	no		No. of storylines	Ten, filtered down to three
	Marine	no		Participatory	Heavy use of stakeholders
	Land use	no		Qualitative or Quantitative	qualitative
	Water	no		Legitimacy	5
	Geopolitical	yes		Credibility	3
	Health & Welfare	yes		Saliency	4
	Socio-economic	yes		Wildcard scenario? (low-probability high-impact events)	no
	Planning	no		Internally consistent?	na
	Agriculture	no	Quality of data	Peer review	-
	Fisheries	no		Expert Judgement	yes
	Telecommunications	yes		Grey Literature	yes
	Energy	yes	Summary	Review of scenario construction is useful, the final storylines may be of use also	
	Transport	yes			
	Ecosystem Services	no			
	Coastal	no			
	Tourism	no			
	Demographics	yes	Usefulness to PEGASO		2

Project or publication name		Carpenter, S.R, Pingalis, P. L, Bennett, E, M & Zurek, M. B. Ecosystems and Human Well-being: Scenarios, Volume 2. (2005). Millennium Ecosystem Assessment, Island Press, Washington D.C.			
Project affiliation		MA			
Type of project		Scenarios			
If reference, why?		na			
Geography		Global			
If non Med or BS, sufficient detail?		Very little mention			
Indirect drivers	Demographic	yes	Direct drivers of change	Habitat Change	yes
	Economic	yes		Pollution and Nutrient Enrichment	yes
	Socio-political	yes		Overexploitation of Resources	yes
	Cultural & Behavioural	yes		Climate Variability and Change	yes
	Scientific and technology	yes		Invasive Species	yes
Output Focus or Indicators	Climate	yes, main theme	Scenario construction	Timeline	2050 and 2100
	Environmental	Yes, strong emphasis		Complexity	High
	Biodiversity	Yes, strong emphasis		No. of storylines	4, Global Orchestration, Order from Strength, Adapting Mosaic, TechnoGarden
	Marine	yes		Participatory	Yes, fully
	Land use	Yes, strong emphasis		Qualitative or Quantitative	both
	Water	yes		Legitimacy	5
	Geopolitical	yes		Credibility	5
	Health & Welfare	Yes, strong emphasis		Saliency	5
	Socio-economic	yes		Wildcard scenario? (low-probability high-impact events)	no
	Planning	yes		Internally consistent?	yes
	Agriculture	Yes, strong emphasis	Quality of data	Peer review	yes
	Fisheries	Yes, strong emphasis		Expert Judgement	yes
	Telecommunications	yes		Grey Literature	-

	Energy	yes	Summary	Extremely thorough and comprehensive set of scenarios with strong emphasis on biodiversity, ecosystems and the consequences of management on ecosystem services. Very useful guide to creating new scenarios	
	Transport	yes			
	Ecosystem Services	Yes, strong emphasis			
	Coastal	Yes, strong emphasis			
	Tourism	yes			
	Demographics	yes	Usefulness to PEGASO		4

Project or publication name		Nakicenovic. IPCC Special Report on Emissions Scenarios. Cambridge UNiversity Press (2009) pp. 27			
Project affiliation		IPCC			
Type of project		Scenarios			
If reference, why?		na			
Geography		Global			
If non Med or BS, sufficient detail?		no			
Indirect drivers	Demographic	yes	Direct drivers of change	Habitat Change	no
	Economic	yes		Pollution and Nutrient Enrichment	yes
	Socio-political	yes		Overexploitation of Resources	yes, fossil fuels
	Cultural & Behavioural	yes		Climate Variability and Change	Yes, Main theme
	Scientific and technology	yes		Invasive Species	no
Output Focus or Indicators	Climate	yes, main theme	Scenario construction	Timeline	2020, 2050, 2080
	Environmental	no		Complexity	medium
	Biodiversity	no		No. of storylines	4 main groups, A1, A2, B1, B2
	Marine	no		Participatory	yes
	Land use	no		Qualitative or Quantitative	both
	Water	no		Legitimacy	5
	Geopolitical	yes		Credibility	5
	Health & Welfare	no		Saliency	5
	Socio-economic	yes		Wildcard scenario? (low-probability high-impact events)	no
	Planning	no		Internally consistent?	yes
	Agriculture	no	Quality of data	Peer review	yes
	Fisheries	no		Expert Judgement	yes
	Telecommunications	no		Grey Literature	-
	Energy	no	Summary	Highly developed Climate change emissions scenarios, useful for including global factors in Mediterranean or Black Sea scenario creation; also good for incorporating CC mitigation or adaptation aspects	
	Transport	no			
	Ecosystem Services	no			
	Coastal	no			
	Tourism	no			
	Demographics	no	Usefulness to PEGASO		3

Project or publication name		Barbosa et al. Land cover model inputs and efficient data model with possibilities to be updated. EnviroGRIDS (2010) pp. 1-82 AND Ivanov and Barbosa. Existing scenarios and data compilation on integrated scenarios using demographic, climatic, land cover from global and Black Sea Basin studies. (2010) pp. 1-72			
Project affiliation		EnviroGRIDS			
Type of project		Scenarios			
If reference, why?		na			
Geography		Black Sea			
If non Med or BS, sufficient detail?		na			
Indirect drivers	Demographic	yes	Direct drivers of change	Habitat Change	yes
	Economic	yes		Pollution and Nutrient Enrichment	yes
	Socio-political	yes		Overexploitation of Resources	yes
	Cultural & Behavioural	yes		Climate Variability and Change	yes
	Scientific and technology	yes		Invasive Species	no
Output Focus or Indicators	Climate	yes	Scenario construction	Timeline	2020, 2050
	Environmental	yes		Complexity	medium
	Biodiversity	yes		No. of storylines	3, best environmental scenario, worst scenario and a business as usual
	Marine	brief mention		Participatory	yes
	Land use	Main theme		Qualitative or Quantitative	both
	Water	Main theme		Legitimacy	3, so far
	Geopolitical	yes		Credibility	4
	Health & Welfare	yes		Saliency	4
	Socio-economic	yes		Wildcard scenario? (low-probability high-impact events)	no
	Planning	yes		Internally consistent?	yes
	Agriculture	yes	Quality of data	Peer review	-
	Fisheries	no		Expert Judgement	yes
	Telecommunications	no		Grey Literature	-

	Energy	yes	Summary	Developed specifically for the Black Sea region; work in progress but potentially very useful due to incorporation of modelling outputs	
	Transport	no			
	Ecosystem Services	no			
	Coastal	no			
	Tourism	no			
	Demographics	yes	Usefulness to PEGASO		4

Appendix 2

Building on the Mediterranean Scenario experiences

Internal deliverable D4.3.3

Provided by Plan Bleu

Pegaso Project

People for Ecosystem based Governance
in Assessing Sustainable development of
Ocean and coast

Funded by the European Union
under FP7 – ENV.2009.2.2.1.4
Integrated Coastal Zone Management

Specific Programme FP7

Collaborative Projects
Large scale integrating Project

Grant agreement n°: 244170

BUILDING ON THE MEDITERRANEAN SCENARIO EXPERIENCES

Cross-cutting approaches between regional foresight analysis and participatory prospective

Code Internal Deliverable ID4.3.3 - Task 4.3 “Scenarios”

**Date /
version** 26th of October 2012 / V2

Author **Serena Sanna and Julien Le Tellier**
In collaboration with Jean-Pierre Giraud and Antoine Lafitte
Plan Bleu (UNEP/MAP)

This report is mainly made of Plan Bleu’s publications (see details in the list of references), and has particularly benefited from Serena Sanna’s expertise in political sciences.

The authors are grateful to their colleagues Loïc Bourse, Maud-Anaïs Claudot, Ferdinand Costes, Marianne Milano, Didier Sauzade, and Lina Tode (Plan Bleu), for the time and effort they spent in reviewing this manuscript and for their contributions which helped to improve the report.

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Resume In the framework of the Subtask 4.3.3, the internal deliverable ID4.3.3 “Building on the Mediterranean Scenario Experiences” aims at identifying how existing foresight analysis and tools developed by Plan Bleu can be used in the context of the PEGASO project.

After a quick overview of the methodology used to define regional scenarios (i.e. *A Sustainable Future for the Mediterranean*, Plan Bleu, 2005, updated in 2008), this report proposes a synthesis of existing foresight analysis in the Mediterranean. Focusing both on the “business as usual” (BAU) and alternative scenarios, this synthesis is fed by sectorial focus on several topics: population and demographic trends (and consequences on employment); climate change and consumption of natural resources; water; energy; coastal development and urbanization; tourism and recreational activities; maritime transportation; fisheries, etc.

This analysis is extended by considering other recent scenario studies, as for instance: *Tomorrow, the Mediterranean* (IPEMED, 2011), *EuroMed 2030: Long-Term challenges for the Mediterranean Area* (EC - DG Research, 2011), *What research and what partnerships for the Mediterranean? (Quelles recherches et quels partenariats pour la Méditerranée?)* (French National Agency for Research - *Agence Nationale de la Recherche / ANR-France*, 2011).

Moreover, some reflection elements are developed to take into account linkages between main changes and recent events, such as economic crisis at the global level, “Arab Spring” in the Southern and Eastern Mediterranean Countries (SEMCs), as well as institutional initiatives for the Mediterranean (i.e. Union for the Mediterranean / UfM).

Furthermore, in order to put into perspective foresight analysis at regional scale on the one hand, and participatory prospective at local scale on the other hand, the second main part of this report revisits the “*Imagine*” method developed and implemented by Plan Bleu in the framework of several Coastal Area Management Programmes (CAMPs) of the Mediterranean Action Plan (UNEP/MAP). “*Imagine*” allows building “participatory scenarios” at the local scale by considering stakeholders and end-users as experts at their level (in and for their territory).

Finally, the conclusions of this report put the emphasis on cross-cutting aspects between regional foresight analysis and participatory prospective to define a range of ‘possible futures’ to be taken into account during the PEGASO “Regional ICZM Visioning Workshops” that will be held: (i) in Tour du Valat (South of France) in November 2012, and; at the Black Sea Commission, in Istanbul, in December 2012.

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FORESIGHT ANALYSIS IN THE MEDITERRANEAN – PLAN BLEU'S EXPERIENCES

The first part of this report is structured in four sessions:

- Introduction and overview;
- Methodology: summary of the methodological approach that steered Plan Bleu's works to prepare the prospective reports: *"Futures for the Mediterranean Basin. The Blue Plan"* (Grenon et Batisse, 1990) and *"A sustainable future for the Mediterranean: The Blue Plan's environment and development outlook"* (Benoit et Comeau, 2005);
- Scenarios: "business as usual" and alternative scenarios, via transversal and thematic approaches;
- Seeds of changes and inflections of trends, by taking into account recent events in the Mediterranean.

Introduction and overview

One of the aims of the PEGASO project is to build on existing capacities and develop common novel approaches to support integrated policies for the coastal, marine and maritime realms of the Mediterranean and Black Sea Basins in ways that are consistent with and relevant to the implementation of the ICZM Protocol for the Mediterranean. It is important to help decision-makers and planning authorities to explore the policy and management implications of possible futures for the coastal zones of the Mediterranean and Black Sea countries.

In this framework scenario method allows to study the threats and opportunities that arise in relation to sustainable development, and the possible policy responses that might be needed. Focusing on "Scenario" activities and tools, the PEGASO Task 4.3 aims at reviewing the storylines of scenario studies, mainly those undertaken by Plan Bleu for the Mediterranean region (in addition of inputs from other and more recent initiatives), with recommendations on current trends and in line with the PEGASO objectives.

The Plan Bleu's report *"A Sustainable Future for the Mediterranean: the Blue Plan's Environment and Development Outlook"* (Benoit and Comeau, 2005, updated in 2008) develops both trend and alternative scenarios. Those scenarios constitute useful materials to be used for the development of an integrated regional assessment for the Mediterranean and Black Sea coastal and marine areas (PEGASO Task 5.2 Regional Assessment) as well as for building a regional ICZM vision according to possible futures designed by foresight analysis for the Mediterranean and Black Sea Basins (PEGASO Task 4.3 Scenarios).

Regarding the methodology adopted, the scope and the objectives, as well as the topics considered in the 2005 Plan Bleu report, this key publication is probably one of the most successful regional initiatives in the field of scenario studies. By using a multi-sector and transversal approach a "baseline scenario" allows exploring the current trends up to 2025 according six strategic key issues: water, energy, transports, urban areas, agriculture and rural areas, and coastal areas. An alternative scenario for shifting policies and action towards more sustainable development is proposed too.

In this way the report offers a relevant starting point for: Analysing trends and changes; Identifying main issues, risks and opportunities; Assessing plausible alternatives. First of all, the synthesis of the 2005-Plan Bleu report contributes is of crucial importance to design guidelines for an integrated regional assessment and outlook for the Mediterranean and Black Sea basins, in collaboration with stakeholders. Secondly, the synthesis of the existing scenario studies undertaken by Plan Bleu are complemented by a brief analysis of other relevant and recent foresight analyses related to the aims of the PEGASO project. Finally, this first part of the ID 4.3.3 is concluded by some "food for thought" due to the latest main changes and most recent events in the world and especially in the Mediterranean region: global economic crisis, Union for the Mediterranean, Arab Spring, etc.

Methodology for regional prospective studies (synthesis)

The methodology used for the two “Plan Bleu prospective reports” (1989/90, 2005), based on a participatory scenarios building approach, are quite similar. The methodology used for the 2005 report was simplified comparatively to the one used for the 1989/90 report. This approach comprises three phases starting from the analysis of the system to the recommendations to the stakeholders: **“Understand, Explore and Suggest”**.

The participatory process of the scenarios building was mainly based on the organisation of international workshops focused on the main issues, hypothesis and results. These workshops gathered several international experts and national stakeholders – mainly the ministries of environment but also some concerned ministries and agencies.

From 1991 the participatory approach for the local scenarios was declined from this regional approach in numerous Coastal Area Management Programmes (CAMPs) then consolidated and formalized in the “*Imagine*” approach in the 2000s.

Understand: System analysis (Fig. 1)

Prospective studies are applied to a complex reality, which leads to favouring systemic analysis as a basic tool for handling of this complex reality, then reduced to a “system”. This phase is essential for consolidating an agreement on the overall scope of the prospective study. Several definitions of a “system” exist and Plan Bleu adopted the following definition: **“A system is an intellectual construct geared towards a specific goal and consisting of elements interacting dynamically”** (Michel Grenon, 1990).

This systemic approach enables us to simplify reality, reducing it to its most pertinent elements, in relation to the goal to achieve, to understand the dynamics of each element, especially the dynamics of their relationships and interactions. These evolve in time, and they can be projected with their dynamism.

First of all the geographical scope was defined according the Plan Bleu mandate. The thematic studies and the report focused mainly on the Mediterranean bordering countries for most of general issues, on the Mediterranean watershed for the water related issues and on the Mediterranean coastal regions for the coastal development and marine pollution issues.

For most of these issues analysis (trade, migration, energy ...), more countries (oil producer countries, USA, China ...) and some group of countries were considered as crown area (Europe, North-America ...) in order to strengthen the exchange analysis in a global and consistent manner.

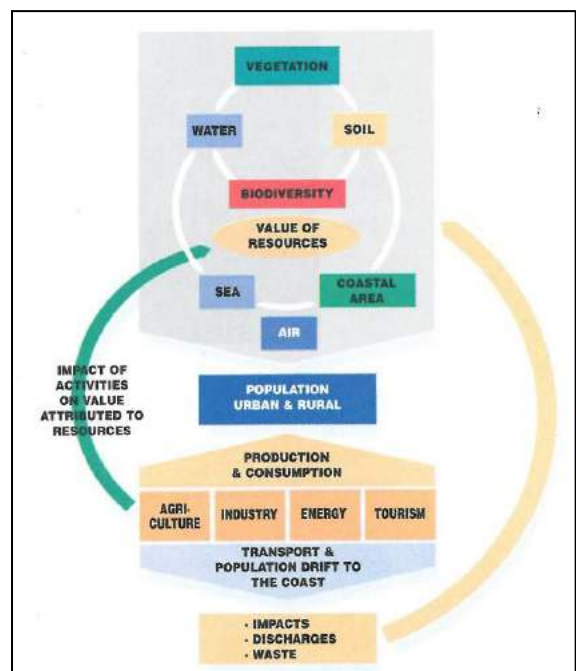


Figure 1: System analysis in the 1989 Plan Bleu report

The analysis of the “development / environment interactions in the Mediterranean Basin” started to the identification of the main issues and therefore the dimensions and the environment components and their main interactions.

This analysis based on several thematic studies carried out by experts “binomes” (one expert from the North of the Mediterranean basin, one from the South) allowed also structuring the report according the dimensions and the components.

The analysis of the interactions, which can be done using different matrix tools (structural and Negative-Positive-Neutral (NPN) matrices), allowed identifying the key variables which will be used for the hypothesis of the scenarios and for the impacts on the environment components.

Assumptions for the baseline scenario (2025) – Plan Bleu 2005 – Table 5 page 63

Determinant	Assumed changes
Climate change	Global warming less than 1°C by 2025 Accelerated occurrence of extreme natural phenomena (droughts, floods)
Population	Decrease and rapid convergence in fertility rates Slowdown in population growth but still an additional 96 million in the region by 2025: <ul style="list-style-type: none"> 3.7 million more inhabitants per year in the SEMC 31 million more in coastal zones by 2025 40 million more households by 2025, with decreases in household size. Ageing accelerating in the North South and east have 3 million net more people of working age per year Spread of poor eco-efficient consumption patterns 105 million more urban dwellers by 2025, of which 33 million will be in the coastal regions Rural population stability
Globalization and trade	Persistence, but lowering, of more or less open conflicts Boom in the market economy, spread of the technological paradigm and the information society Strong world growth (driven by the Asian pole) Relative drop of the Euro-Mediterranean pole: ageing in the north, poor development in the south Intensification of trade between the EU and the SEMC: <ul style="list-style-type: none"> evolution towards free trade, with progressive steps in the agriculture sector persistence of clandestine immigration to the EU tourism in 2025: <ul style="list-style-type: none"> at country level: 178 million more international tourist arrivals at coastal region level: 136 million more tourist (international and national) arrivals growth in Euro-Mediterranean trade increase in capital flows from the EU to the SEMC
Regional cooperation and integration	Northern shore more and more integrated into the EU Weakness of Euro-Mediterranean integration that varies between countries Limited cooperation between SEMC Regional Euro-Mediterranean cooperation on the environment with limited resources
Environmental governance	Environmental policies remaining more reactive and curative than preventive Environment largely remaining a matter for states Poor integration of the environment into development Weakened land planning and regional development policies in national political agendas Environmental governance remaining impotent in the face of sustainable development challenges
Reforms within SEMC	Uneven continuation of socio-economic reforms in the SEMC, with limited room for manoeuvre and focused mainly on economic upgrading

Explore: Scenarios building

The phase "Explore" led to the preparation of scenarios through co-operation between national teams and a central team. The result has been a synthesis report endorsed by the bordering States and the EC.

Intended to investigate plausible futures of a system previously defined, scenarios have to include four components:

- An initial image for the base year;
- A choice of consistent hypotheses;
- A path to the selected horizon, and;
- A final image (with possibly some Intermediaries images).

All this connected by an internal logic (the rules of the game).

Storylines (wording) describing the scenarios allowed presenting in few sentences the range of scenarios and the consistency of the hypothesis for each scenario.

These scenarios were prepared using initial hypothesis on five dimensions: the international economic context, demography, national development strategies, land management policies, and environmental policies.

In the 1989/90 report, 5 contrasted scenarios were elaborated:

- 3 trend scenarios:
 - o Scenario T1 – Reference scenario
 - o Scenario T2 – Worst scenario
 - o Scenario T3 – Moderate scenario
- 2 alternative and proactive scenarios:
 - o Scenario A1 with strong North-South cooperation
 - o Scenario A2 with predominant South-South cooperation

Besides the continuation of present trends (reference trends scenario T1), three contrasted types of development have been conceived:

- A development with weak economic growth. In the case of slow worldwide growth with harsh competition, budgetary constraints would hamper development, the investments necessary for environmental protection and regulatory action would be limited by the fragility of enterprises. This corresponds to the "worst trend scenario T2";
- A rapid growth but with insufficient environmental concern. In spite of socio-economic advantages, such a growth could lead to serious, even irreversible, environmental damage due to increasing pressure on resources and a posteriori difficult adaptation of the actions needed to repair the resulting damage. This is the moderate trend T3;
- A well-balanced development concerned with the environment. The combination of national strategies (determined policies for an *a priori* environmental regulation in particular) with enhanced intra-Mediterranean co-operation could make economic growth and environmental protection compatible. These are the alternative reference scenario A1 (North-South cooperation) that correspond to a sustainable development logic.

The 2005 exercise was based on only 2 scenarios, one baseline trend scenario and one alternative scenario declined for each issue.

The time (horizon, base year, past time series) is obviously a crucial parameter of the scenarios building:

- In the 1989/90 Plan Bleu exercise, 2025 was selected as the scenarios horizon and 2000 as an intermediate horizon. The base year was 1984-85 depending of the variable and the time series started in 1960 (or 1950) depending of the data availability.
- In the 2005 Plan Bleu exercise, 2025 was also selected as the horizon scenario and the base year was 2003-2004.

In the 1989/90 scenarios exercise, in addition to the national development plans and existing prospective studies, some national scenarios carried out by national team were used for reinforcing the hypotheses elaborated at the Mediterranean level (for some group of countries).

The likelihood of the scenarios exploring the Mediterranean futures needs to be continuously checked, and some aspects of these scenarios were updated in many thematic studies and reports.

Suggest: Recommendations to the stakeholders

The "Suggest" phase which accompanied the dissemination of the results and the publication of the report is essential in the framework of an international institutional process which aims fitting the needs and demands. Together with the prospective reports, an executive summary, describing the main results according the scenarios developed was provided to the stakeholders with some policy recommendations.

During this phase, the prospective reports were presented and discussed in several international events including the meetings of the Barcelona Convention contracting parties and the report was used as stimulus of the debates on the sustainable development issues in the Mediterranean.

Moreover the 2005 prospective report was the main support for the setting-up of the Mediterranean Strategy for Sustainable Development (MSSD) adopted by the contracting parties of the Barcelona Convention.

Storylines: narrative description of the regional scenarios

Representing the core of the first part of this report, this session is devoted to the synthesis of the Plan Bleu scenarios in addition of elements coming from more recent key studies.

Regional scenarios – Cross-cutting views: outcomes of Plan Bleu studies and inputs from other initiatives

The following analysis has been built on the basis of four studies:

1. A sustainable future for the Mediterranean: The Blue Plan's environment and development outlook, 2005 (updated in 2008)

Authors: Plan Bleu, Guillaume Benoit and Aline Comeau (dir).

This publication of 432 pages including statistical annexes, is the fruit of a collective expertise based on various studies and workshops organized in the last decade with the different components of the MAP, other institutions, Mediterranean networks of experts and NGOs, which has mobilized more than 300 experts from all Mediterranean countries as well as from some European countries not bordering the Mediterranean sea. This key-publication presented both a thematic status report (sector by sector), and proposals for an alternative and cross-cutting scenario of an economically more sustainable development. The study has been developed on the basis of a trend scenario which extends the basic tendencies observed according to major determinants (climate, demography, geopolitics, economics and governance) and an alternative scenario analysis.

2. EuroMed-2030 - Long term challenges for the Mediterranean area, 2011

Authors: Directorate for Science, Economy and Society of the European Commission - DG Research & Innovation in collaboration with a group of experts 'EuroMed-2030'.

This study considers the following topics: Demography, Water, Agriculture, Energy, Climate change, Education and Science, Religion and Culture, Geopolitics and Governance. This study is developed on three levels. First of all 'Trends' focus on the status of the main challenges that affect the Mediterranean nowadays and their potential evolution over the next twenty years. Secondly 'Tensions' examine socio-economic pressures that could generate from interactions among trends. Finally 'Transitions' aim at proposing initiatives able to face tensions. Macro-economic projections (demography, GDP growth, international trade) have been used for the SEMCs, focusing on connections between EU members and SEMCs in economic and social field, most of all in strategic issues as Euro-Mediterranean free trade area, migration, energy, transport, environment, water, agriculture, climate change, technology transfer, marine and maritime issues as well as cultural issues including conflicts, religions and gender.

3. Tomorrow, the Mediterranean - Scenarios and projections for 2030, 2011

Authors: IPEMED (Euro-Mediterranean Think Tank, Paris).

IPEMED has undertaken, in partnership with specialised organisations (CARIM, CIHEAM, FEMISE, OME) an extensive foresight project whose aim is to rally, within the "Mediterranean 2030" consortium, institutional and private-sector foresight bodies in the Mediterranean basin to the task of building a common vision of the Mediterranean in 2030; the "Mediterranean 2030" consortium regularly gathered more than 30 institutions from 15 different countries of the Mediterranean basin. The project has a scientific and economic objective: to elaborate joint, region-wide diagnostics and projections in the fields of energy, agriculture, water, environment, population and migration. But more importantly, a political and pedagogical objective: to foster and encourage long-term cooperation between officials responsible for foresight, to disseminate foresight methodology throughout the Mediterranean region and to be a tool for decision making.

4. PARME Workshop on Mediterranean Forward-thinking - Partnerships and Research in the Mediterranean, 2011

Authors: Agropolis Montpellier / French National Agency for Research (ANR).

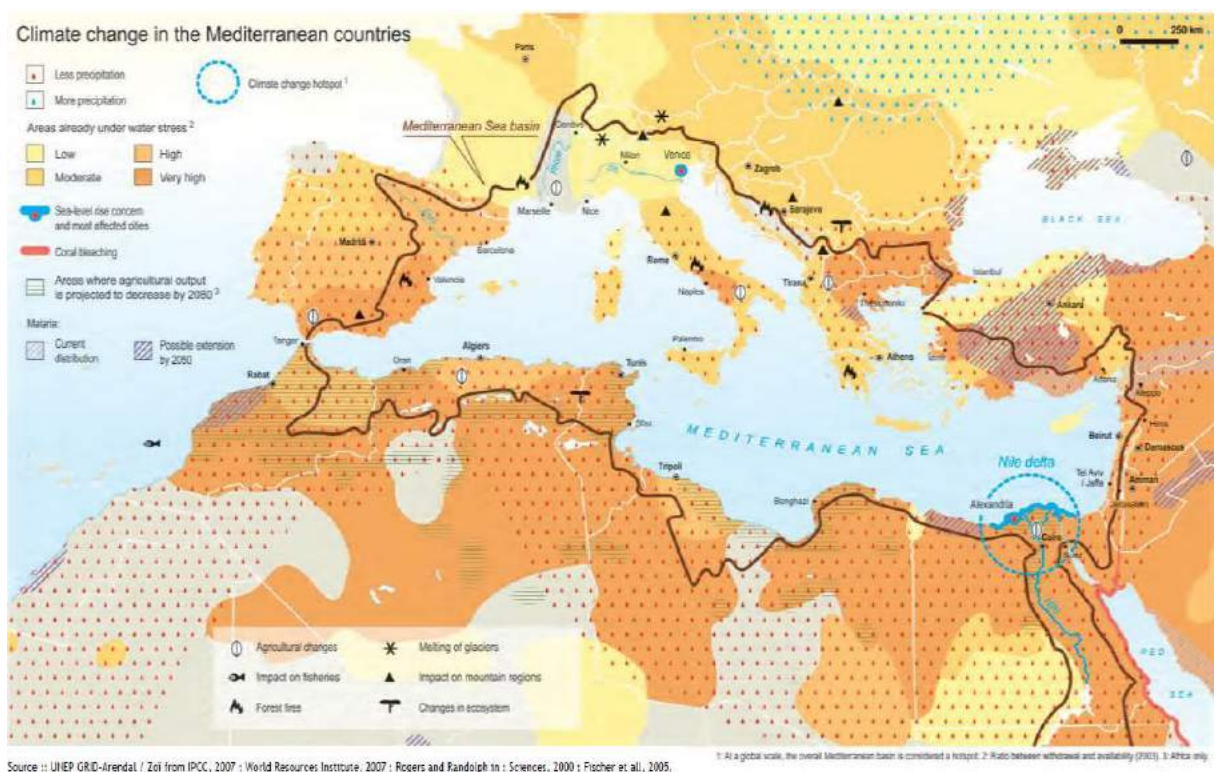
The study was conducted in four phases: (i) a summary of 80 prospective studies involving the Mediterranean, conducted over the past decade, (ii) the development of a common framework of forward thinking on the major issues identified in the previous phase, and the establishment of thematic working groups on these key issues, (iii) the identification of research priorities to address the major issues of each topic, (iv) a cross-sectional analysis of proposals to put forward a formulation facilitating their integration of a systemic point of view, leading to the final report. The study is based on a cross-sector and trans-disciplinary approach.

“Business as usual” scenarios (trend scenarios)

Plan Bleu report (2005) devotes its first part to perspective developing a trend scenario founded on assumptions related to climate change, cooperation and regional integration, population, economy, environmental and development policies.

Plan Bleu's trend scenario assumes a growing vulnerability to natural hazards because of an intensification of global warming (less than 1°C by 2025) and an increase of extreme climatic events in the Mediterranean area (see Fig. 2). These figures could be in some way integrated with those identified by the Intergovernmental Panel on Climate Change (IPCC): IPCC scenario A1B foresees an increase from +2.2°C to +5.1°C in 2080-2099 in comparison with 1980-1999 increasing temperatures.

Figure 2: Climate change in the Mediterranean



The EU will strengthen its presence in the Mediterranean by the accession of five coastal States (Albania, Bosnia-Herzegovina, Croatia, Montenegro, and Turkey) and by the improvement of some legal instruments aimed at achieving the maintenance of peace, adherence to principles of social market economy, economic convergence and action to protect the common environment.

However Euro-Mediterranean integration is proceeding slowly in part because of limited resources aiming at building a structured cooperation and in part because of the persistence of several conflicts in the SEMCs. Even that, Euro-Mediterranean economic interdependencies are likely to increase. Up to 2025, the baseline scenario assumes continued globalization, liberalized North-South trade (progressive in agriculture), and restrictive migratory policies.

Figure 3: Fertility rate in the Mediterranean. Trends and projections - 1950-2025 (Plan Bleu, 2005)

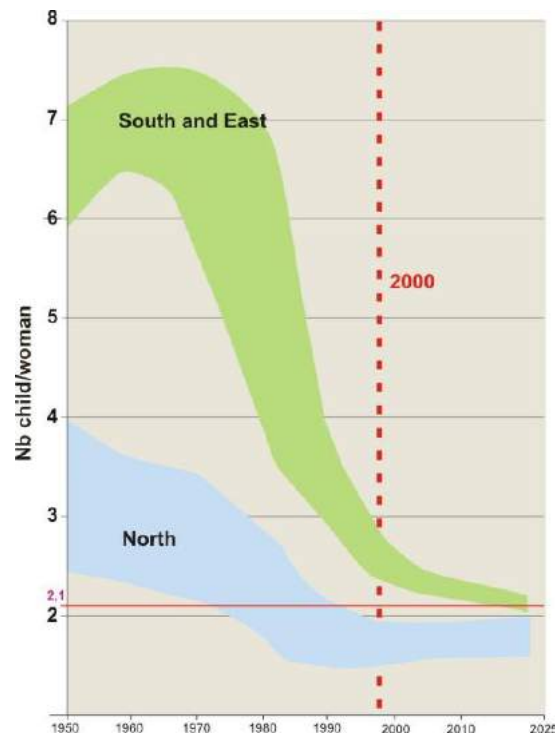


Figure 4: Comings and goings on the labour market (in million inhabitants) in Spain, France, Italy and Greece, 2000-2050

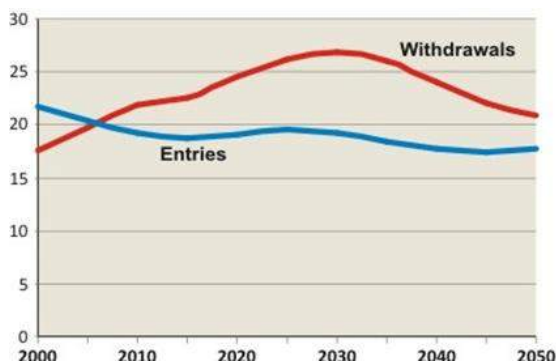
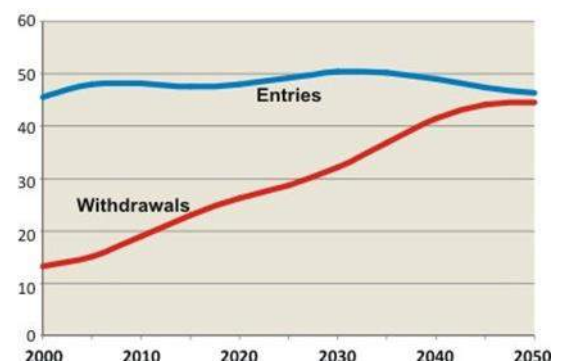


Figure 5: Comings and goings on the labour market (in million inhabitants) in other Mediterranean countries, 2000-2050



Source: Plan bleu from United Nations Population Division - World Population Prospects: The 2006 Revision

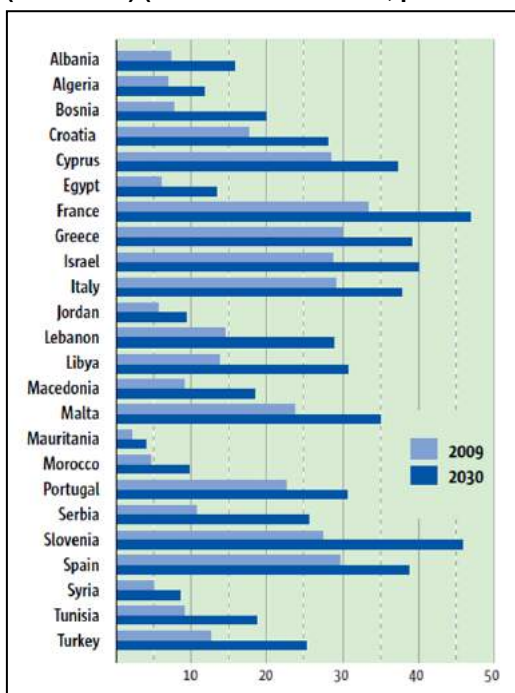
In the SEMCs the demographic transition and the convergence of fertility rates with those in Northern Europe (Fig. 3) will generate an increase in population of 137 million people by 2050 (Egypt and Turkey have the greatest population growth); that raises the issue of massive demand for employment (Fig. 5). In contrast, the countries of the Northern Mediterranean will have to face the problems raised by an aging population – which could be balanced (compensated) by a larger demand for employment coming from SMECs (Fig. 4).

Economic growth remains uncertain by 2025, particularly in the SEMCs: the 2005-baseline scenario assumes for the entire Mediterranean Basin an average GDP growth rate of 2.7% per year over the period 2000-2025 versus 2.5% in 1985-2000. Youth unemployment and revenue gaps between SEMCs and Northern Mediterranean countries (NMCs) will not be reduced.

Concerning environmental policies they will keep remaining basically top-down, corrective and regulatory instead of participatory. Economic cooperation and sector policies (agriculture, energy, water, transport, and tourism) will poorly integrate the environmental component or sustainability concerns.

An interesting BAU scenario is produced by IPEMED too that, unlike Plan Bleu, focuses more on foreign direct investment, population and migration, energy, agriculture, and water. The trend scenario proposed by IPEMED assumes an increase both of the intra-Mediterranean divergence and of intra-European gaps. According to IPEMED, in a scenario with horizon 2030 the projection of current trends precludes any possibility of convergence in the Mediterranean. It turns out that in the trend scenario Southern Mediterranean and Western Balkan nations are still to be confronted more and more with emerging nations in the global market. Few Mediterranean countries will continue successfully on the road to catching up process with Europe. Croatia, Serbia and Turkey, and to a lesser extent Tunisia and the other Balkan countries, will approach the levels of Portuguese income per capita, distancing sharply levels of North Africa (especially Egypt and Algeria) and the Middle East (Lebanon and Jordan) (Fig. 6). At the level of intra-European divergence growth rates in Greece and Portugal are hindered by difficulties in their balance of payment and public debt.

**Figure 6: Reference scenario continuation of past trends and IMF forecast for 2015.
Per capita GDP (2009-2030) (thousands of dollars, purchasing power parity)**



Sourc: Centre d'Analyse Stratégique (France) – IPEMED, 2011.

The free movement of persons and labour in the Mediterranean is not forthcoming (we focus here on movement of persons and labour, not on movement of goods, services, and capital). Despite their drop in the number of people in work, the Northern Mediterranean countries are tightening regulations on migration concerning both qualified and low qualified workers. In the South and East of the Mediterranean, the very high unemployment rates (an average of 10% of the population of working age) is the cause of main migratory pressures towards EU countries.

In the trend scenario the environmental impact of economic activities is not held in high regard although the increase in demand for energy, food and the rate of urbanization leads to serious consequences in terms of pollution, loss of biodiversity and paving the coastline.

In the energy sector we are witnessing two opposing phenomena: in Northern Mediterranean countries there is a stabilization of CO₂ emissions but, instead, in the South an increase in per capita consumption of energy (which, however, always is 30% lower than the European average) and a very strong growth of their CO₂ emissions (of about 100%) necessarily follow the industrial and population growth. The development of energy resources and energy efficiency also does not yet reach European levels.

Concerning the agricultural sector, the increase in consumption and production rates causes the disappearance of production of food crops. Rural zones only attract few activities for the benefit of littoral zones, thus accentuating rural exodus in the South and agricultural concentration in the North. The part of agriculture in GDP strongly decreases, except in Turkey, on behalf of big exploitations intended for the export. The Euro-Mediterranean agricultural decline would be accompanied by a strong penetration of suppliers from the rest of the world (meat and cereal crops). In the SEMCs the pressure on water resources becomes unbearable.

Alternative scenarios

The Plan Bleu's alternative scenario is built on a model of a more efficient management of natural resources on the basis of sustainable consumption patterns. Thanks to a new environmental awareness, greater resource efficiency is promoted in several sectors (water, transports, energy, etc.). For instance, there are foreseen savings amounting to about a quarter of total primary energy demand up to 2025 and at a cost likely to be at less than 10% of currently planned investment. In addition greenhouse gas emissions are likely to stabilize or even decrease.

The water sector too will know a greater efficiency even though an increased demand is projected. Concerning transports the Mediterranean area will move towards a model based on rehabilitation of public transports and improvement of modal transport (maritime and rail). This change will go together with a process of development of renewable energy (solar and wind in particular) thanks to the development of research in this field. In the agricultural sector a stronger awareness of risk linked to unsustainable methods will bring to the promotion of new practices.

The IPAMED study does not underestimate the upheaval that the various revolutions of the Arab Spring can bring into the society of the Southern Mediterranean, but makes these extraordinary events the theoretical basis of the alternative convergence scenario. With their political transition Arab countries claim and defend those civil, political and economic values which have long been at the basis of the political life of European societies. This sharing of values, including, for example, political participation and individual freedom, opens the door to a process of economic and social convergence with the European countries that takes place in the form of integration of production systems through the development of a Mediterranean network of synergies and collaboration. Regional integration will have its own legal basis: establishment of the four EU freedoms (persons, goods, services and capitals), access to the European domestic market and standardized norms allowing the emergence of a regional preference system. In this context, economic growth and reduction of unemployment will be favoured by a regional process of redistribution and well-working social protection.

The effects of this political atmosphere and economic cooperation are easy to guess: Creation of businesses and economies of scale as a result of so many positive externalities of the regional integration; Total factors productivity increase, and; Diffusion of technology through imitation and knowledge as well as capital transfers leads to a productivity catch-up.

Such a political and economic atmosphere certainly gives new impetus to trade flows from the Middle East and the Maghreb to the European countries and the Gulf countries. Relations in the Arab world deserve special attention. The alternative scenario IPEMED, in fact, assumes a commercial Arabic liberalization, by the Great Arab Free Trade Agreement - GAFTA (Arab countries including the States of the Gulf Cooperation Council) or amplifying the Agadir agreements (involving Egypt, Jordan, Morocco, Tunisia and the Palestine territories) in addition with the implementation of common projects in agriculture, energy, tourism or health.

The EuroMed 2030 consortium proposes four forms of transitions that could assure a real future of convergence in the Mediterranean Basin: Managing conflict; Win-Win transition; Deeper economic integration; Transition towards a Euro-Mediterranean Community (see details below).

- The first one is based on a “Managing Conflict” approach to cooperation. It is not possible to assume a convergence scenario without a serious transition in Euro-Mediterranean relations capable of giving a setback to the tensions as legacy of history, disillusion and disappointment with progress so far in the Euro-Mediterranean, difficulties in cooperation, recent specific events as Arab Spring. This 'Managing Conflict' hypothesis of transition seeks to identify the necessary actions at the level of the Euro-Mediterranean that will permit to evolve towards this region to more peaceful and serene future. This scenario then starts from the assumption of an improvement in existing structures of dialogue and cooperation whilst respecting the characteristics of each partner, and especially of involving more and more stakeholders from business, NGOs, students and youth. For a decrease in tensions that still threaten the harmony of the Euro-Mediterranean relations, the EU is called to take a firm position in foreign and security policy, especially on the most problematic issues such as Cyprus, Balkans, Western Sahara, Israeli-Palestinian and Israeli-Arab issues. In this regard, the EU will be required to develop an effective military capability. Important initiatives will be needed also on the social and cultural level.
- A peaceful atmosphere should be accompanied by the liberalization of fluxes in goods, services and knowledge through improved procedures of the Barcelona Process managed by the European Commission and by the UfM Co-Presidency and the UfM Secretariat: it is the so-called “Win-Win Transition”. Thanks to a more pragmatic approach to the original Barcelona Process objectives, the UfM will support the process of signing of the Association Agreements and the Action Plans, generating stronger South-South integration and guaranteeing a fair regional European Union-Mediterranean Partner Countries (EU-MPC) dialogue on the issues of common interest. Last but not least, besides knowledge and innovation are promoted in the SEMCs thanks to a common agenda of the EU and the MPC aiming to develop scientific and economic partnerships useful to increase the innovative capacity of the SEMCs.
- A “Deeper Economic Integration” is the main assumption of the third transition. It continues the process of creation of the Euro-Mediterranean Free Trade area whose main purpose is just promoting the diversification of trade and investment relations between the EU and the Mediterranean region, to contribute to a more favourable investment climate and to attract both domestic and foreign investment, through increased transparency, predictability and sustained economic growth.
- A “Transition towards a Euro-Mediterranean Community” represents an integrated scenario, assuming the overcoming of the biggest problems that have so far prevented the success of the Euro-Mediterranean integration process: lack of a shared vision, lack of political will, lack of trust, lack of resources, and lack of suitable institutions. Such results can be obtained only if the existing ones are improved: the European Neighbourhood Policy is called to make a stake in the internal market and access to the four freedoms. Implementation of European financial instruments such as Structural and Cohesion Funds would need to be extended to the SEMCs with priority to interventions aimed at the regional, meso-regional or sub-regional

levels. On the transnational level of cooperation between intermediary organizations and individual human beings, the institutional set-up has to be flexible and enabling.

Finally, the EuroMed 2030 idea is to create forum for building trust through transnational exchange, shared experience, dialogue, and hospitality. The Euro-Mediterranean civil forum, the Euro-Mediterranean Parliamentary Assembly, the Anna Lindh Euro-Mediterranean Foundation for the dialogue between cultures, the Euro-Mediterranean Human Rights Forum and the multiple existing networks in the field of economic cooperation can serve as models for these enabling spaces. They should foster the broadest participation, and create spheres of non-interference by governments, spheres of mutual respect and a spirit of unity in diversity. Convergence policies have been at the core of EU policies in order to promote growth-enhancing conditions and factors leading to economic, social and territorial convergence for the least-developed Member States and regions. The aim was, and still is, to create social cohesion through equitable and sustainable growth, thus balancing huge disparities in welfare and development whilst creating solidarity and the social basis for peace.

Focus on several topics: scenarios by issue

This session focuses on scenarios by issue / sector. It describes the assumptions and rationale used for determining factors that form the baseline and alternative scenarios. It summarizes several regional scenarios, sector by sector, by taking into account socio-economic, demographic and institutional context and trends. It focuses on main issues and sectors such as: Population/Demography (and consequences on employment), Consumption of Natural resources and Climate Change, Water, Energy, Transports and particularly Maritime transportation, Coastal development and urbanization, Tourism and recreational activities (including cruise), Marine Protected Area.

Demography: trends and prospects

Most of the demography scenarios provided for the international prospective studies (including Plan Bleu, IPEMED...) are based on the projection elaborated every two years by the Population Division of the Department of Economic and Social Affairs of the United Nations (the next one is due in the first half of 2013).

➤ “Business as usual” scenario

According to the scenario proposed by Plan Bleu the demographic transition already underway in the Southern Mediterranean will continue and will go in parallel with the convergence of fertility rates towards Northern Mediterranean levels. The population of the southern Mediterranean which has doubled in just three decades, reaching 258 million in 2005, will increase by another 137 million by 2050. The largest population growth will be concentrated in Egypt and Turkey which will reach a total of 121 and 99 million inhabitants respectively. Urban and coastal areas will be the most affected by demographic pressures. Spurred on by this trend the demographic swing between the North and the South is destined to become larger; by 2025 the population which inhabits the northern shores of the Mediterranean will increase only by 4.5 million.

The population growth will be accompanied by an accentuation of differences in the age structure between the two shores. According to EuroMed 2030 in the EU-27 not only there will be a very slow raise by less than 2 % by 2030, but also the population in the age group from 15 to 64 will fall by 6.5%, from about 330 million in 2010 to 310 in 2030. In the SEMCs, the total in this cohort will increase from 195 million to 250 million over the period, with a raise by more than 31%. The consequences are not difficult to imagine: by 2030 about 55 million people from SEMCs will be looking for work; the data reveal that will be especially Egypt, West Bank and Gaza from which comes the increased demand for labour. The EuroMed 2030 study emphasizes that such trends will determine the demand for higher educational facilities, and will create demand for housing, water, energy and transport. At the same time, this demographic trend could combine well with the needs of the NMCs for labour and the availability of people of working age in the SEMCs. The success of this complementarity will require new political, institutional, social and above all cultural efforts.

➤ Alternative scenario

An alternative scenario concerning demography is proposed only by IPEMED (Tab. 1 and 2) that assumes that the expansion of the labour market favoured by the regional integration process limits the migration of qualified workers from the SEMCs. Thanks to the return of their “brains” the SEMCs know a certain economic turmoil. Countries such as Croatia, Serbia, Turkey, Tunisia and Algeria stop being countries of emigration and become one of the main Mediterranean destinations of migration.

Table 1: Population aged 15 years and over in Euro-med countries and the Balkans (2000-2030)

	2000	2007	2020	2030
MCs	157,652,462	187,675,086	236,451,924	274,362,500
EU27	398,814,493	416,512,633	428,570,690	432,427,178
Balkans ⁽¹⁾	19,039,016	19,504,206	19,878,546	19,708,616

Source : UN Pop. Div. quinquennial estimates and projections (Medium Variant Scenario). (1) Serbia including Kosovo.

(IPEMED, 2011)

Table 2: Evolution of the population by age group (2007-2030) (Thousands) (IPEMED, 2011)

Age	15-65		25-65		15-80	
	2007	2030	2007	2030	2007	2030
MCs	173,895	242,661	119,893	185,123	185,908	269,731
EU27	331,958	311,805	271,023	258,303	394,753	397,127
Balkans ⁽¹⁾	16,201	15,094	12,676	12,490	18,902	18,719
Total	522,054	569,560	403,592	455,916	599,563	685,577

Source : UN Pop. Div. quinquennial estimates and projections (Medium Variant Scenario). (1) Serbie incl. Kosovo.

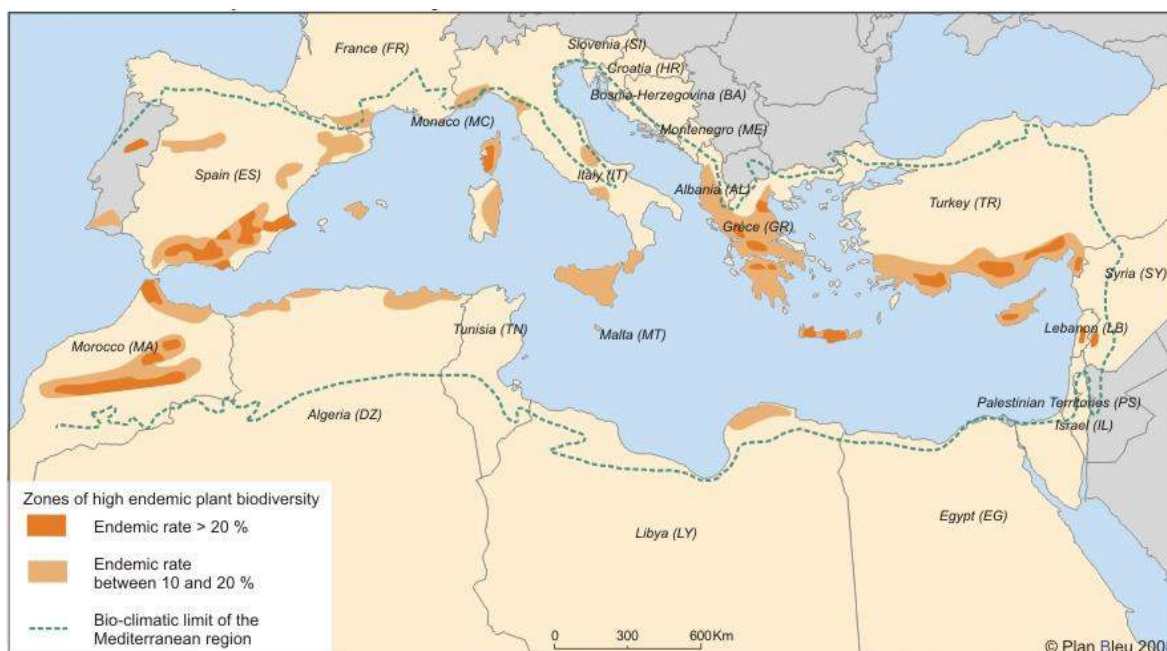
Coastal development: trends and prospects

➤ “Business as usual” scenario

According to the scenario developed by Plan Bleu the coastal zones will be characterized between now and 2025 by a significant urbanization and by the consequences that a phenomenon of such magnitude entails. The raise of coastal urbanization is the result of two separate phenomena: on one hand, the increase of population (a further 20 million town-dwellers by 2025 along the coasts); on the other side, the doubling of tourist flows (a raise of 137 million in the coastal regions: 2.3% per year). To these two indicators are tied some important dynamics whose environmental impact on the balance of the coastal bands is of some importance. Coastal overdevelopment, sprawl of large conurbations and saturation of coastal areas, together with an enormous increase in transports will not only worsen degradation of biodiversity (which is particularly rich and unique in the Mediterranean basin: Fig. 7), but will increase natural and social risks in nearly 50% of the coastline.

Besides the consequences of global warming on Mediterranean marine environments, an increase of 35 cm in sea levels expected by the end of the century will provoke phenomena as an increased submersion of lower lying coasts, particularly deltas, lagoon coastlines, marine marshes, mangroves, coral reefs and certain islands. Degradation of coastal environment will be marked by accelerated cliff and beach erosion, increased salinity in the estuaries too.

Figure 7: Riparian countries and areas with a high level of endemic plant biodiversity in the Mediterranean bio-climatic zone



Source: Zones of high endemic plant biodiversity according to Médail & Quezel, in *Annals of the Missouri Botanical Garden*: 84 (1997)

➤ Alternative scenario

The alternative scenario points to the sustainable management of the Mediterranean natural and cultural coastal heritage thanks to the implementation of policies aiming at the protection of ecosystems, at ensuring a quality environment for local populations and at the development of sustainable tourism. Shifting to this model will require the Mediterranean countries to implement policies that are not only able to stop coastal degradation and to reduce the forecasted risks in the trend scenario, but also to develop coastal areas from an economic, social and urban perspective. Several models of development will be adopted according to the characteristics of the coastal areas. In a perspective of sustainable use of coastal areas the densely built areas will benefit from restoration and recovery of housing or receiving already existing infrastructures. The areas with high potential for development of commercial or industrial districts will benefit from an improved transport network. In other areas activities joining tourism and production (as for example fishing or agriculture) will be supported in the framework of policies aiming at the promotion of quality and territory-specific features. The alternative scenario also provides that all along the Mediterranean coasts an integrated and sustainable management of coastal areas will be promoted aiming at stopping continuous linear urban development and to promote innovative approaches to sustainable tourism and conservation. Shifting to the alternative scenario will require the Mediterranean countries to strengthen coastal policies at local, national and international level. The adoption by the Contracting Parties to the Barcelona Convention of a Protocol on Sustainable Management of Mediterranean Coastal Areas (ICZM Protocol for the Mediterranean came into force in 2011) would provide a clear will of countries of giving a common strong answer to problems linked to coastal degradation.

Urbanization: trends and prospects

As far as the population is mainly concentrated along the coasts and in urbanized areas, the coastal attractiveness or “*coastalisation / littoralisation*” phenomenon will progress in next decades.

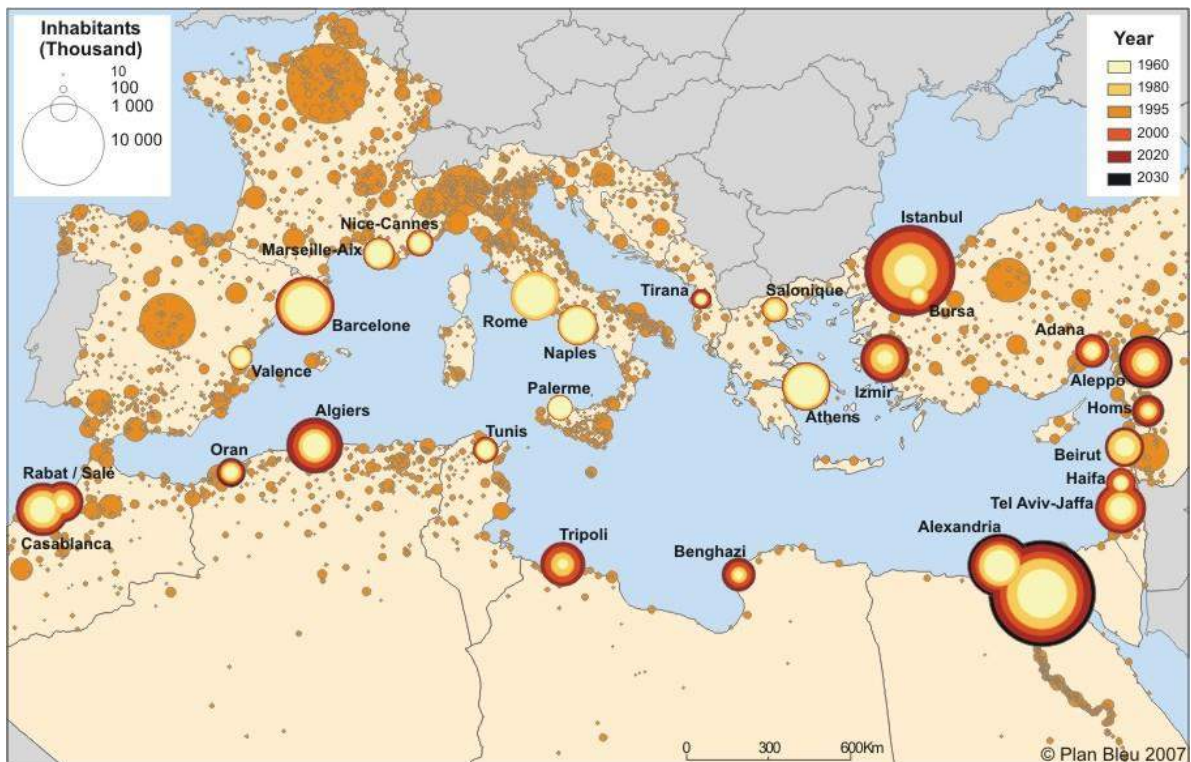
➤ **“Business as usual” scenario**

The BAU scenario proposed by Plan Bleu assumes that at the horizon 2025 the SEMCs will assist at two important phenomena:

- The considerable increase of urban population (expected to amount to 220 million in 2025 against 151 million in 2005), and;
- A raise of urbanization of coastal regions (one third of the urban population in 2025 will focus right on the Mediterranean coasts).

A third of the total new urban population will be hosted at least in the thirty political and economic capital cities of the Mediterranean. Besides an interesting growth of 85 medium size cities (from 300,000 to one million inhabitants) will allow the host of about 18% of city-dwellers (Fig. 8).

Figure 8: Population changes in some cities in the Mediterranean countries – Projections to 2030



Source: Plan Bleu from Geopolis 1998 and United Nations Population Division, World Urbanization Prospects: The 2005 Revision

It is clear that such an increase in urban population will be inevitably accompanied by some social and environmental dynamics. An increase in the number and size of the large urban centres (towns) will provoke consequences in terms of losses of agricultural land contributing to extending artificial land cover. In the SEMCs a wild urbanization built on an unregulated housing will limit access to water, sanitation, and other basic facilities to urban-dwellers. Besides, the fastest expansion of urban areas will be linked to difficulties in management of household waste. Especially in the SEMCs waste production levels are forecast to jump from 282 kg/capita/year in 2000 to 600 kg/capita/year in 2025. In Northern shore countries urban population is estimated to reach 156 millions of people in 2025: despite some important achievement in EU waste management regulation, the waste production tends to be stable at 566 kg/capita/year. In both SEMCs and NMCs natural risks due to climate change are estimated to increase.

➤ Alternative scenario

The alternative scenario proposes a model of sustainable urban development based on urban regeneration, on urban renewal, on the promotion of Mediterranean cultural heritage on the basis of successful experiences such as in Barcelona, Naples and Aleppo. These objectives will be achieved through a serious urban regeneration process and renewal initiatives, such as the integration of transport and urban planning, the protection of farmland and natural areas and the creation of green areas, the promotion of hinterland tourism and urban tourism, the improvement of maritime and rail transport. New policies in the field of pollution decrease are adopted allowing a reduction of total waste production in Mediterranean countries to 250 million tons by 2025 against nearly 600 million tons in the trend scenario. Governance is estimated to improve in promotion of sustainable urban development both at local level and national level thanks to amelioration of participatory process and to an improvement of Euro-Mediterranean cooperation.

Tourism: drivers and trends

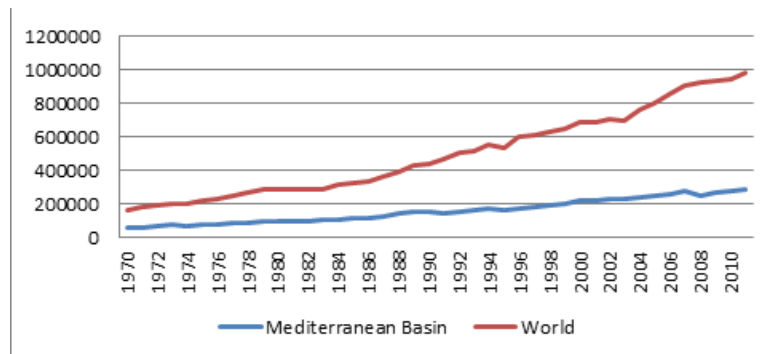
(From Loïc Bourse, Plan Bleu Note to be published)

Concerning tourism an interesting short foresight analysis is offered by the World Tourism Organization (WTO) which identifies some trends up to 2030 concerning Mediterranean area (Pierret / WTO, 2012).

➤ “Business as usual” scenario

According to the WTO, the Mediterranean consists of 29 tourist destinations in Europe, Middle East and Africa, sharing a similar climate, geography, and in most cases a Mediterranean coastline, as well as historical and cultural links dating back to antiquity. Thanks to its unique combination of mild climate, rich history and culture, exceptional natural resources and proximity to major source markets, the group of 29 countries around the Mediterranean Sea is the world's leading tourism destination in terms of both international and domestic tourism. The Mediterranean countries represent still around 30% of the global tourist visits.

Figure 9: International tourist arrivals in the Mediterranean



Source: Plan Bleu

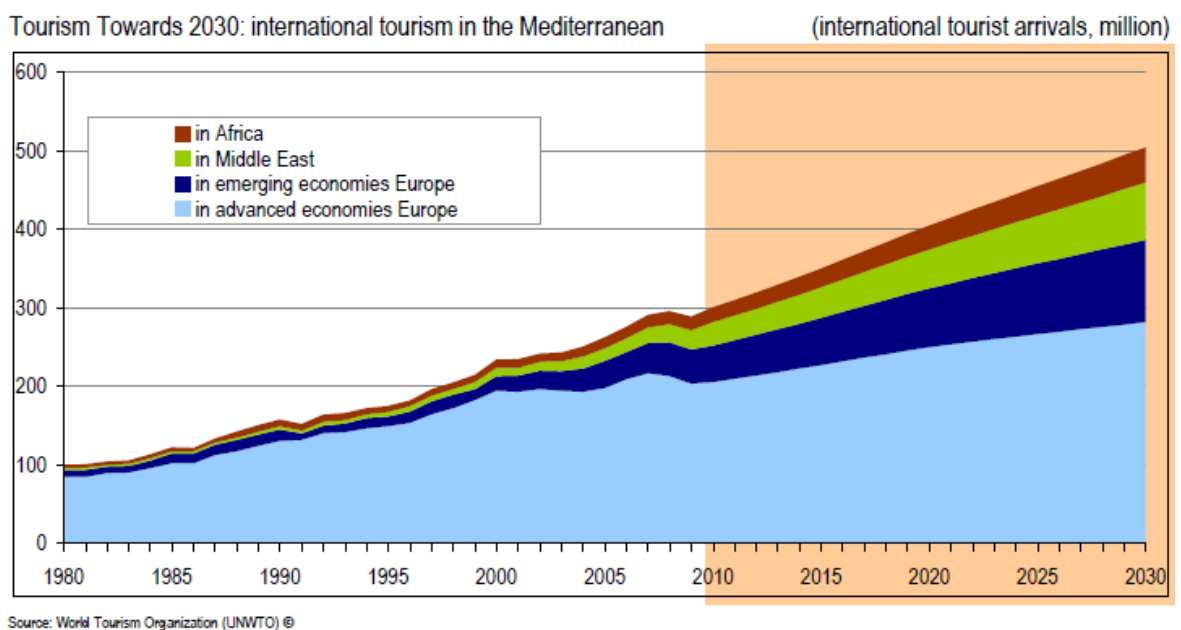
Over the past 40 years the region faces a growth rate of 400% in the number of international tourist arrivals: from 58 million arrivals in 1970 to 282 million arrivals in 2011. This phenomenon provokes an increasing importance of tourism for national economies such as Tunisia and Egypt, where tourism represents 9 and 6% of GDP, but also in local economies such as district of Alanya in Turkey where tourism accounts for more than 60% of GDP.

Mediterranean tourism is characterized by the predominance of three countries: France, Spain and Italy receive 59% of arrivals in 2010 (26%, 18%, and 15%) and 70 % of tourist spending in the Mediterranean.

According to the WTO from 2010 to 2030 the number of international tourist arrivals will pass from 300 million to over 500 million with an average 2.6% growth per year for that period, somewhat below the world average of 3.3% a year. In absolute terms this represents an average increase of some 10 million visitors a year (Pierret, 2012).

Despite this, the market share of Mediterranean destinations in total tourist arrivals worldwide will decrease slightly from 32% in 2010 to 28% in 2030. In this scenario it will be registered a sharp increase in touristic flows towards Balkans and the Middle East (Turkey) which are forecast to become the new main important destinations in the area. As Fig. 10 shows, in 2010-2030, Mediterranean Africa (+4.6% a year), the Middle East (+4.5% a year) and the emerging economies of Europe (+4.1%) will outgrow the advanced economies of Europe (+1.6%).

Figure 10: Tourism Towards 2030: International tourism in the Mediterranean (1980-2030)



Environmental pressures coming from tourism on landscapes, biodiversity, and quality of the urban environment and natural resources quality are expected to grow. In addition problems related to drinking water quantity and quality, seawater quality, energy consumption, and noise could seriously affect those areas which are expected to face a growth in touristic arrivals.

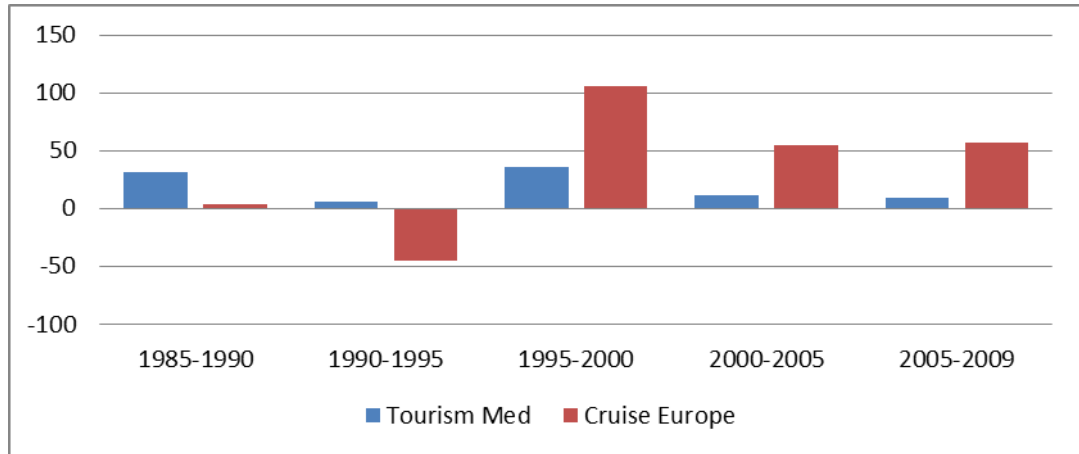
Cruise sector: drivers and trends

(From Loïc Bourse, Plan Bleu Note to be published)

The cruise industry holds only a small share of international tourism in the Mediterranean, representing 1.4% of international arrivals in 1985 and 1.8% in 2009, and just over 1% of nights spent by international tourists in the Mediterranean in 2009. The supply is still low compared to the overall Mediterranean tourism market, with cruises representing about 2.5% of the accommodation capacity (number of beds) in 2009.

While these numbers may seem low, the cruise tourism sector has high growth potential. If one focuses on the five-yearly rate of change over the past 25 years, cruises increased by only 3% between 1985 and 1990, then fell sharply (by 45%) between 1990 and 1995, before experiencing 15 years of rapid growth (106% between 1995 and 2000, 55% between 2000 and 2005 and 57% between 2005 and 2009) (Fig. 11).

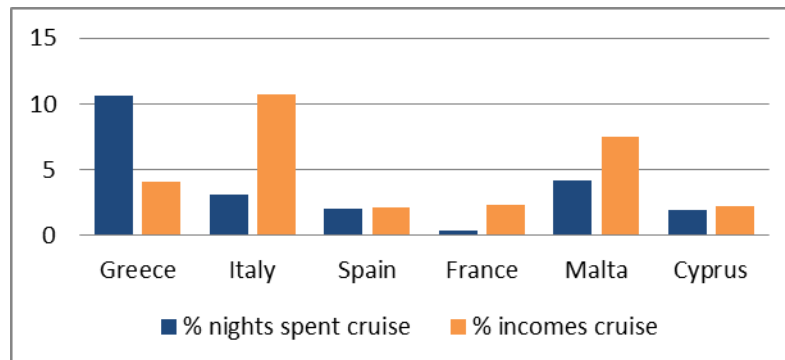
Figure 11: Five-yearly percentage changes in cruise passengers and international tourists in the Mediterranean 1985-2009



Source: Data WTO & Med Cruise, Plan Bleu, 2012

The Mediterranean countries that are major cruise destinations are in order of importance: Greece, Italy, Spain, France, and Malta. The comparison between the number of nights spent and the revenue this generates illustrates a significant difference between Greece and other countries. While cruises in Greece account for about 10% of total tourism demand, they generate only 4% of the country's revenue from tourism. Italy experiences the opposite phenomenon, with cruises representing about 3% of total tourism demand in terms of nights spent, yet more than 10% of total revenue from tourism. Spain's position is intermediate, since the number of nights spent and revenue from cruises are balanced, at approximately 2% of the Spanish tourism offer. This approach highlights the ability of the cruise industry to produce added value yet raises the question of the difference in economic performance between Greece and Italy (Fig. 12).

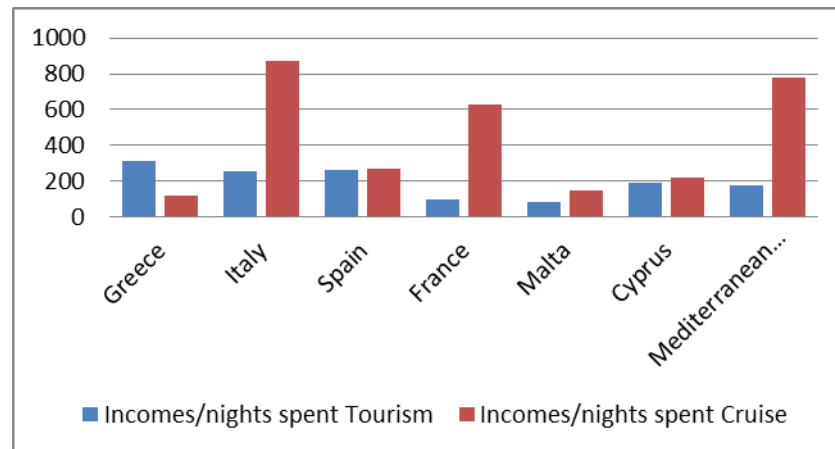
Figure 12: Comparison of the share of nights spent and the share of revenue generated by cruises (2009)



Source: Data Med Cruise, Plan Bleu, 2012

The cruise segment has high added value compared with the tourism sector in general (Fig. 13). In Italy, cruises generate, per night, four times more revenue than tourism in general (over €800 per night compared to over €200 for tourism in general) and in France, the ratio is six to one (about €600 for cruises and €100 for tourism in general). In Greece, cruises generate three times less added value (€100 for cruises compared to €300 for tourism in general).

Figure 13: Economic performance of cruises compared with tourism in general (revenue in Euros per night) (2009)



Source: Data WTO & IIC, Plan Bleu, 2012

35% of Mediterranean ports that receive cruises are Italian and 34% are Greek, pointing to an almost identical number of ports in both countries. In contrast, 63% of ports of departure are located in Italy (France comes in second place with 13%) and 42% of ports of call are in Greece (Italy is in second position with 28%). The difference between Greece and Italy in the production of added value lies in the distinction between ports of departure and ports of call.

Figure 14: Distribution of ports of departure (in yellow) and ports of call (in red) in the Mediterranean (2010)



Source: IIC – Alberto Cappato, Plan Bleu, 2011

Does the added value created by the investment in infrastructure return to the local area? This is extremely hard to measure, especially in the case of cruises. On average, each passenger spends €50 per call when eating off the ship. 70% of passengers return on board for lunch or dinner. Cruise lines organize “tours” to capture the maximum possible share of their passengers’ expenses. They make their largest profit margins on customer spending on-board ship and from on-shore excursions organised directly by the cruise company. Thus, the local benefits are limited and hard to perceive (Cappato, 2011).

In terms of economic results, the ports that receive the most revenue are the ports of departure which host a wide range of services, including transport, responsible for over 30% of indirect jobs. Italy has the majority of ports of departure (Fig. 14). Even these ports, however, receive only a small share of the revenue that could be theirs, since cruise lines monopolise an entire segment of the marketing of services and goods, causing economic drain from the local economy.

Across the entire Mediterranean region, cruises create about 0.7 direct and 1.5 indirect jobs per bed, or a total of 2.2 jobs per bed. 32% of total jobs (both direct and indirect) related to the cruise industry are located in Italy, since this is where most of the shipyards are situated. Shipbuilding represents 18% of direct employment by the cruise industry in the Mediterranean (for example, Fincantieri holds 41% of the world market for the number of beds produced).

In order for the cruise industry to stimulate regional development, countries must combine cruise ship production with a high ratio of ports of departure to ports of call and a considerable number of overnight stays. In the Mediterranean, only Italy manages to combine these different factors.

One reason for the inability of the dominant model of Mediterranean tourism development to meet sustainable tourism objectives is based on the disconnection between tourism and the places where it operates, in terms of their economic, social, environmental and cultural contexts.

This disconnect is created mainly:

- By the amalgam existing between economic growth and regional development.
- By the implementation of regional development policies which alludes to the belief that the investment in infrastructures will necessarily convey to wealth creation for the territory.
- By an inefficient governance of tourism on the international, national and local scales.

This can sow the seeds of socio-political instability and lead to popular rejection of overly “selective” development, monopolised by a few and offering minimal prospects for vulnerable local populations (employed and unemployed members of the active population, people with low levels of formal education, women, young people). It is thus necessary to situate tourist destinations within regional projects, in other words, to plan tourism strategically in line with other activities and the economic, social, environmental and cultural potential of each area.

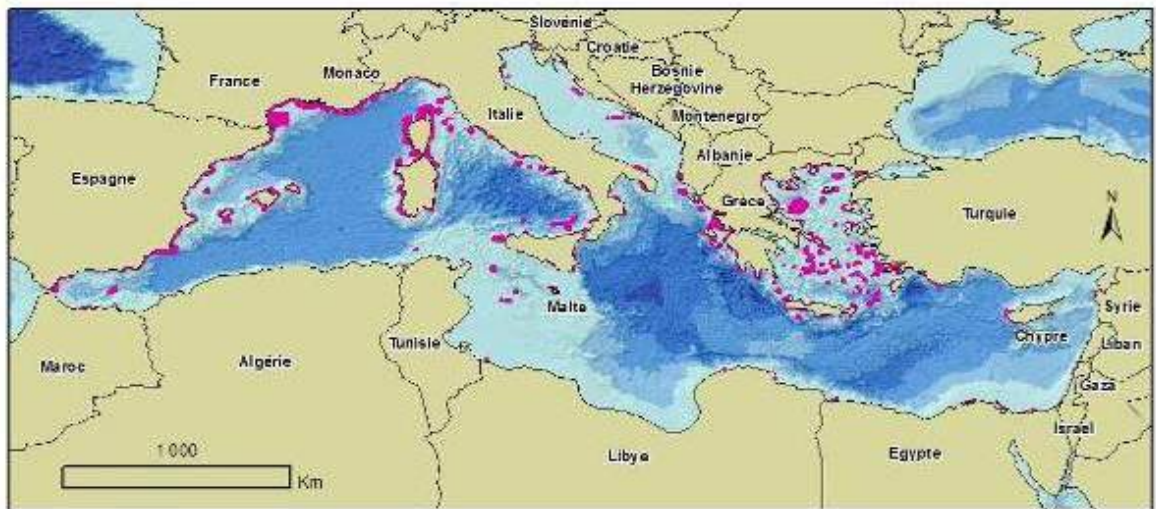
Marine and Coastal Protected Areas (MCPA): trends and prospects

(From Maud-Anaïs Claudot, internship, Plan Bleu)

While only representing 0.8% of the global ocean, the Mediterranean Sea represents about 8% of the world marine biodiversity (close to 17,000 known species) with a significant endemism rate – approximately 20%. This richness is all the more important to protect that the geographic characteristics of half-closed sea of the Mediterranean, makes it particularly sensitive to natural and anthropic pressures (habitat conversion, marine and terrestrial pollution, fisheries overexploitation). Marine and Coastal Protected Areas (MCPA) are therefore a key tool for the future of Mediterranean Biodiversity.

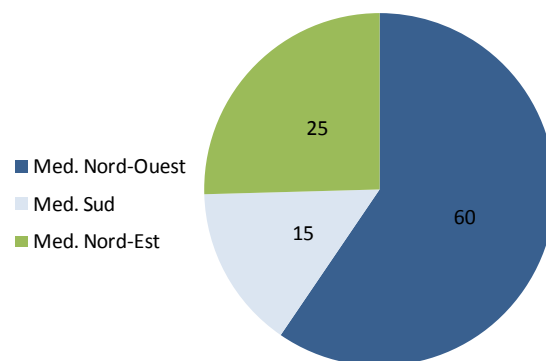
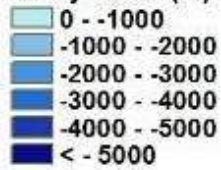
With a number of 675 MCPAs (Fig. 16) (of which 500 are Natura 2000 sites) covering 106,660 km² or 4% of the Mediterranean Sea (a surface that falls down to 19,160 or 0.4 % of the sea if we exclude the Pelagos Sanctuary), the 2010 Aichi target of protecting 10% of Marine and Coastal Areas by 2020 is currently far from being achieved in this region. Even the 56 projects of new MCPAs only represent 1,126 additional km². Moreover, their representativeness is weak: MPAs are mostly located on coastal zones, as Pelagos is the only Mediterranean high sea MCPA, and in the North Western part of the basin.

Figure 15: Marine and Coastal Protected Areas in the Mediterranean



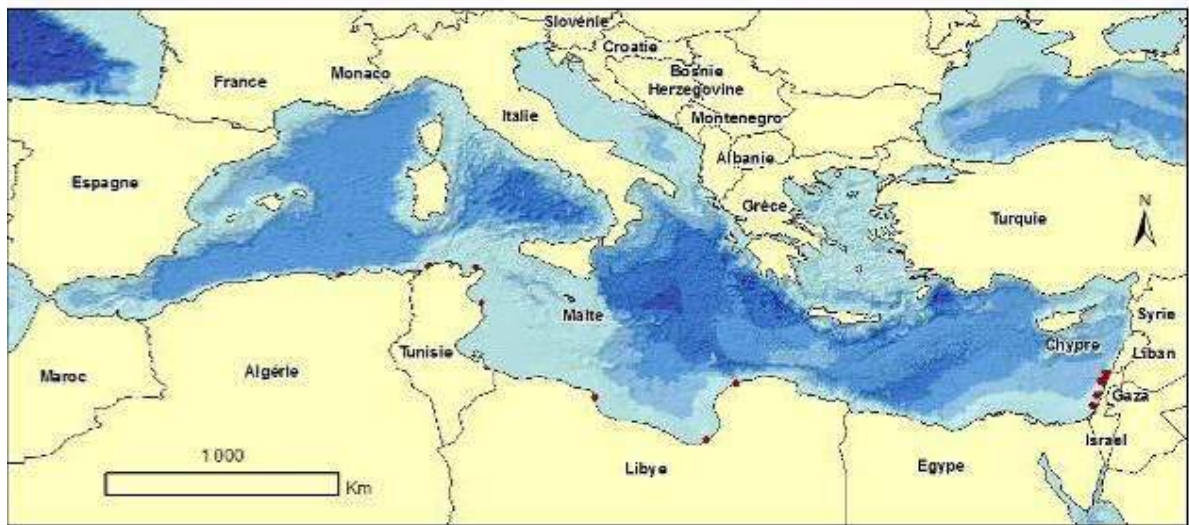
 AMP (tout statut, dont Natura 2000)

Bathymétrie (m)



Source: MedPan 2012 Statute of Mediterranean MPAs (to be published)

Figure 16: Projects of Marine Protected Area in the Mediterranean



Aires marines protégées en projet

Source: MedPan 2012 Report - Statute of Mediterranean MPAs (to be published)

However, MCPA projects mainly concern the South and South East of the Basin (Fig. 17). Mediterranean MCPAs highly vary in term of statute (most of them being nevertheless multiple use zones), purpose (from protecting emblematic species such as loggerhead turtles or monk seals, to preventing mass tourism development), size, age, and financial (from 0 to 6,345,000 €) as well as human resources. However, according to the 2012 Statute of Marine Protected Areas led by the MedPan network, more than 90 % of the sites (except for the Natura 2000) count with an administrator. On the interrogated panel, 44% have a management plan, and 22% are currently elaborating one. In the vast majority of cases (more than 75%) the governance of the MCPA is assumed by governmental instances, and for 89% of the MCPA, the funds mainly come from governments.

Given the current economic context and the weak surface that would be protected by current MCPA projects, the Aichi target is unlikely to be reached by 2020. The most likely trend to be adopted by Mediterranean MCPA would therefore be a slight increase in the protected surface, along with a stagnation, or even decline, of the budgets of existing MCPA, sometimes leading to an abandonment of some MCPA that are generally perceived as obstacles to local economic growth.

An alternative scenario might include awareness raising on local benefits brought by MCPA (Plan Bleu is currently working on an economic valuation of 5 Mediterranean MCPA) leading to easier local acceptance, a deeper implication of local stakeholders in MCPA management including compensatory measures for the sectors that are negatively affected, and eventually the multiplication of MCPA until the Aichi target is reached.

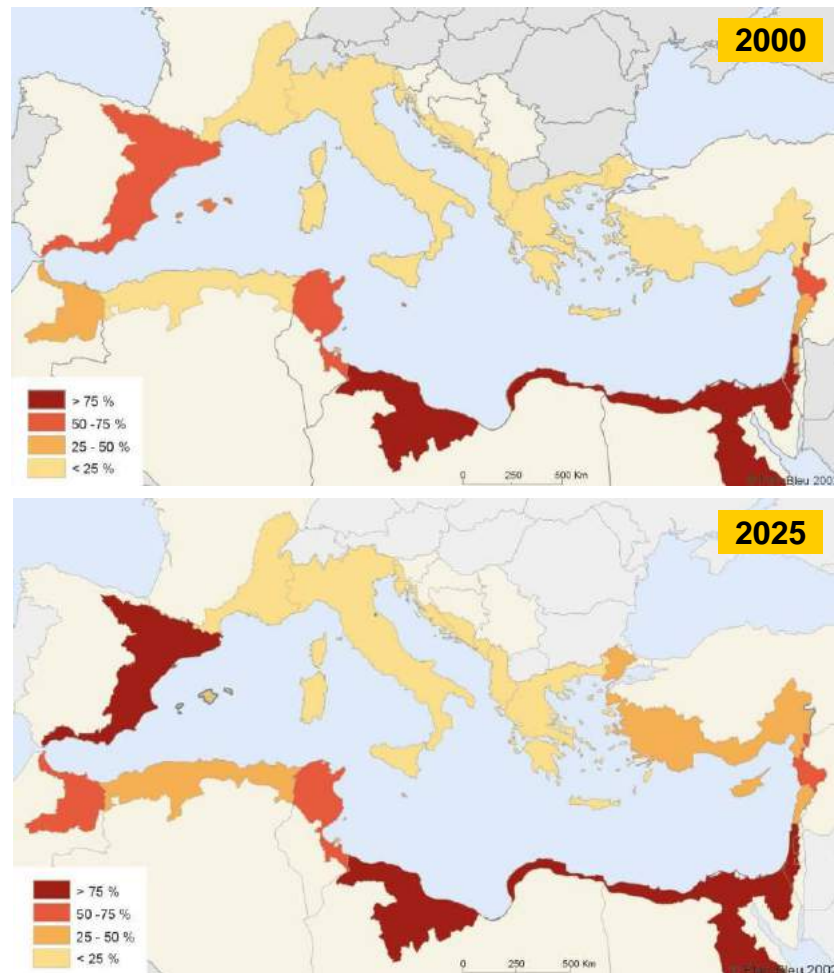
Water resources: trends and prospects

The Mediterranean basin is one of the world's most vulnerable regions to climatic and anthropogenic changes and constitutes a water crisis' hot spot. Under such context, questions on water resources management arise. Currently, the southern and eastern rims are experiencing high to severe water stress. By the 2050 horizon, a 30-50% decline in freshwater resources is simulated over most of the Mediterranean basin and total water withdrawals are projected to double. Water stress could hence increase over the whole Mediterranean basin. However, if progresses in efficiency are reached, total water withdrawals would stabilize over the Mediterranean basin and even make them decrease (10-40%) in many northern catchments. Water stress could thus be tempered in some eastern catchments and kept to low on the northern rim (Milano, 2012; Plan Bleu, 2008).

➤ “Business as usual” scenario

The Mediterranean region is notoriously facing acute water problems (Fig. 18), with 85% of water withdrawals used for agriculture in the Middle East and North Africa, which nevertheless remains a net importer of food (phenomenon of virtual water imports).

Figure 17: Exploitation indices of renewable natural water resources (catchment basin)



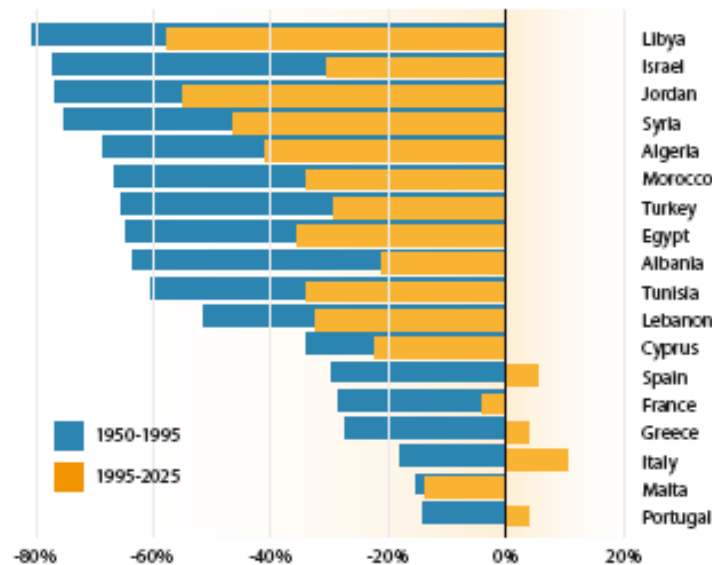
Source: Plan Bleu, 2005 (Jean Margat)

The region is considered as one of the most vulnerable regions of the world to climate change, with an average decrease in rainfall and a significant increase in temperature associated with increased recurrence and intensity of extreme events. The Southern rim countries receive only 10% of the total precipitation; “water poor populations”, living in countries with less than 1,000 m³/capita/year, could reach 250 million inhabitants in 2025, 80 million of whom would be facing shortage conditions with less than 500 m³/capita/year. Twenty million Mediterranean people, particularly in the South and East, are already deprived of access to drinking water. During the second half of the 20th century, water demand, i.e. the amount of resource abstraction (95% of total withdrawal) plus unconventional production practices (desalination, wastewater reuse,...), including losses during transport and use –estimated at nearly 40% of total water demand–, has increased twofold, reaching 280 km³/year in all riparian countries in 2005. Agriculture is the main water-consuming sector (180 km³/year to irrigate 24 million hectares) and accounts for 64% of total water demand (45% in the North and 82% in the South and East), while it only remains marginal in the Eastern Adriatic countries.

The ARP PARME study underlines high pressures coming from anthropogenic factors on one hand and climate change on the other hand. Demand for drinking, industrial or agricultural water should greatly increase as the availability of water will be in sharp decline. Tourism development and heliotropism (including seasonal retirees) will add to this demand and exacerbate competition with other uses of water. Aquatic ecosystems, providing procurement services and regulation as wetlands (natural purification and filtration of water) will be increasingly at risk because of urbanization, particularly on the coast. In terms of management policy for the water supply, implementation of desalination or wastewater reuse techniques is coming increasingly to meet the more and more growing demand.

The scenario proposed by Plan Bleu reveals a dramatic situation as regards access to water by the population of the SEMCs. By 2050, climate change, reduced rainfall, excessive pressure on water resources, and reduction of renewable water resources will result in a substantial water shortage affecting almost 290 million people in the South and East of the Mediterranean. The increase in water demand will be even of 25% and will be recorded mainly in countries such as Syria and Turkey. These data differ from foresights undertaken by EuroMed 2030 that in the following graph (Fig. 19) shows how access to water has fallen since 1950. In the case of Libya, it fell by 80% from 1950 to 1995 and is expected to fall by another 60% from 1995 to 2025. The smaller impacts for the EU member States are mainly the consequence of low (sometimes negative) population growth over the period.

Figure 18: Variation in per capita water resources (1950-2025)

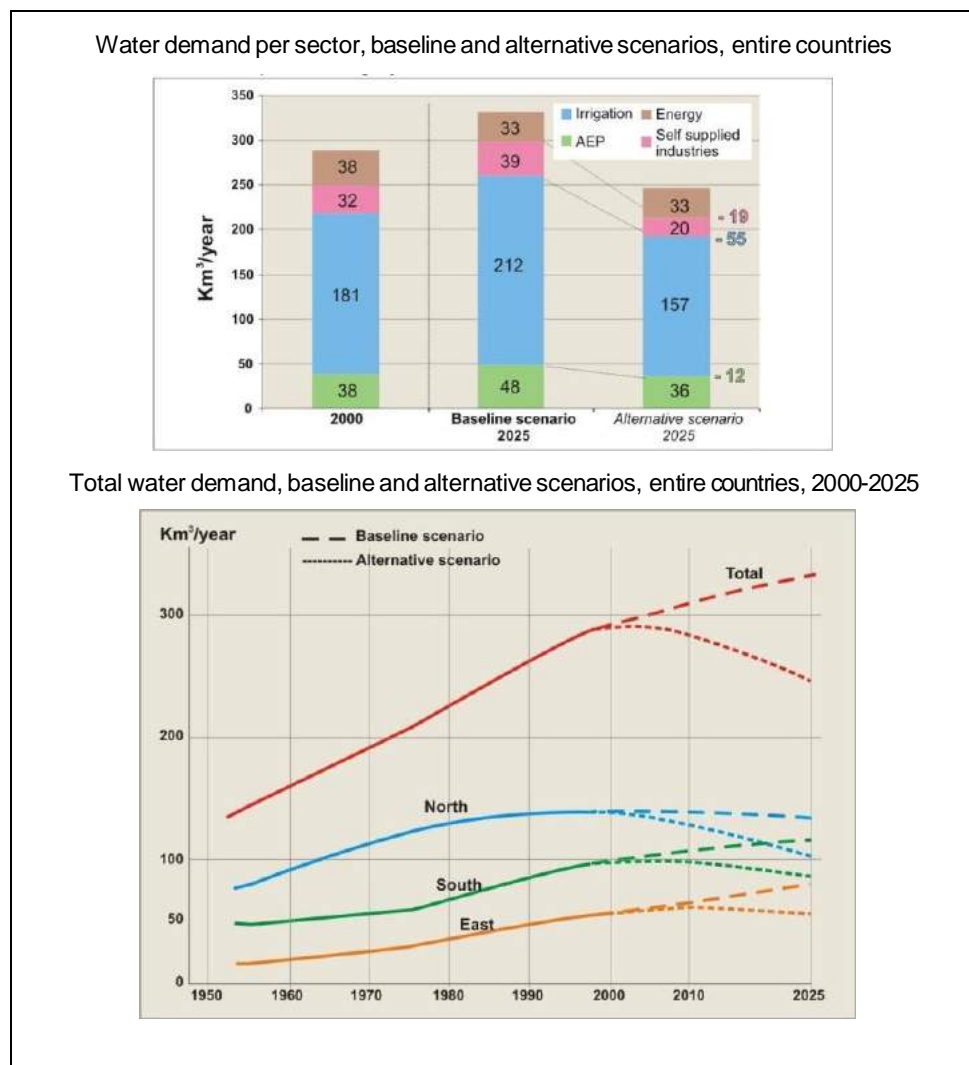


Source: CIHEAM and FAO (*EuroMed 2030*, 2011)

Tensions on the water resources are expected to be particularly high in Egypt, Israel, Libya, Palestinian Territories and in the Spanish Mediterranean catchment areas (index at -75% or higher), as well as in Malta, Syria, Tunisia and in some catchments of Morocco (index between 50 and 75%) (Fig. 18). Water demand is increasingly met by over-abstraction on natural resources. The index of unsustainable water production on the Mediterranean catchment basin exceeds 10% in Israel, Cyprus and some Spanish regions, 20% in the Palestinian Territories, and 30% in Libya and Malta. On a national level, fossil-water withdrawals are added to over-exploitation of renewable water, bringing the index values to 22, 35 and 84% in Tunisia, Algeria and Libya respectively. Pressures are also qualitative, such as excessive pesticide or nitrate contents in many aquifers, particularly in the North. There is also the problem of saltwater intrusions in overexploited groundwater bodies. However re-use of wastewater for irrigation could reach a total of 5.7 km³ on the Mediterranean Basin in 2025, and the industrial production of freshwater through desalinization of sea water or brackish water could be developed (0.2% of total demand). The extent of these new forms of water production must nevertheless be put into perspective: in 2025, total re-use and desalinization would account for only 25 km³, 90% of which in Egypt with the use of recycled water from agricultural drainage.

➤ **Alternative scenario**

Figure 19: Water savings, demand management with the alternative scenario to 2025 (Plan Bleu, 2008)



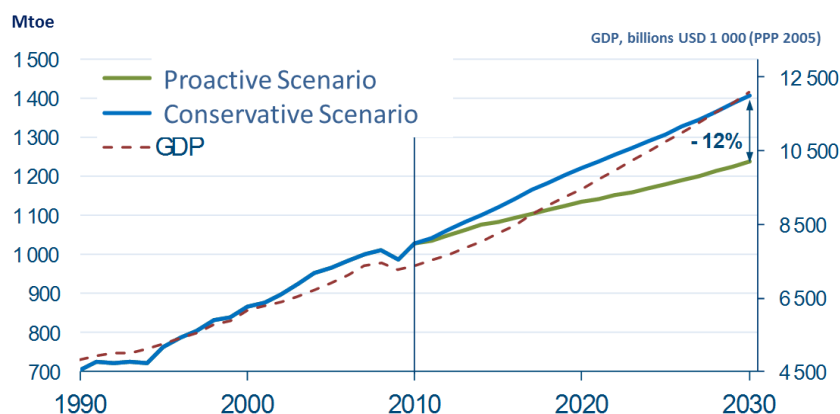
The alternative scenario relies on an improved water demand management which will allow saving 25% of water demand, i.e. approximately 86 km³/year in 2025 (Fig. 20). Main results will come from agriculture with nearly 65% of total water savings potential identified in the Mediterranean: transport losses reduced by 50%, down to 10%, irrigation water efficiency increased from 60% to 80%. Concerning industry it will offer a further 22% in water savings potential: recycling rate up to 50%. Thanks to transport losses and household leaks reduced by 50%, respectively down to 15% and 10%, another 13% of water saving will result from drinking water supply. This means that Mediterranean countries will decrease their water demand to 102 km³/year in the North and at 144 km³/year in the South and Middle East, globally equivalent to the drop in total current demand of approximately 40 km³/year. Moving towards the alternative scenario requires the implementation of sustainable policies able to promote improved water and soil conservation, and increased recourse to the artificial replenishment of water tables in arid areas, etc.

Energy: trends and prospects

➤ “Business as usual” scenario

It is obvious that primary energy demand in the Mediterranean will grow over the next few years, driven by various phenomena. The primary factors of growth and new demand for energy services and infrastructures are high demographic growth (1.2% on average per annum in Southern countries and 0.3% in Northern countries between 2009 and 2030), combined with rapid urbanization and major socio-economic development needs. Economic growth is forecast to be 3.9% annually in the South and 1.9% in the North on average¹. The trend scenario proposed by Plan Bleu and Mediterranean Energy Observatory (*Observatoire Méditerranéen de l’Energie* / OME) assumes that from 2009 to 2030 the primary energy demand will grow more than 40% by 2030 to over 1,400 Mtoe (Fig. 21 and 23).

Figure 20: Projected changes in primary energy demand in the Mediterranean (1990-2030)



Source: OME database, 2012.

The increase in energy demand will be more pronounced in Southern Mediterranean countries in parallel with their demographic and economic growth. The proportion of demand from Southern countries in regional consumption will increase from 34% in 2009 to 44% in 2030.

The gap in energy consumption per capita between the North and the South is also projected to fall. However, depending on the scenario, an NMC inhabitant will by 2030 consume 1.7 to 2 times more energy on average than an SEMC inhabitant.

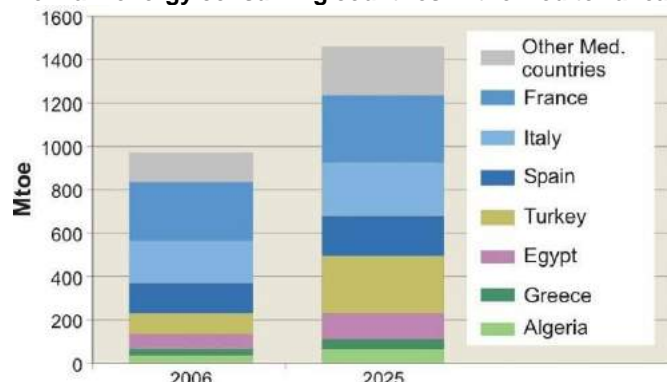
¹ H. Allal and L. Guarrera (OME), F. Costes (Plan Bleu), *Towards A Breakdown Energy Scenario in The Mediterranean?*, Plan Bleu, Sophia Antipolis, July 2012.

The Plan Bleu-OME “conservative scenario” assumes also that:

- The Mediterranean energy mix will still be dominated by fossil fuels and the region will enter the natural gas era from 2020;
- The power generation industry will continue to expand;
- Renewable energies will grow strongly, by the equivalent of two Mediterranean Solar Plans by 2020 and two others between 2020 and 2030;
- Energy efficiency offers significant and attainable potential and is a priority;
- Environmental challenges will be exacerbated (climate change, interaction with water resources).

Fossil fuels (oil, gas and coal) remain the main energy sources: 79% of the countries' energy is represented by fossil fuels, especially natural gas (that will represent 37% of primary energy demand in the SEMCs) and electricity. The latter will know a remarkable expansion on the side of the demand mostly in the SEMCs thanks to growth in the industrial sector, improved access to electricity, and improved standards of living directly linked to consumption in the residential sector. Especially in countries as Turkey, Tunisia, Algeria, Egypt and Morocco the consumption will double, and for some country even will triple, by 2025 (Fig. 22).

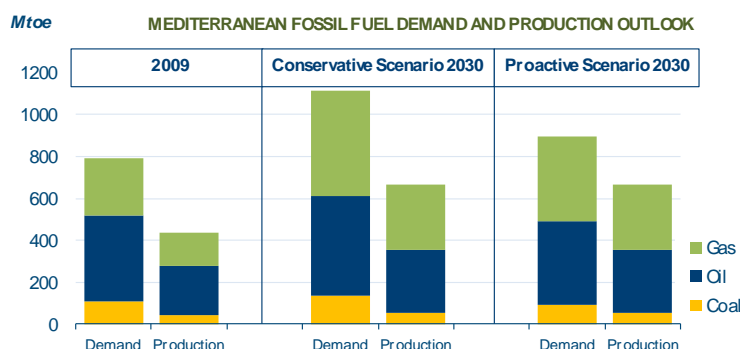
Figure 21: The main energy consuming countries in the Mediterranean, 2006-2025



Source: Mediterranean Energy Observatory (Plan Bleu, 2008)

Oil production should slow down after 2020. The Mediterranean is a net oil importer and will remain so over the next twenty years. However, gas production should more than double over the same period.

Figure 22: Projected fossil fuel demand and production in the Mediterranean

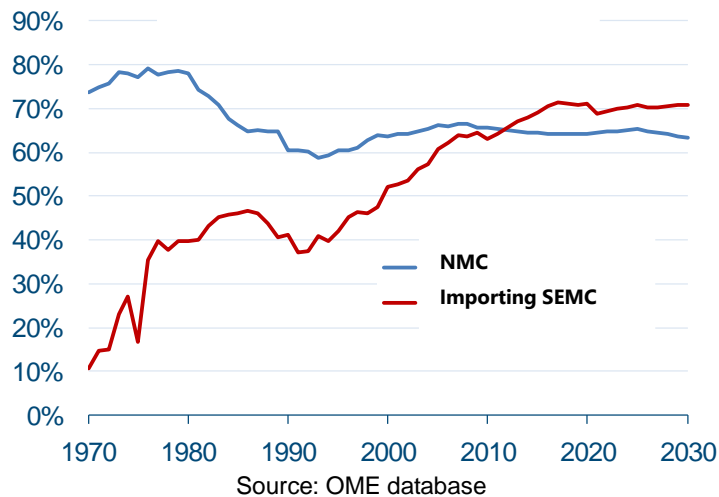


Source: OME database, 2012

Electricity generation will remain the most gas-hungry industry, accounting for more than half of total demand in 2030. The Mediterranean as a whole will remain a net gas importer.

Across the Mediterranean, energy dependence could thus hit 40% by 2030, which would exacerbate tension around the security of supply. This dependence will be all the more marked for importing countries (excluding Algeria, Egypt, Libya and Syria). In these countries energy dependence under the business-as-usual scenario would be 63% for NMCs and 71% for fuel-importing SEMCs (Fig.24).

Figure 23: Energy dependence of importing countries in the Mediterranean



According to ARP PARME renewable energy (solar, wind, hydro, biomass) represent only 6.7% of the regional energy balance. Except for hydraulic energy and biomass, the trend scenario foresees a small increase from 2,8% to only 3% of primary energy in the SEMCs and from 3 to 4.2% in the NMCs.

Concerning renewable energies EuroMed 2030 Consortium recalls studies undertaken by the German Aerospace Centre (DLR) which affirms that by using less than 0.3% of the entire desert area of the Middle East and North Africa region (MENA), enough electricity and desalinated seawater can be produced to meet growing demands their own along with 100 GW of export to Europe by 2050. The awareness of this richness has given rise to a number of initiatives at both national and Mediterranean levels. For instance, in November 2009 Morocco announced its Integrated Solar Energy Generation Project to install 2,000 MW of concentrated solar power by 2019 on five sites covering 10,000 hectares. The generation from these plants would be 4,500 GWh per year, corresponding to 18% of the current annual generation. Also Tunisia has launched its National Solar Plan, comprised of a portfolio of energy efficiency and renewable energy projects. Egypt is preparing its plan and several other countries have their national plans, objectives and projects.

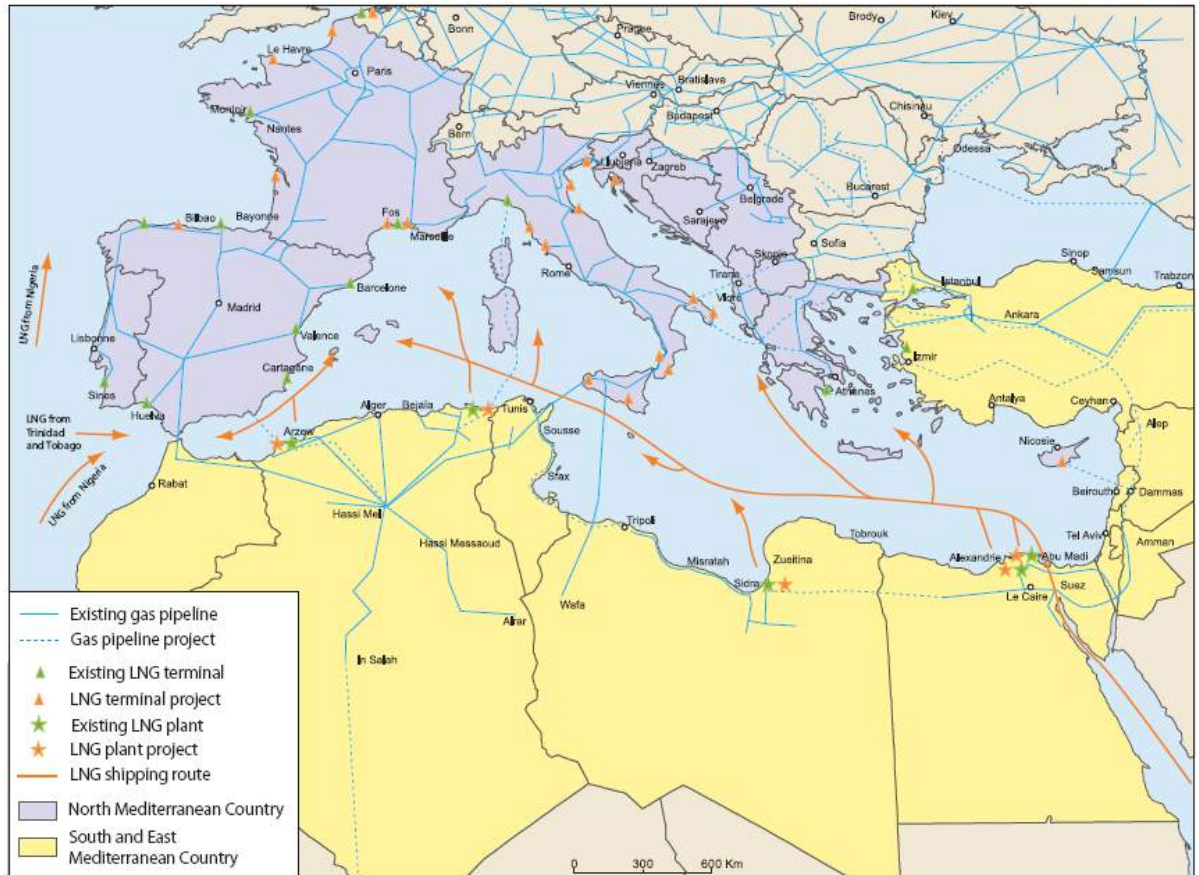
The energetic infrastructure of the SEMCs is developing fast and the construction sector is expected to double by 2030. The decisions taken now about building design, urban layouts, transport systems, and industrial equipment will determine in a large degree the energy use of the next few decades. Energy efficiency can contribute to the competitiveness of industry, the alleviation of pollution, and the improvement of security of supply.

Mediterranean basin is not only a big energy consumer area (Turkey is foreseen to become the second biggest consumer in Mediterranean) but will continue to be an important oil provider too: 22% of the Mediterranean basin's oil imports and 35% of its gas imports will come from Algeria, Libya, Egypt and Syria.

The effects of these trends are several and not really positive. It is not difficult to imagine a higher increase in energy dependency: it could increase sharply both for the SEMCs importers (rising from 77% in 2006 to 88% in

2025) and for the NMCs (up from 68% to 73% over the same period). Environmental risks are expected to increase because of the raise of CO₂ emissions by 55% in the NMCs and by 119% in the SEMCs up to 2025.

Figure 24: Gas infrastructures and connexions in the Mediterranean



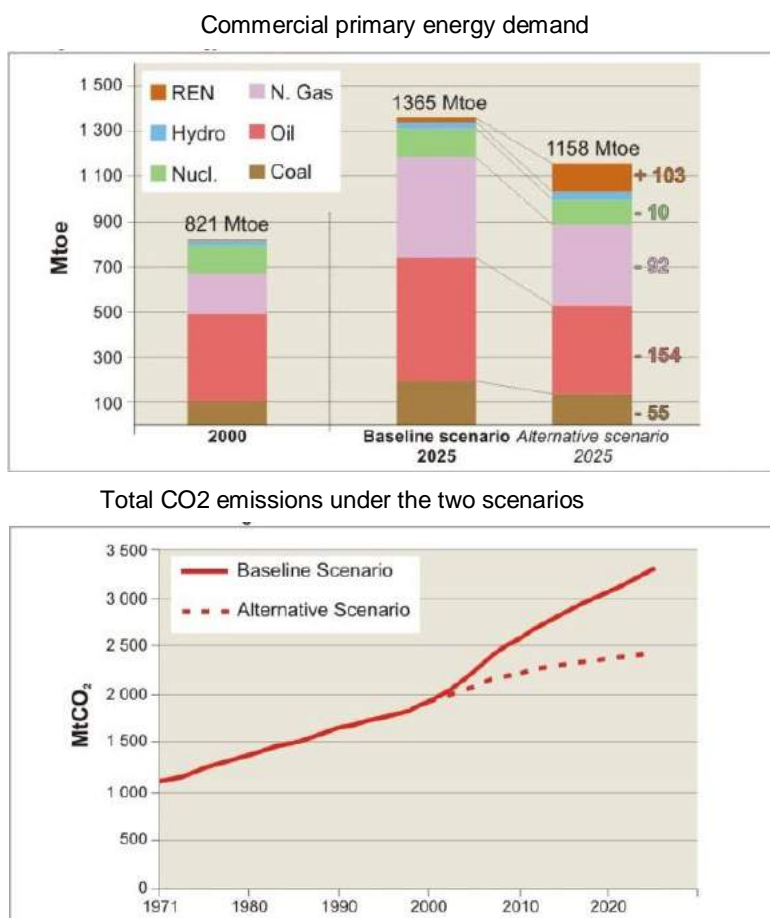
Source: Mediterranean Energy Observatory (OME - 2006)

➤ Alternative scenario

The alternative scenario proposed by Plan Bleu assumes a model based on a sustainable and efficient use of energy resources thanks to a rapid improvement in use of renewable energies (solar, wind, geo-thermal energy and hydroelectricity). According to alternative scenario projections up to 2025, savings of 20 to 25% in total energy demand (mainly in housing sector) will be achieved with renewable accounting for 14% as compared with the 4% in the baseline scenario (Fig. 26).

Thanks to a reduction of 18% in energy dependency (compared with 38% in the trend scenario) and of 860 million tons less of CO₂ in greenhouse gas emissions the new trend will take to the creation of numerous jobs in the innovative sectors of the 'post-oil' era (Fig. 26).

Figure 25: Energy and CO2 emissions savings which can be achieved with the alternative scenario, 2025 (all Mediterranean countries)



Source: Plan Bleu, Mediterranean Energy Observatory, 2005

Table 3: Progress of energy consumption per inhabitant in the Mediterranean up to 2030 in the convergence scenario (toe/inhabitant) (IPEMED, *Tomorrow the Mediterranean*, 2011)

Scenario	2009			2020			2030		
	Crisis	Divergence	Convergence	Crisis	Divergence	Convergence	Crisis	Divergence	Convergence
Med.	1.8	2.0	2.2	2.1	2.2	2.1	2.2	2.5	2.4
NMCs	2.7	2.9	3.1	3.0	3.0	3.0	2.8	3.2	3.3
SEMCs	1.2	1.4	1.6	1.5	1.5	1.5	1.7	2.1	1.9

Source: OME, 2011.

IPEMED convergence scenario is much more based on benefits that regional cooperation could bring to the development of renewable energy and to the achievement of energy efficiency by promoting technology transfers. By 2030 renewable energy resources will satisfy 16% of the global demand for energy (24% in Latin Europe, including the Balkans, but only 8% in the SEMCs). Thanks to promotion of energy conservation (prevention campaigns, creation of an "energy saving" label, energy-efficient buildings), in the scenario of convergence not only the carbon intensity is reduced by 20%, but also energy dependence is reduced and energy inflation is partially curbed. Despite efforts made, the impact of growth on climate change nevertheless remains worrying: from 2020, CO2 emissions from the SEMCs overtake those of NMCs even though energy consumption per inhabitant remains lower.

Transports: trends and prospects

➤ “Business as usual” scenario

Between 1970 and 2000 the transport growth far outstripped population and economic growth: 4.9% per year for passengers and 3.8% for freight (excluding maritime traffic). Road transport accounted for 88% of land passenger traffic and 82% of land freight in 1999. Rail (9% of domestic passenger traffic) plays a significant role in Egypt (47% of the total) and the Eastern Adriatic countries (23%). Strong growth in air transport (7.3% per year) is linked to the growth in tourism. Maritime freight transport has also grown considerably (4% per year), even though North-South Euro-Mediterranean transport chains lack competitiveness. The Mediterranean fleet transports hazardous substances, while controls are limited. Maritime transit flows account for almost 40% of Mediterranean traffic.

The trend scenario forecasts a massive growth of transport by 2025: a 2.6 fold increase in land freight traffic, 3.7 fold in maritime freight traffic, and a virtually two-fold increase in passenger traffic. Impacts on environment are dramatic because of the raise of congestion, noise pollution, greenhouse gas emission and local pollution.

➤ Alternative scenario

The alternative scenario assumes a turnaround in the transport system compared to the current scenario as regards the motorized mobility; despite strong economic growth, the alternative scenario assumes a decline of 8% of motorized mobility. The intermodal rail transportation system and maritime reach up 20% of the mode of transportation choices: that means a limitation of the road primacy. Moving towards this change requires also an extended and stricter implementation of rules to combat pollution from ships. Sustainable policies aiming at guaranteeing efficiency will need to be adopted at all governance levels (Euro- Mediterranean, national, regional, and local). They will be required initiatives able to ensure the financing of sustainable transport infrastructures, to rationalize taxes and subsidies, and to strengthen international cooperation to regulate liberalization. The paramount role of EU institutions is foreseen to increase. Important results are achieved as concerns reduction of CO₂, VOC (90,000 tons avoided) and NO_x emissions, congestion costs, road accidents, noise and marine pollution.

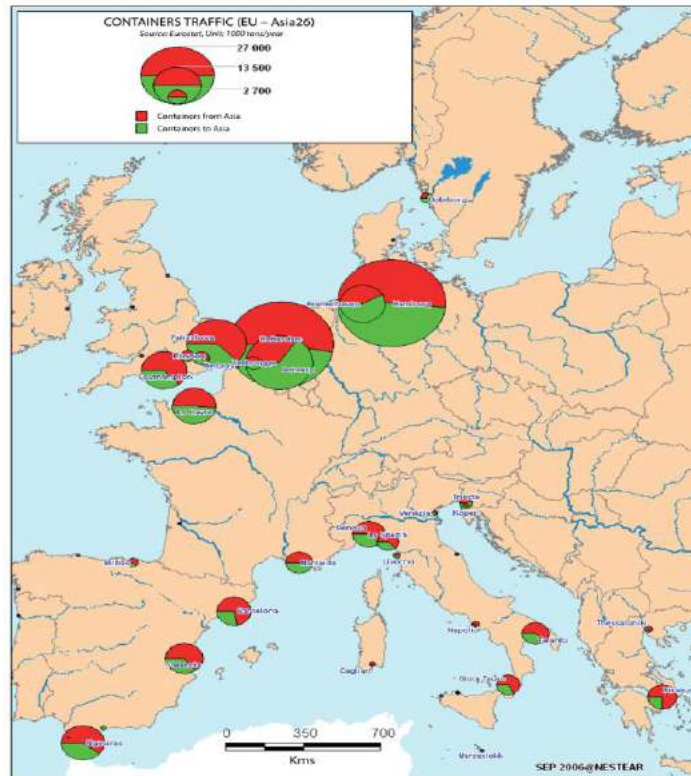
Maritime transports: trends and prospects

➤ “Business as usual” scenario

As showed by Plan Bleu’s report “Maritime transport of goods in the Mediterranean: outlook 2025” (2010), the Mediterranean basin keeps to be the main transit area for trade flows between Asia and Europe: the Mediterranean Sea accounts for 30% of the international maritime freight transport and for 20 to 25% of tanker-transported oil products. Due to increased population pressure, economic growth, and trade liberalization, Mediterranean Sea transport is increased by 50% between 1997 and 2006. Annual growth of oil transport stood at 6%; LNG transport ranged between 7 and 8%; container traffic reported a growth rate of 10%; while Ro-Ro stood at 5%. Container port traffic increased by 71% and the average ship size reported a 55% growth rate between 1997 and 2006.

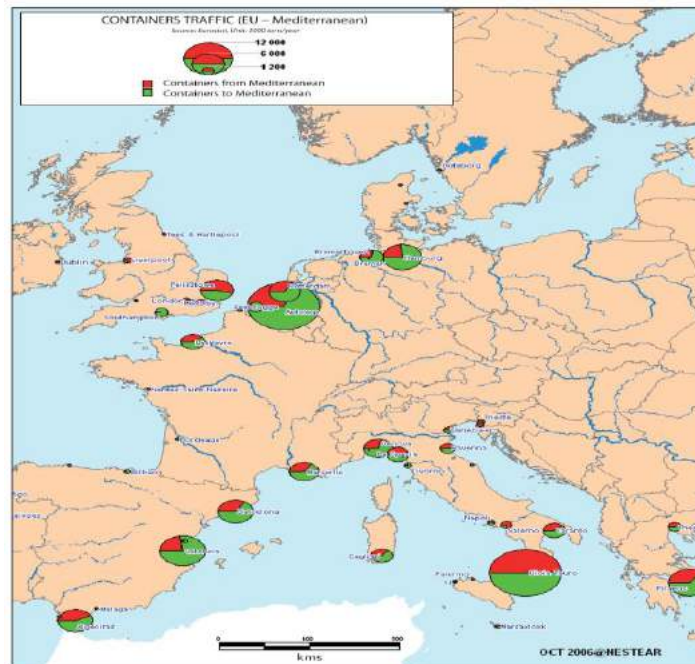
Asia remains by far the major trade partner and the main source of non-bulk transport. These goods are preferentially disembarked in the ports of the Northern Europe, especially Hamburg which represents the first exchange and transshipment port for merchandise from Asia and from the SEMCs too (Fig. 27).

Figure 26: Maritime transport container ports (EU-Asia)



Source: Plan Bleu, 2010.

Figure 27: Maritime transport container ports (EU-Mediterranean)



Source: Plan Bleu, 2010.

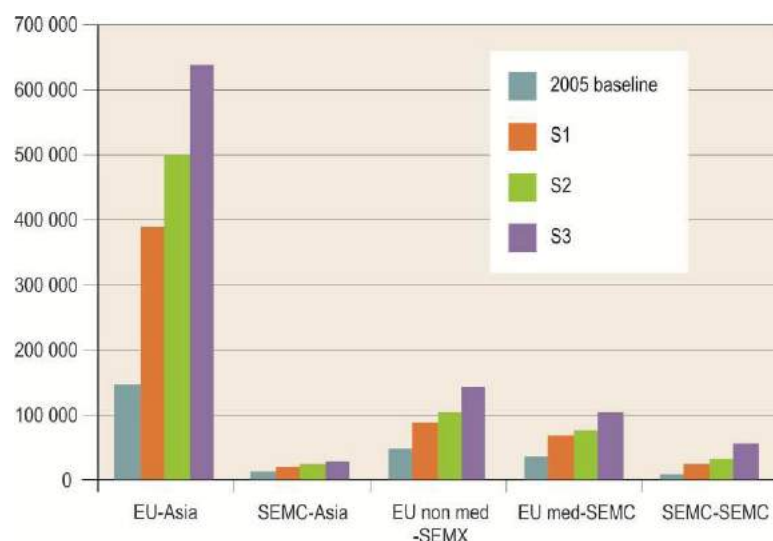
The predominance of maritime traffic with Asia will not change significantly, unless the policy of large scale port infrastructure is reviewed. The Mediterranean does not really offer a southern entry to the densely populated and economic heartland. Unlike the hub and spoke harbours systems (good connection of the ports with the railway network) in Northern Europe, the major Mediterranean ports such as Port Said (Egypt), Tangiers Med (Morocco), Algeciras (Spain) Marsaxlokk (Malta) and Gioia Tauro (Italy) restricted only to the activities transshipment (Fig. 28). This reducing asymmetry between North and South is to be found in foreign trade: the EU accounts, according to the countries, for 20 to 70% of the trade with the SEMCs, while the SEMCs account for a modest 8% of the EU foreign trade. Trade with the EU are chiefly conducted by sea (75%) and via fixed connections (20%), consisting mainly of gas pipelines. The remaining 5% are conducted via land and air routes. It appears that the Mediterranean is characterized by an intensive transit transport and a low level of integration, especially with regard to South-South trade.

The trend scenario (named S1 in Fig. 29) assumes a stable economic growth (1.5% in the North and 3% in the South) that gives new impetus to the *massification* of the movement of goods. This process encourages a greater flow of investment in port and logistics platforms. Governments envision scale-ups and construction of deep water ports. The scenery foresees an increase by a factor of 2.2 over twenty-year container handling capacity.

➤ Alternative scenario

Plan Bleu's alternative scenario (2010) assumes a dynamic economic growth (2.1 % in the North and 5% in the South) with significant investments in ports implemented, and the support of proactive public policies in terms of the development of rail transport: connections to ports, logistics platforms, and institutional reform. In this scenario leading groups hold control over logistic chains. "Motorways of the sea" begin to emerge and system hub and spoke too. The development of logistic platforms connected to the railway would reduce the pressure on coastal and ease road congestion. In this scenario the intra-Mediterranean exchanges remain quite low with respect to exchanges with Asia and do not alter the status of the Mediterranean as a "transit sea". According to this scenario, the share of intra-Mediterranean traffic would thus decrease from 25% in 2005 to 19%, while that of traffic with Asia would rise from 28% to 40% (Fig. 29). This scenario reveals that a good connection of the ports with the railway network helps multiply railway traffic by 5.5 and road traffic by 2.1. This capture of road traffic —made possible by proactive policies, and facilitated by high oil and CO2 prices— mitigates the saturation of port cities and 'smoothes' the transport of goods.

Figure 28: Results of "non-bulk" maritime transport scenarios (in thousand tons/year)



Source: Plan Bleu, 2010.

Agriculture: trends and prospects

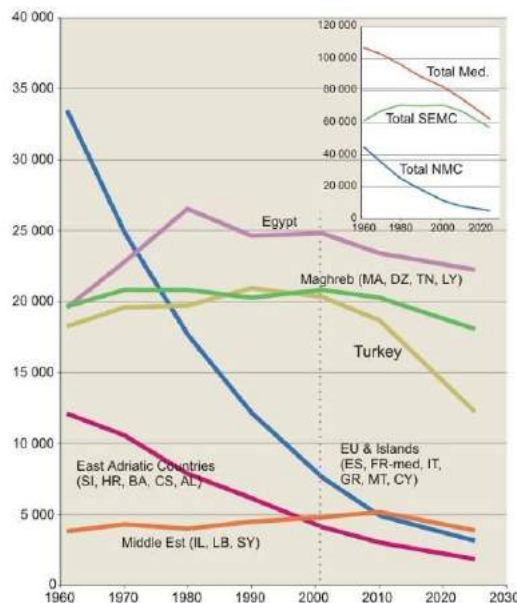
➤ “Business as usual” scenario

The importance of the agricultural sector in the economic activity of the SEMCs is undeniable (Fig. 30). Almost half of the SEMCs population is engaged in or receives its income from rural areas. The agricultural sector still represents 11.6% of the GDP of these countries (from 1.9% in Israel to 22.6% in Syria). To this figure we should add another one that reveals to us how the agricultural sector is really connected to the productive life of the Southern Mediterranean: not only some 40% of the population in the Southern Mediterranean area lives in rural areas, but the share of the working population in the total farm labor force widely varies from around 2% to 3% in Israel and Lebanon to 43% in Turkey (EuroMed 2030).

As underlined by IPEMED the accelerated industrialization and development in the SEMCs and Balkans are the main causes of agriculture's share of GDP dropping sharply. However rural exodus seems contained because of the development of non-farming rural activities (e.g. tourism, real estate) and a food-processing chain that stimulates jobs in industry and services (e.g. transport, distribution, quality). Access to investment, creation of storage capacity, alert mechanisms and the availability of seed also help to modernize crops subsistence farming and limit the negative impacts of fluctuating prices. In addition, the labelling of Mediterranean products guarantees agricultural competitiveness based on quality.

According to the IPEMED scenario, which projected these trends in 2020, the North will continue in the path of reduction of the agricultural labour force. On the contrary the SEMCs will experience substantial growth of the rural population that will stabilize only in 2020. The political transition in the Mediterranean does not reduce the importance of food and agriculture issues that remain a key issue given the importance of agriculture in the economic life of the Mediterranean countries. The increase in population in the Mediterranean (500 million by 2030) will be obviously followed by an increase in levels of food consumption. The BAU scenario assumes that, between 2000 and 2030, cereal demand will increase from 85 million tons to over 140 million tons. The increase in agricultural production due to intensive farming will be translated not only into increased food calories for cultivated area but also into rapid fluctuation in the price increase.

Figure 29: Agricultural populations in the Mediterranean countries: trends and projections (excl. non-Med-France, in thousands) (Source: FAO, Plan Bleu, 2005)



More pessimistic, Plan Bleu trend scenario forecasts a worsening of rural, agricultural, pastoral and wooded areas because of the risks linked to expansion of urbanization and climate changes (desertification, rural poverty, biodiversity degradation, agricultural land cover losses, water scarcity, vulnerability to fire and floods) (Fig. 30). Despite the achievement of a larger liberalization of agricultural trade basin and the improvements in development of a highly technology- and capital-based 'precision' agriculture in NMCs, the adoption of a sustainable approach towards agriculture is not still completed. Differences among Mediterranean countries in agricultural workforce conditions still persist as rural exodus in the SEMCs.

➤ **Alternative scenario**

According to Plan Bleu, the rural revival of the SEMCs together with an increasing awareness of the multifunctional importance of Mediterranean agriculture and forests characterize the alternative scenario. Sustainable agricultural and rural developments are inserted in the framework of the Euro-Mediterranean Partnership.

At national and local level new environmental policies aiming at a sustainable rural development are implemented through participatory approaches involving actors at all levels. Important initiatives are proposed on both rims in order to fight the desertification, the losses of quality farmlands from artificial land cover and the biodiversity losses. The green sensitivity spreading in Mediterranean contributes to the raise of demand for typical products and for rural and green tourism. This process is facilitated by the implementation of facilities and services, agricultural modernization, diversification of rural economies (tourism, agrifood, craftsmanship, facilities along with support to small cities, industry), and clarification of rights and rules on access to natural resources.

In the IPEMED alternative scenario the sharing of common goals concerning food and agricultural issues will push Mediterranean countries to adopt a Euro Mediterranean Food Security Pact: that means a co-development pact that enhances regional food security. These objectives fit in a process of progressive convergence (which is the main aspect of the IPEMED alternative scenario) as the Mediterranean States engaged in the challenge of food safety will be required to develop concerted and complimentary regional agricultural policies. Through a participatory approach investment policies designed to boost agricultural production will be implemented, and besides a system of agricultural policies designed to provide some protection against fluctuations in agricultural prices. The provision on domestic markets of quality products and services supporting production and the economy in rural areas is planned too.

In order to increase the agricultural GDP from 3 to 5% per year, substantial public and private investments are made in sectors like the mobilization of water resources, transportation and distribution of localized irrigation water but also in strengthening devices on rainfed agriculture and economy on of water resources in farming systems, making attractive grasslands and areas of supplementary irrigation.

Other economic policy initiatives will be needed: policies to stimulate production, credit support, subsidies, new insurance schemes designed specifically for the agricultural sector. The alternative scenario also assumes the implementation of regional partnership agreements, through the establishment of policies of protectionism of some products such as cereals, ensuring the income of farmers which will have access to local markets at profitable prices. In this way not only it will be limited the impact of speculation but also they will be guaranteed consumers.

Fisheries: trends and prospects

➤ “Business as usual” scenario

Mediterranean fishing activities are distinguished by the variety of techniques and historic traditions, from the non-industrial fishing essentially carried out from small boats (<15 m long) to industrial fishing with big boats in large marine ecosystems.

Mediterranean fish catches represent a small part of total catches worldwide: a bit more than 1% of total catches. This volume is significant in the Mediterranean context because this sea represents less than 0.8% of global oceans. Production currently ranges between 1,500,000 tons to 1,700,000 tons per year, and 85% of the catches are attributable to six countries: Italy, Turkey, Greece, Spain, Tunisia and Algeria. However only 1/3 of fishing demand from riparian countries is satisfied by Mediterranean seafood. That means that the Mediterranean region is dependent on imported fish-based products (processed fish, and especially ready-made fish dishes, etc.), which now account for over 50% of total fish consumption in some European countries.

New trends could be foreseen: economic and demographic drivers will explain an increase in intensive fish farming (aquaculture) and in fishing activity. Development of new techniques and increase in boat size will determine ever more acute fishing pressure with increasing risks for environment and especially for some major fish species. Red tuna for example is already endangered because of the great demand from Asian markets; the risk of extinction of some major species represents a common challenge for the Basin (EC ENPI 2008). According to the General Fisheries Commission for the Mediterranean (GFCM), certain species of economic and commercial importance are in an alarming state as a result of over-fishing (UNEP/MAP, 2009) (EU Commission DG MARE, Blue Growth Scenarios and drivers for Sustainable Growth from the Oceans, Seas and Coasts Third Interim Report , Rotterdam/Brussels, 13 March 2012).

“Seeds of change”: inflections of current trends

Since this report aims at developing a cross-cutting approach between regional foresight analysis and participatory prospective in the Mediterranean, it is essential to focus briefly on the most recent inflexions of change affecting economic and politic relations in the region. A foresight analysis could not exclude projections on the future role of EU in the Mediterranean basin (keeping in mind which has been European reactions to the Arab Spring) neither on new forms of Mediterranean cooperation. Besides a particular attention should be dedicated to Turkey, whose power seems able to change next geo-strategic relations in the Mediterranean. These elements have been developed thanks to the interesting analysis conducted in the framework of two important projects: FP7-MedPro and MedGovernance.

A wave of popular demonstrations has shaken the Arab world and has interested the world public opinion. Since the outbreak of the first demonstrations in December 2010, the Southern Mediterranean region has witnessed the fall of Ben Ali in Tunisia, Mubarak in Egypt, Kadhafi in Libya, and Saleh in Yemen; two monarchies (Jordan and Morocco) have advanced reform packages, and finally Libya and Syria have gone down the violence spiral towards a civil war.

The EU response to the outbreak of the revolutionary events in the Southern Mediterranean was weak and not compact. The EU's stance as reflected in the Commission's Communication on “Partnership for Democracy and Shared Prosperity” issued in March 2011, and complemented soon thereafter by “A New Response to a Changing Neighbourhood” issued in May 2011, has been generally timid and focused on the short term, with no major change foreseen in the state of affairs in the region. The EU recognizes the need to offer more assistance to its neighbours, ranging from more financial benefits to more targeted help in developing and sustaining political parties (through the Endowment for Democracy) and civil society (through the Civil Society Facility). It also recognizes the need to embark on Deep and Comprehensive Free Trade Agreements (DCFTAs), which can be expected to open the door to more access to the EU's single market. Moreover, it has promised more ‘mobility partnerships’ with the South Mediterranean region, which are designed to better manage migration flows between the EU and third countries, and in particular to fight illegal migration, in partnership with the EU, in exchange for enhanced possibilities of mobility between their countries and the EU for their citizens, in terms of legal migration opportunities and of short term movements (short stay visa issues). These commitments to change are welcomed but they remain trapped in the logic of enlargement, security, vagueness, insularity, and bilateral relationships with the South Mediterranean. On the multilateral dimension, the UfM role has not yet been reinforced in the post-Arab spring, although it has the potential to implement the sustainable development objectives in the region within its inter-governmental philosophy (Tocci, 2011).

European Union's ability to answer positively to the needs, demands and changes that come from the South and East of the Mediterranean could be the cornerstone of possible scenarios that we can imagine a horizon in 2030, as shows the interesting analysis about next developments in this area offered by the MedPro consortium in its report “*What scenarios for the Euro-Mediterranean in 2030 in the wake of the post-Arab spring?*” (Ayadi and Sessa, 2011).

As MedPro (www.medpro-foresight.eu/fr) underlines in its first scenario (*the Euro-Mediterranean Area under threat*), the non-resolution of the conflicts in the Middle East (Palestine, Syria) and the Western Sahara would exacerbate tensions in the Mashreq and the Maghreb, offering new opportunities for terrorist organizations and radical movements to take power. Sporadic conflicts would become long-lived and would spread from one country to another leading to deeper political uncertainties and mounting economic and social difficulties. In this framework the absence of a true input to cooperation from European institutions on key sectors, such as migration programs, research and education, agriculture, security, and energy could widen the gap between European policies and Southern-Mediterranean expectations. In this context, a situation of conflicting civilization, uncertainties and tensions between the two shores could grow up. As a result, in 2030, the Mediterranean would become a border zone of broad conflicts, which, if not contained, would spread to the Northern frontiers.

For these reasons, it should be hoped a willingness to integrate political, social, cultural and economic activities in the Euro-Mediterranean area. Serious reflection on the commonality of culture, language and history may be the only tool able to get at that "Euro-Mediterranean Union", as suggested in the alternative scenarios proposed by MedPro.

Recognizing their shared past and believing in their common future, the European and the South Mediterranean countries would form an integrated region with a common market. The integration scheme would follow the European Economic Area model, establishing full economic relations with full participation in the EU's Internal Market, as now exists for Iceland, Norway and Switzerland. This path would result in the adoption of the EU *acquis* and would thus lead to more convergence.

Under such a scenario, the current tensions and conflicts in the Euro-Mediterranean region would be settled. Since not all of the countries have reached the same level of political and economic development, the differentiated approach of the EU as outlined in its response to the Arab spring, the so-called 'renewed neighbourhood policy' might give rise to a number of countries fulfilling the requirements to become part of the EU economic block quicker than others. At a later stage, this renewed neighbourhood policy would need to be fundamentally reoriented towards the philosophy of the European Economic Area model. The Union for the Mediterranean (UfM) could play a role in fostering regional cooperation, thus deepening the economic integration between all countries of the region. However, the importance of the UfM would diminish over time when all South Mediterranean countries would have become members of the European Economic Area. In this scenario, the UfM is seen as a mechanism to revive trans-Mediterranean relations. In addition, the creation of a larger and powerful Euro- Mediterranean community would influence the global scenario for the year 2030, with the emergence of a tri-polar world, dominated by the US, China and Euro-Med.

But integration and/or European engagement for cooperation could not be the only solution to promote a peaceful environment in Mediterranean area. Common policies could be built with the active contribution of people, civil society and policymakers on both sides of the Mediterranean, even without the emergence of a dominant partner. It could be imagined a scenario of differentiated multilateralism, that assumes that different regional cooperation schemes could be applied in a more selective way with regard to participating actors and subject areas, fully recognising that Western Mediterranean, North Africa and Eastern Mediterranean are distinct geographical sub-regions (even if there may be some overlap) each with its own specific problems, opportunities and challenges.

Given its inherent heterogeneity, in all likelihood, this scenario would not entail a resolution of the protracted Arab-Israeli and Western Sahara conflicts, which may continue to be with us up to and even after the 2030 horizon. However, distinct but related countries and sub-regions (e.g. Western Mediterranean, North Africa, Eastern Mediterranean) would work in association towards the same aim of sustainability within an increasingly interdependent world.

Bilateral EU policies, such as the European Neighbourhood Policy (ENP), would shed their 'enlargement-like' approach, while multilateral policies, such as the UfM, would need to be revised to account for a more heterogeneous southern Mediterranean. The latter would also feature its own forms of multilateral cooperation (e.g. the Arab League, the Arab Maghreb Union, etc.). The North and South would enter into cooperative contractual relations, featuring trade and co-development, political dialogue, security, as well as specific initiatives pertaining to youth education and employment opportunities, circular migration schemes, research, innovation and infrastructure (energy, transport, and information and communication technologies), agriculture, food and water security, and mitigation and adaptation to climate change. The EU and the South Mediterranean countries establishing a Euro-Mediterranean Alliance Treaty, which would cover a number of common key areas of interest, such as peace and security, co-development, shared citizens' rights, youth, education, research, innovation and intercultural dialogue. Such vision is coherent with a multipolar world envisaged for

the year 2030. Both the EU and the Southern Mediterranean will play separate roles on the global stage, maintaining preferential relationships of co-development on some key areas of common interest.

Beside this new cooperation that could be assumed concerning European and Southern Mediterranean, United States are expected to keep stay the most influent actor in Middle East and North Africa in the years to come. But another power could affirm itself: Turkey. In fact according to the 2011 Euromed Survey of Experts and Actors², this country is increasingly perceived as a “model” for the region, being a mostly Muslim country within a secular state progressively consolidating itself as a mature democracy. While Turkey’s foreign policy since the AKP’s arrival to power in 2002 has allowed an increase in country presence and influence in the Mashreq, the same cannot be held about the EU. In spite of its long engagement in the region and of its relatively active response to the Arab Spring, it is deemed to maintain a secondary role, overshadowed as ever by the US, and from now on also by Turkey - and by Saudi Arabia to a lesser extent - which has positioned itself as its main competitor for influence in the region. In turn the Arab league, Iran, Russia and China are overall expected to play a comparatively less important role³.

Euro-Mediterranean institutional framework: a general outlook

Euro-Mediterranean cooperation between Europe and the countries of the southern shore of the Mediterranean begins on 28th November 1995 with the signing of the Barcelona Declaration by twenty-seven countries from the EU and the Mediterranean world.

The first steps towards this regional approach started in 1972 with the launch of the Global Mediterranean Policy by the European Economic Community. However, despite the good name, the project never reached those economic outcomes for which it was designed. In 1989, however, the idea of a “Renewed Mediterranean Policy” was proposed by the European Commissioner Abel Matutes which sensed the need for a new regional policy able to seriously address the economic and political challenges from countries of the southern and eastern Mediterranean. Driven by the end of the Cold War, the EC focused greatly on issues of development and security. From this point of view, it starts a reflection on issues related to conflicts between states or national groups in the Middle East, in the Western Sahara, in Cyprus, in the Balkans, but also on a wide range of new threats such as terrorism and Islamic ultra-nationalism, fundamentalist, violations of human rights, competition for scarce resources, environmental degradation, transnational organized crime, arms trafficking.

In order to ensure security and development in this area, EU adopted several initiatives among which the best known are the 5+5 dialogue in 1990, the Mediterranean Forum and the NATO Mediterranean Dialogue in 1995. These commitments culminated in the Barcelona Process and Euro-Mediterranean Partnership which were made operational with the entry into force of the Treaty of Maastricht on 1 November 1993, which provided that the Common Foreign and Security Policy (CFSP) also included the power to hold conferences and summits with third countries.

Barcelona Declaration ushered in a new era in the relations between Europe and its Mediterranean partner countries. The Euro-Mediterranean Partnership represented an unprecedented qualitative leap in the EU’s Mediterranean policy:

- It was grounded in a set of shared values and principles (dialogue, democracy, peace, shared prosperity, respect for human rights, etc.), rather than purely economic and trade-related criteria;
- It was based on ‘partnership’, i.e., on all members of the Euro-Mediterranean Partnership having the same status and participating on equal footing in all the core functions of the new framework of multilateral cooperation;

² The Euromed Survey of Experts and Actors on the Euro-Mediterranean Partnership is part of the programme “Promoting mutual awareness, understanding and cooperation between the EU and the European Neighbourhood Region (South)”, co-funded by the EU through the European Neighbourhood and Partnership Instrument (ENPI) regional track and conducted by the Institut Europeu de la Mediterrania between December 2011 and January 2012.

³ Pitarch L. and M. Pont, 2012, “The EU in the Arab Spring: A Reinforcer Rather than a Catalyst”, IEMed Obs, Barcelona.

- It had the added value of being the only forum for dialogue shared by Israel and Arab and European countries.
- Also new was the participation of civil society through the Euro-med Civil Forum, which meets every two years and encompasses associations, networks and local authorities

The Barcelona process aims at promoting a stricter integration as demonstrated by the goal of creating a Free Trade Euro-Mediterranean Area in order to trigger a virtuous cycle of prosperity that foster the growth of trade, investment and the labor market in partner countries of the Mediterranean. In order to avoid growth models based on excessive neoliberal deregulation and privatization of the privileges, for partner countries in the Mediterranean it was created the MEDA program, a financing system that unites macroeconomic stabilization with the implementation of institutional reforms and legislative modernization of justice systems, to high quality education.

In this first phase of activity of the Barcelona Process, from 1995 to 2005, the primary objectives were the achievement of peace, common prosperity and mutual cooperation. To this end, the EU and each partner country negotiated and adopted the Mediterranean Association Agreements. Of course, the entry into force of these agreements was not immediate and it took a long and complex process.

The Declaration of the Fifth Euro-Mediterranean Conference provided for the creation of three institutions:

- In the political sphere the Euro-Mediterranean Parliamentary Assembly;
- In the cultural sphere the Anna Lindh Foundation for the Dialogue between Cultures, and finally;
- In the economic sphere, the Centre for Research on Euro-Mediterranean Investment and Partnership for (FEMIP) which in the future could turn into a real Euro-Mediterranean Bank for Development.

In 2005, the Barcelona Process was reinforced with two initiatives: the European Neighborhood Policy (ENP), launched in 2003 by the former President of the European Commission Romano Prodi, and the Union for the Mediterranean, promoted by President Nicolas Sarkozy in Toulon in February 2007.

Although conceived between 2003 and 2004, the European Neighborhood Policy (ENP) was not put in place until 2005-2007 when, after the accession to the Community of many Central-Eastern European countries the European Commission decided to focus on South. ENP offers to neighbouring countries the opportunity to take advantage of some European instruments, such as the access to EC markets and the participation in European agencies, but not the use of EU institutions. One of the main contributions of the ENP in the Barcelona Process (Euro-Mediterranean Partnership) has certainly been the creation of the European Neighborhood and Partnership Instrument (ENPI), a financial instrument for all partner nations of the East or the South (as under the MEDA program). The new funds are intended primarily to bilateral programs of modernization agreed with each Mediterranean partner country on the basis of their respective action plans and are intended to improve cross-border cooperation.

At the Paris Summit of 13 July 2008, in the presence of Heads of State and Government of forty-three nations, the Mediterranean Union, a project launched by Nicholas Sarkozy in February 2007, it became the "Barcelona Process: Union for the Mediterranean ". The UfM encourages greater responsibility by developing an institutional Euro-Mediterranean architecture in which the European and Mediterranean nations will be united in the achievement of successes. This new institutional structure deepens further the commitment of the Euro-Mediterranean Partnership. The Permanent Secretariat, based in Barcelona, promotes not only projects of the UfM, but also the whole of the Euro-Mediterranean relations. Important are the six projects to which it gives priority: combating pollution of the Mediterranean Motorways of the Sea, the Mediterranean Solar Plan, the initiative for the development of Mediterranean business, civil protection, and research and education quality.

What about possible roles of Turkey for the Mediterranean future?

In the last years Turkey not only has not abandoned its traditional foreign policy positions (such as the desire to join the EU, NATO membership and strong transatlantic link) but also points firmly to assert itself as a regional power in the Mediterranean and Caucasian.

Its growing commitment in international relations is manifested by an increasing participation in trade agreements, military cooperation, diplomatic meetings, and international or regional organizations. Concerning the latter, the examples of the new Turkish foreign policy trend are numerous, but deserve to be mentioned: first of all the election of non-permanent member of the Security Council of the United Nations for the biennium 2009/2010 and besides the attention given to this country by the NATO, which Ankara contributes with the second largest army in the Alliance for military units. Turkey also intervenes increasingly in a proactive way in main issues related to the Mediterranean or Middle East. This is the case of Ankara friendship with Iran, renewed on the occasion of the re-election of Mahmoud Ahmadinejad to the presidency of the Islamic Republic. The role of Ankara is of crucial importance for the maintenance of a channel of dialogue with Iran, as has been noted on several occasions, starting with the Turkish mediation for the release of the English staff the British Embassy in Tehran or, for the release of five Iranian diplomats held by the Americans in Iraq in 2007. Expectations of Turkish mediation in the Iranian nuclear issue are numerous, especially, of course, by the United States. Such hopes are warranted by the frequency of summit meetings held between the two countries.

Defined by Hillary Clinton a "global power emerging" Turkey can act as a credible interlocutor with Israel and China on issues of great importance. Regarding China, Ankara has had a serious discussion about the treatment of Uighurs in Xinjiang. Many have recognized in the Turkish Foreign Minister Davutoglu the author of this evolution. *"This spy former academic is seen as the architect of Turkey's soft power, which blends realpolitik with a fierce pride. A pious Muslim with a moralistic bent, Mr. Davutoglu has been among the most influential foreign ministers in the history of the Turkish republic. His approach rests on two pillars. One is to have "zero problems" with the neighbours, many of them troubled or troublesome. The other is "strategic depth". This calls for a Turkish zone of political, economic and cultural influence, primarily among neighbours (many of them former Ottoman dominions) in the Balkans, the south Caucasus and the Middle East"* (The Economist, Dreams from their fathers, 23rd July 2009).

Developed in 2001, the doctrine of "strategic depth" aims on the one hand to unfasten Turkey from any form of dependence on external actors, and in particular by the Western Allies, but on the other to enhance the diplomatic power by inserting at the head of a series relationships and alliances.

In addition Turkey works more actively for an improvement in relations with neighbouring countries and for the establishment of a dialogue with all the actors in the Caucasus and in the Mediterranean, in order to contribute to the equilibrium of the area. The war between Georgia and Russia, the latter representing the first trading partner and energy supplier for Turkey, had put Ankara in a very unstable position. Turkey has answered with the launch of a platform for cooperation and stability in the Caucasus according to the principles of the Organization for Security and Cooperation in Europe (OSCE), showing that is currently one of the leading real power in the Middle East and Caucasian.

In the Middle East, Turkey seeks to play a central role in the search for solutions to regional problems of his most direct interest, maintaining a complex balance between traditional alliances, such as with Israel and the development of better relations with Iran, Syria and the Islamic world in general⁴. Related to this change are the economic reasons, whether its energy supply, investment opportunities, attraction of capital or influx of tourists from countries such as Iran and Russia. The fact that the strengthening of political relations in the Middle East region but also in the Black Sea and Central Asia countries has an important economic aspect is in itself a novelty in Turkish foreign policy that has traditionally focused on safety. The new role of Turkey is witnessed by

⁴ Meliha Benli Altunisik, "Le rôle de la Turquie au Moyen-Orient", in Mediterranean Yearbook 2009, Institut Européu de la Mediterrània, Barcelona, 2009.

its increasing commitment in the field of peace-keeping. Turkish troops are currently stationed in Afghanistan, where Turkey has also held the command of the NATO ISAF (International Security Assistance Force) mission, in Lebanon and Bosnia. In addition, Ankara has also intensified its dialogue with the Kurdish regional government, obtaining in this way a strengthening of security cooperation against the Communist Party of Kurdistan (PKK) between the Turkish authorities and the Kurdish-Iraqi.

“Macro Region”: a new institutional tool for an alternative scenario and for territorial cooperation in the Mediterranean?

Territorial cooperation is one of the most important issues to consider in order having an idea of next political changes in Euro-Mediterranean relations. In fact Mediterranean regions are assumed to become increasingly important in the development of territories thanks the improvement of instruments as the EU Regional Policy (Structural Funds and other tools dedicated only to European regions) and the EU External actions (Cross-Border cooperation and Neighbourhood policy). Ideation of new tools as “macro-regions” could be a key of change too.

As underlined under the framework of the MedGovernance project two major trends can be highlighted as far as territorial cooperation is concerned:

- I. As shown by the long-term development of the Structural Fund from 1994 through 2013, Regional Competitiveness and Employment is set to become an increasingly important regional policy objective (for European Mediterranean regions, also); this builds a rationale for integrating territorial cooperation with the Europe 2020 Strategy, focused precisely on these two issues.
- II. Cross-Border Cooperation is going to remain a key feature of the EU's external territorial cooperation, in particular in the Mediterranean, as border control and management will remain a key dimension of EU security and stability; for European Mediterranean Regions, the integration of Cross-Border Cooperation and the Territorial Cooperation Objective of the Regional Policy would increase their chances of playing a more active role as regions (and probably of attracting more EU funds).

Thanks to these elements three scenarios for territorial cooperation in Mediterranean basin have been built. Prosecution in actual trends will bring to a trend scenario (Scenario “Status quo”) in which budgetary resources would remain insufficient to achieve a true convergence policy across the Mediterranean, and hence to have a true leverage for reform in the Mediterranean Partner Countries and to push for further decentralization. Dispersion of available funds across different instruments and actors, freezing of funds for both the Regional Policy within the EU and External Action and the multiplication or overlapping of programs, instruments and rules on territorial cooperation in the Mediterranean would undermine their effectiveness.

The increase in funding would be higher for Eastern European neighbours than for Mediterranean neighbours, as already happened in 2011-2013, and probably for the Balkans and Turkey, reflecting a major geopolitical shift and, even more so, the increasing weight of Eastern European Member States in the EU decision-making process. In the framework of the Cross Border Cooperation Programme, basin programs are preferred to bilateral ones.

The adoption of the EU Strategy for the Baltic Sea Region in 2009, followed by the Danube Region Strategy to be presented in late 2010 have given birth to an innovative model of regional cooperation in the EU around the concept of “macro-region,” widely defined as “an area including territory from a number of different countries and regions associated with one or more common features or challenges.” This is called by MedGovernance the “Mediterranean Macro-region” scenario. The “macro-regional” approach is based on a “three NOs” principle (no additional institutions, no additional legislation, no additional funding) and hence focused on a multilevel, transnational coordination approach along the axes of concrete cooperation issues (in other words, limited to a joint, integrated, decentralized planning and programming exercise which can be useful to create synergies between existing dynamics converging on the same territory or issue, but not necessarily to create new dynamics).

The concept of macro-region could not be realized without the development of strong institutional capacities in participating regions. This feature does not concur in the case of the Southern Mediterranean countries. The limited approach focused on a low number of issues of common interest –maritime surveillance, environment...- is fine among countries and regions with a similar level of development. It remains to be seen whether this can work between countries and regions with a wide development gap, where a true convergence policy is needed first before concrete cooperation on specific issues is possible.

As a first step, a “macro-regional” approach could be adopted in the framework of the Integrated Maritime Policy. In the Mediterranean, this will make it necessary not only to “continue working in close cooperation with Member States on an integrated approach with non-EU Mediterranean coastal States and engage in the exchange of best practices complementing existing initiatives, paying attention, where appropriate, to the development of regional strategies at the sub-regional level,” as stated in the EU Council conclusions on Integrated Maritime Policy (2 June 2010) and the 2009 European Commission Communication on “An Integrated Maritime Policy for a Better Governance in the Mediterranean”, but also to combine it with the “Mediterranean Maritime Strategy,” since, according to the Marseille Declaration of the Union for the Mediterranean (November 2008), “Studying the process of developing a harmonized maritime policy and promoting a foreseeable maritime strategy for the Mediterranean shall take particular consideration within the EuroMed Partnership in 2009 and beyond,” with the creation of a sector working group composed of national experts.

As experts of MedGovernance project remind, the extension of the Regional Policy Model of the EU (i.e., the Structural Funds) to the neighbouring countries is an option that has been increasingly present in policy debate on territorial cooperation across the Mediterranean at least since 2005. It was already agreed, in the Five-year Work Programme approved in 2005 for the Euro-Mediterranean Partnership, to “launch by 2007 at least two projects implementing EU regional policy methodology in two pilot regions.” Yet, instead of a pilot project approach, ultimately a simplified version of the regional policy methodology has been introduced since 2007 for all cross-border cooperation projects and programs of the ENP. This prospect emerged again in the shape of a clear commitment in the Joint Document on the Advanced Status of Morocco published in October 2008 in which the parties agreed to engage in a joint reflection aimed at achieving, from 2013 on, a new phase that would provide access to adequate EU financial resources to support Morocco in a process consistent with the EU regional and cohesion policy and the adoption of new implementation procedures, in other words, to envisage a new scheme of financial assistance modelled on the methodology of EU structural funds. This scenario “Towards an Extension of Structural Funds?” assumes a stronger strategy for Mediterranean territorial cooperation by European regions in order to overcome the current “cooperation fatigue” and to mobilize resources commensurate to the challenges ahead.

The stakes are high: Mediterranean cooperation runs the risk of being marginalized and stigmatized as an ineffective instrument and a waste of resources (as it is often presented in central European countries). The credibility of the regions as reliable and effective partners for Euro-Mediterranean cooperation is largely linked to the success of the ENPI Cross-Border Cooperation Programme, so they should mobilize their resources and cooperative energies to work in this direction.

Ultimately, the increasingly role of the regions within EU policy-making in issues such as regional policy or the Europe 2020 Strategy is at stake in this endeavour. A good approach towards territorial cooperation in Mediterranean area could be necessary to improve cohesion in European Union. For this purpose Euro-Med regions should start engaging themselves, affirming their capacity to act locally and in a decentralized way, and thus contributing to the global political agenda. So the European Mediterranean regions should choose their strategy and the cooperation model they promote carefully, weighing its long-term implications and the ultimate objectives it leads to.

To conclude, as underlined by MedGovernance project, European Mediterranean regions are strategically interested in promoting a change of paradigm in EU dealing and cooperation with the Mediterranean Partner Countries, in order to stop being considered “external” to the EU and hence subject to its external action and to allow them to be seen as part and parcel of the European Union Area. This would fit perfectly into the rationale of the European Neighbourhood Policy, which can be understood as an enlargement process without accession, in a true “everything but the institutions” spirit.⁵

⁵ Jean-Claude Tourret and Vincent Wallaert, Medgovernance project: 3 scenarios for a mediterranean macro-regional approach, Institut de la Méditerranée, September 2010

TOWARDS “PARTICIPATORY PROSPECTIVE”: LESSONS LEARNED FROM “*IMAGINE*” AT THE LOCAL SCALE

As one of the RACs of the UNEP/MAP, Plan Bleu works on ICZM since the 1990's, especially by involving local stakeholders to implement the “*Imagine*” method in the framework of the CAMPs: Malta (2000-2002), Lebanon (2002-2003), Algiers coastal zones (2003-2005), Slovenia (2005-2006), and Cyprus (2006). In this context, the Plan Bleu's role consisted mainly to support the application of the “*Imagine*” method by the local teams managing the coastal environments covered by the CAMPs.

One of the major elements within this participatory process consists of the joint consideration of possible futures (business as usual and alternative scenarios), bearing in mind past developments and the current situation in the areas in question. Brainstorming amongst the various local stakeholders comprises a crucial stage in the process, facilitating joint assessment of the general trends and mechanisms affecting the coastal area under consideration. It allows the long term consequences of action taken today to be examined, thus making it possible to seek alternative paths towards a more desirable future.

Plan Bleu has developed, tested and consolidated the “*Imagine*” method for Systemic and Prospective Sustainability Analysis (Bell and Coudert, 2005; Coudert and Larid, 2006). This method provides tools to describe, assess, and examine the level of sustainability of an “eco-socio-system” in the past, present and future by means of indicators and based on a participatory approach considering local stakeholders as experts within their own area. This method has proven its strengths in producing shared insight into a given coastal area and fostering stakeholder participation, thus leading to the identification of more desirable futures and the drafting of collegially defined and approved action plans.

With environmental concerns coming increasingly to the fore, as well as in a context of more decentralized decisions, social and political demands are being made in favour of public involvement in the design and implementation of long term territorial strategies. On the other hand, increasing concern regarding the preservation of nature areas and resources in the Mediterranean is being expressed in the growing demand to support “territorial projects”: “*Imagine*” is one of the suitable tools for providing such support.

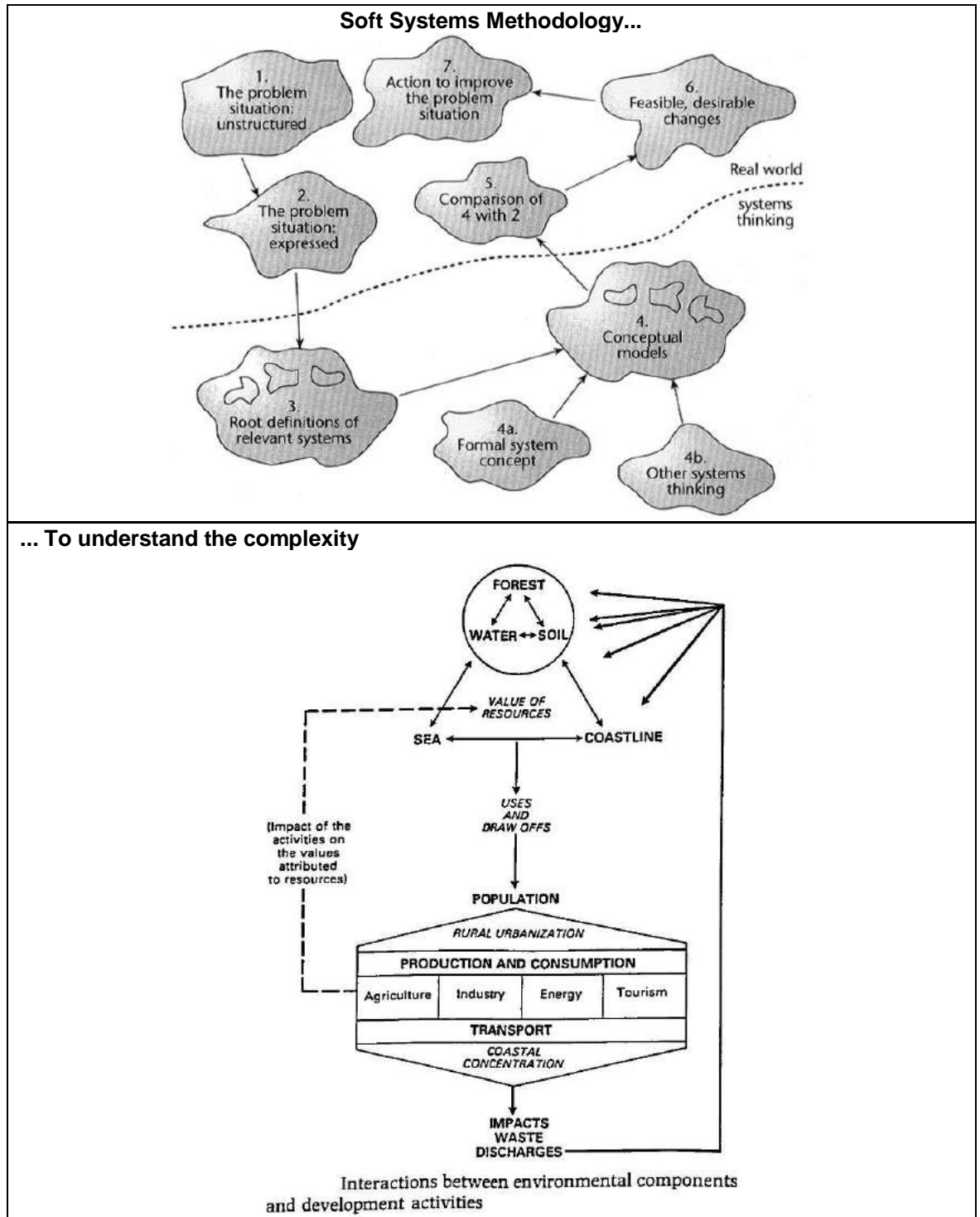
Due to the PEGASO context and the importance of the participatory approach in the selection of the indicators and for scenario building, Plan Bleu suggested adapting “*Imagine*” by simplifying the cycle (number of steps) and its implementation both at the regional level for the “Regional Assessment” and at the local level in the CASES. This adaptation is fully consistent with the Plan Bleu roles in the PEGASO tasks on indicators, scenarios, and participation in order to strengthen the efficiency of such tools.

“*Imagine*”: the Systemic and Prospective Sustainability Analysis

The Plan Bleu's systemic and prospective approaches at the local scale consist of studying the past, present and future impact of development on the environment and natural resources. The aim is to support ‘territorial managers’ and local decision-makers in implementing prospective analysis tools which allow them to shape possible futures (based on past and current trends), and subsequently to help them to define action plans to move towards more desirable and sustainable futures.

Intended to address and anticipate the territory in the light of past and present actions and dynamics, foresight analysis and scenario building methods are suitable tools to support decision-making: by imagining possible (sustainable or unsustainable) futures reverse hypothetical reasoning leads to the identification of the route towards more desirable futures.

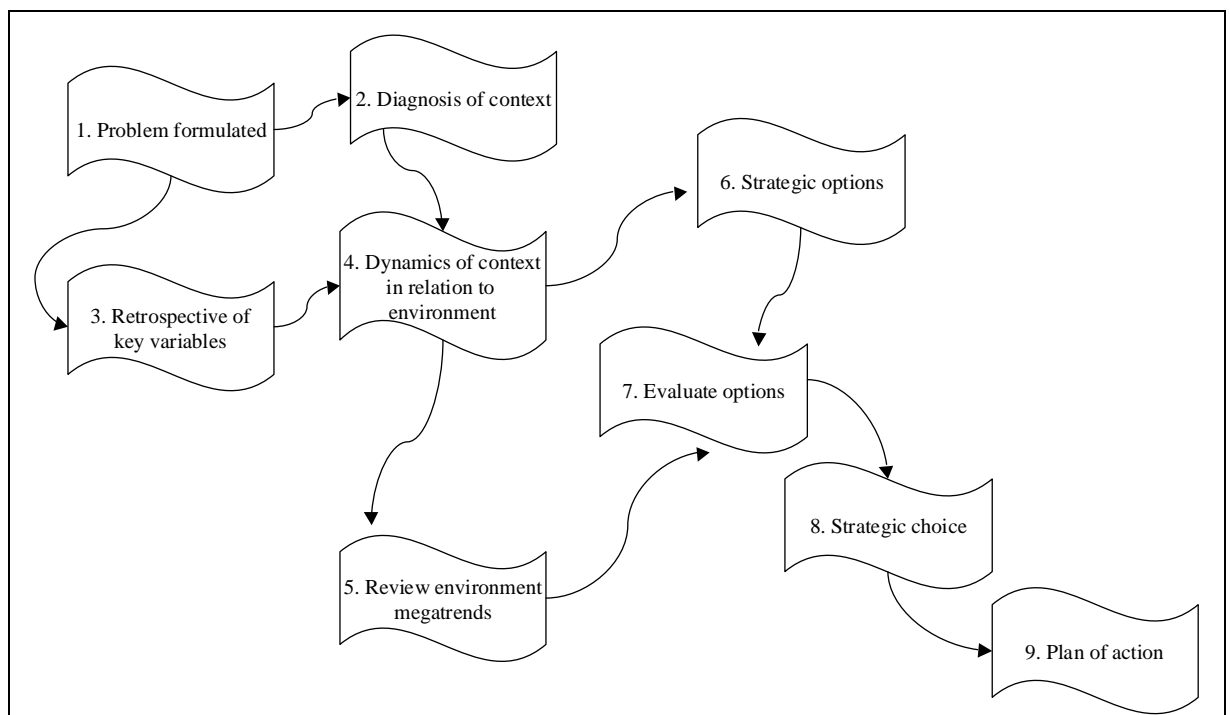
Figure 30: Systemic Analysis. From Checkland, 1981 & Plan Bleu, 1989



To explore the interaction between development and the environment, the Plan Bleu's prospective approach draws on (i) systems analysis and (ii) the scenario method:

- i. On the one hand, by taking into account the interaction between various interdependent components, **the systemic approach** (Fig. 31) allows a territory and its future to be analysed as a whole and provides insight into the processes linked to each element, particularly the relations and interactions between the various elements comprising the system.
- ii. On the other hand, **the scenario method** (Fig. 32) allows the possible futures of a territorial system to be sketched out. The scenarios and its descriptive narration (storylines) comprise a baseline picture, a choice of development hypotheses (assumptions), the path towards the chosen timeframe and an image of the final situation, all bound together by a coherent internal logic stemming from the combination of trend hypotheses and their consequences: e.g. the “*If..., then...*” reasoning.

Figure 31: Scenario making complete process (adapted from Godet, 2000)

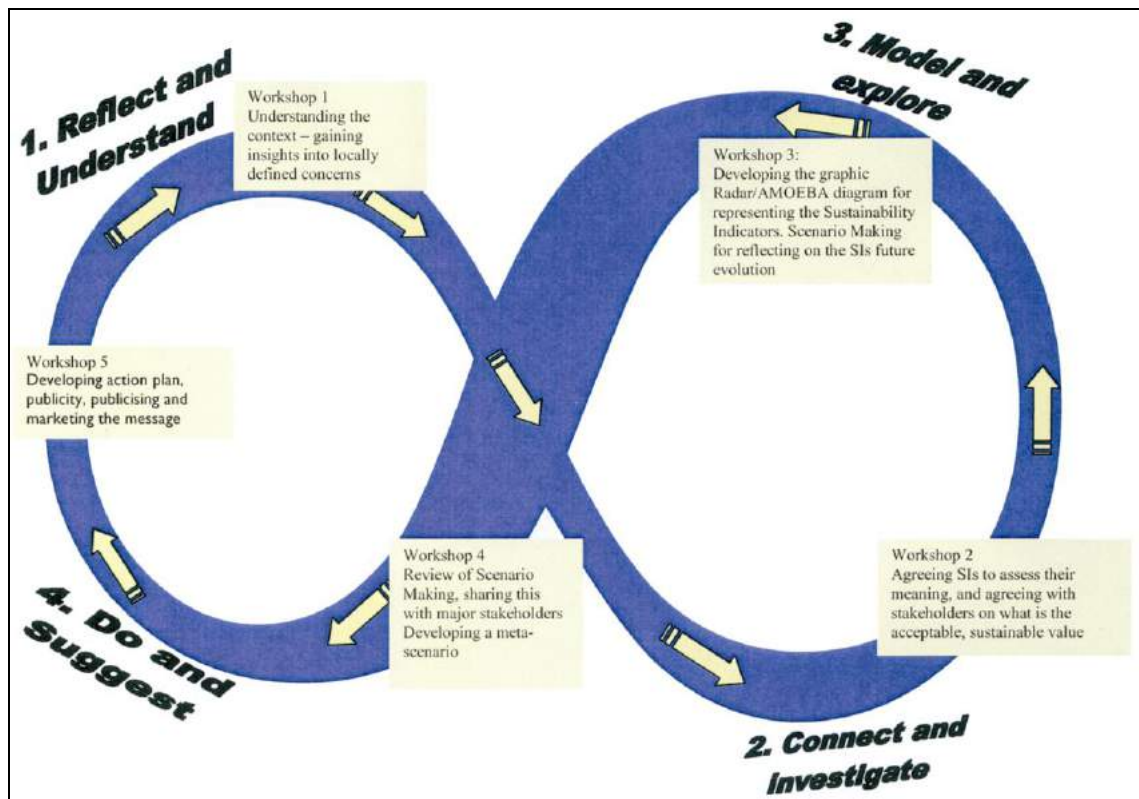


By designing scenarios decision-makers and various stakeholders are provided with a range of possible alternatives of the future, enabling them to better grasp the issues at stake and the risks relating to the trends observed, as well as to establish measurable medium and long term progress objectives.

“*Imagine*” is based on four key-principles:

1. The systemic approach makes it possible to address the territory under consideration as a whole and to buy into a jointly constructed image of a given area.
2. Foresight analysis and the scenario method are intended to guide strategy in the light of trend and alternative pictures of the future.
3. The indicators and sustainability thresholds are intended to monitor and forecast trends with regard to sustainable development.
4. Participatory methods rely on the expertise of local stakeholders in designing and controlling management and development projects.

Figure 32: The four stages of the “Imagine” method

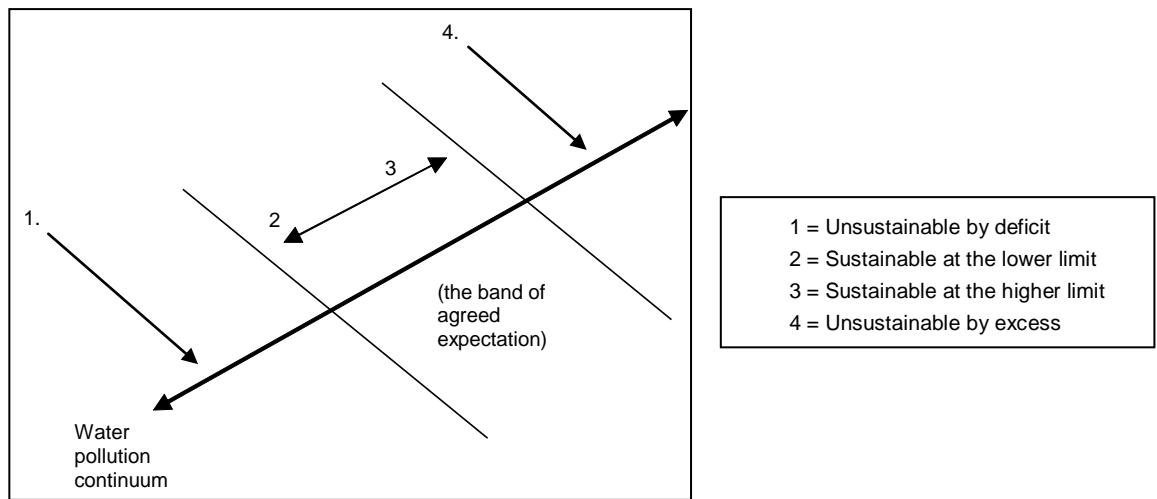


“Imagine” allows the level of sustainability of a system to be described, assessed and explored in the past, present and future, using indicators and working through four successive phases rolled out over five participatory local workshops (Fig. 33):

1. **Reflect and understand.** Reflecting upon and understanding the system, the context of the area, and the key issues at local level through various exercises. During this first stage, rich pictures (Checkland et al., 1990) are used to support participants in graphically portraying complex situations and gaining an understanding thereof. Rich pictures help sum up the real situation perceived by the stakeholders in the shape of a freehand cartoon-type representation. It is a form of simplification, which whilst acting as an icebreaker also encompasses the various elements comprising the system and the links between them.
2. **Connect and investigate.** Associating and analysing the various interacting elements, identifying key sustainability indicators, clarifying their definition and assessing their sustainability value. That means linking comprehension of the system to the sustainability indicators, studying them, establishing their “band of equilibrium” (Fig. 34) and portraying them using the AMOEBA⁶ diagram (Fig. 35). During the second participatory workshop, participants determine the ten to twenty key indicators which are representative of the system by establishing the “band of equilibrium” and plotting them on an AMOEBA graph in order to show the system’s sustainability at some given date. To facilitate selection of the key indicators, participants may draw up a feasibility grid in order to check that the proposed indicators can actually be calculated, that the data is available and accessible, etc.

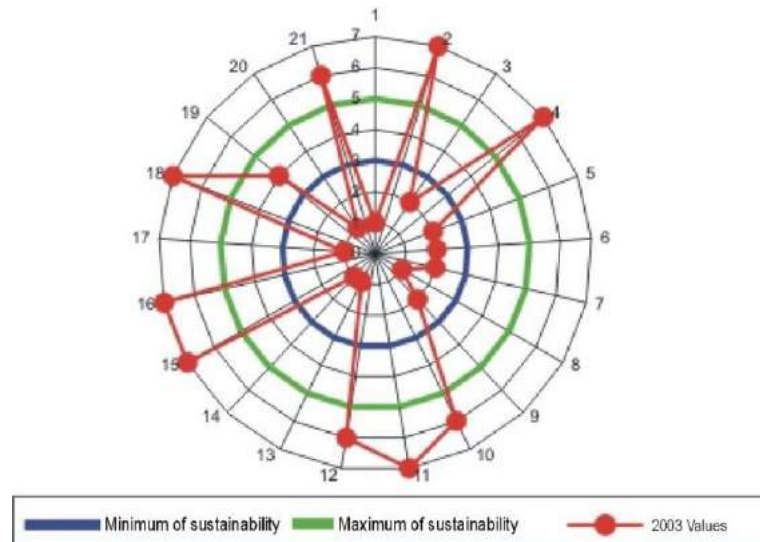
⁶ AMOEBA was initially developed by Ten Brink (Ten Brink et al., 1991) and in Dutch the acronym stands for “*general method for ecosystem description and assessment*”. It is commonly used in “Imagine” to refer to an AMOEBA-like diagram, something similar to the “blobs” used in systems diagramming.

Figure 33: The “Band (Belt) of Equilibrium”

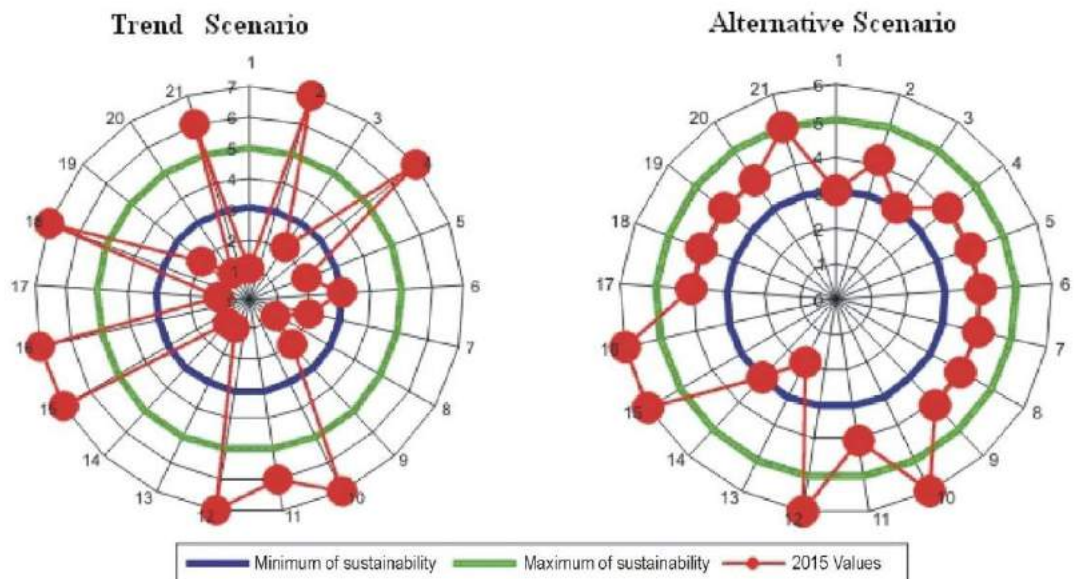


3. **Model and explore.** Modelling and exploring the future of the territorial system under consideration using the scenario method and through representation of the sustainability indicators in graph form and by using scenarios to imagine their future development. During the third stage devoted to building scenarios, participants initially convene in focus groups to work out mini-scenarios for each key indicator. The various groups subsequently hold a brainstorming session to identify risks of incompatibility between the hypotheses per indicator and to eradicate or curb them by changing their course, thereby establishing a consistent overall scenario for the zone in question. Group brainstorming is more effective when it focuses on an objective linked to a single key indicator; action required to reverse major trends emerges more clearly and is better understood. The important point during this stage is that action towards ensuring sustainability per key indicator should be compatible. Achieving overall consistency during the second stage requires the action plans for each key indicator to be analysed, for which purpose a matrix of the various actions at global level can be drawn up and implemented. Potential inconsistencies are addressed in order to establish what measures should be taken and what provisions introduced in order to eliminate them, weighing up whether to take action by indicator or to combine.
4. **Do and suggest.** Suggesting and acting by establishing an action plan for sustainable local development, including monitoring the territorial system's progress towards sustainable development using variations in indicator values compared with sustainability thresholds. During the final stage, participants draw up an action plan towards a more sustainable development of the territorial system based on the alternative scenario, the overall consistency of which has been checked in consideration of the compatibility matrix. They also establish a programme for marketing and publicising the results of the “*Imagine*” approach. In order to highlight priorities or rather the most “profitable” forms of action in terms of their impact or influence on the indicators, all actions with underlying evolution hypotheses for the alternative scenario are listed and clustered. A matrix is then used (with actions on the horizontal and key sustainability indicators on the vertical axis) in order to identify strong links between areas of action and indicators. The purpose is to establish the potential impact of each area of action on each key indicator. Required actions can consequently be classed in order of priority, with a distinction being drawn between actions and measures: the former apply to specific operations requiring appropriate financing, whilst the latter are of a statutory, administrative or institutional nature and do not require specific financing. The final stage of “*Imagine*” consists of marketing and publicising the results of the approach as well as drawing up a communication strategy to prompt decision makers to include the territorial system studied in a pro-active approach, channelling its development towards sustainability, which would guarantee the genuine implementation of the action plan drawn up using the “*Imagine*” approach.

Figure 34: “AMOEBAs” graphs depicting the current situation and two possible future scenarios, with regard to previously defined sustainability criteria



Graph showing the sustainability of the Algiers coastal zone in 2003 (Larid, 2005)



Graphs showing the sustainability of the Algiers coastal zone in 2015 (Larid, 2005)

In brief, once the system has been recognised (phase 1) and the indicators and their sustainability thresholds defined (phase 2), “*Imagine*” uses prospective analysis tools to explore the future (phase 3), which can still be imagined albeit not identified as such. Indeed, drawing on knowledge of past trends and the current situation acquired during the preceding stages of “*Imagine*”, the stakeholder group can design possible and/or desirable futures. The scenario method, one of the best known tools in prospective analysis, is based on the choice of evolution hypotheses, a time horizon and the elaboration of a pathway from present to future using “*If...Then...*”

reasoning. The stakeholder group is thus able to look ahead and explore what might happen if a given decision were taken in order to establish a final image of the area in question: if nothing changes, this is a trend scenario; if action is taken then one or several alternative scenarios emerge. To quote Michel Godet, the aim is *"to enlighten current action in view of possible futures"*. He draws a distinction between the stage of prospective consideration as such, which seeks to answer the question *"What might happen?"*, and the stage of preparing to act, where the question is rather *"What can be done?"* followed by *"What are we going to do?"* and finally *"How do we do it?"*. Combining the scenario method with strategic thinking allows potential future changes within the system to be imagined by projecting past trends using various hypotheses of evolution, as well as the identification of action to be taken in order to reach possible and desirable situations. A logical multi-step sequence produces the action plan, from formulating the problem through to making the strategic choices.

Figure 35 shows an example of graphs from the scenario modelling and exploration stage (phase 3): graphs are drawn up on the basis of a description of the system (phase 1), sustainability indicators and associated threshold values –extreme or limit sustainability values by deficit or by excess (phase 2)–, providing an overview of the current situation and possible futures.

An AMOEBA or Radar is used to display all the indicators simultaneously (Fig. 35), allowing their position to be compared with the "band of equilibrium" and an image of the system's overall sustainability established. In an ideal vision of sustainability all the indicators should fall within the "band of equilibrium". Any deviation either above or below indicates the non-sustainable level of the corresponding values and should lead to the decisions giving rise to such deviations being scrutinised and solutions sought which would allow the indicator value to be brought back inside the "band of equilibrium".

This type of diagram helps determine whatever action urgently needs to be taken to bring the indicators back within the "band of equilibrium" and to assess which sustainability gains would be the most immediate or least difficult to attain. It might seem, for instance, that it would be faster and/or less expensive to improve the performance of the indicators closest to the upper and lower sustainability values rather than immediately tackling the indicators with extreme values. Conversely, it would also be possible to immediately address the worst-performing indicators to avoid encouraging further deviation, which will only become more difficult to reverse the longer it persists.

"Imagine": a set of tools and methods to assist ICZM process

"Imagine" constitutes a participation-based tool to support decision making and has proven particularly suited to ICZM initiatives in the Mediterranean. This method has engaged and combined the expertise of local stakeholders in jointly shaping management projects and defining action to be taken towards rendering management of the areas in question more sustainable. According to the opinion of local CAMPs representatives it seems essential that local stakeholders (decision-makers, managers, practitioners, technicians, scientists, as well as representatives of civil society and private sector) should be involved and work together.

The rich picture (Fig. 36) lays the foundations for subsequent work. The priority issues relating to the situation can be inferred from it, as well as the main action to be taken in order to remedy them. Participants attach the indicators which best describe them before subsequently drafting a statement explaining the aim of the territorial project in respect of these issues and tasks. A collective vision is thus established of the objectives to be reached, constraints to be overcome, the stakeholders and beneficiaries of the desired change. Participants are then in a position to pool these elements to shape the project, thereby ensuring a high degree of consistency amongst the objectives. Figure 36 clearly shows the various stresses (drivers) to which the terrestrial, coastal and marine ecosystems in the Algiers coastal zone are exposed (Larid, 2003).

Figure 35: Rich picture identifying the main issues in the Algiers coastal zone, 2003



This participatory approach draws on the expertise of local stakeholders and allows them to design their own territorial project. Besides encouraging stakeholder involvement in a project of relevance to their future, it also prompts “*decompartmentalisation*” between disciplines, “cross-fertilisation” between several points of view and helps reconcile conflicting objectives. Workshops organised under “*Imagine*” thus bring together players from different sectors and backgrounds (public, professional, associations, etc.), providing them with the opportunity to establish mutual understanding by giving joint consideration to their common future.

One of the effects of the “*Imagine*” method is to rally and remove barriers: the local “*Imagine*” workshops provide a rare opportunity to discuss and debate common problems and projects. Their friendly format is instrumental in “breaking the ice” between participants, for instance to approach the complexity of the territorial systems by designing “rich pictures” (Fig. 36). The participatory workshops, as “public fora for participation”, encourage the sharing of concerns whilst triggering inter-sector processes. “*The method proved its ability to “decompartmentalise” the work of stakeholders in a given area, to make them work together towards shaping and defining a sustainable common future and to provide attractive information about complex situations (...). It also showed that it was able to make difficult, complicated exercises fun, that it was user-friendly and could be rolled out on several levels*” (Minutes of the “*Imagine*” regional workshop, Plan Bleu, 2008).

“Imagine”, a flexible mediation tool to support decision-making

As a tool to assist decision making, the prospective approach of the “Imagine” method sheds light on the territorial context, its trends and prospects, on the basis of which decisions have to be taken, as well as on the possible consequences of these decisions. The Plan Bleu’s territorialised prospective approaches also focus on the socio-institutional aspects: local stakeholders constitute the lynchpin in discussions towards understanding their own interactions and the territorial systems within which they evolve and interact. As such, “Imagine” constitutes a mediation tool towards settling conflict between sectors. Indeed, it seems important to be aware of (and help resolve) conflicts over use. It is just as essential to establish an overview of stakeholders’ positions and strategies (stakeholder mapping) in order to identify and take account of sticking points and conflicting uses in the areas. In the long run this kind of approach helps prepare the ground for change in order to ensure that genuine alternatives emerge and can be taken up. Stakeholder participation in interaction (and often in competition), the facilitation of discussion and the exchange of opinions, the search for a “common language” and compromise and multi-disciplinary thinking are all complementary components of what, as an initial approximation, we call here “participative prospective” (Le Tellier and Briens, 2011) (Fig. 37).

Figure 36: “Imagine” workshops - Coastal Area Management Programme - Slovenia, 2006



Source: Plan Bleu, 2006.

“Imagine”, an evolving tool

Whilst roll-out of the “Imagine” method has proven fruitful and has been welcomed by the stakeholders involved in the CAMPs, there is still room for improvement. Certain stumbling blocks will need to be addressed if the outcome of future applications is to be further improved.

As far as stakeholder participation is concerned, substantial turnover from one workshop to the next would appear over time to hamper the smooth functioning of the group and its dynamics. The heterogeneity of levels of power, influence and representation may also be a problem (Billé, 2008). Moreover, political support is also an essential prerequisite, particularly for the official adoption of the action plan produced by the stakeholders and the mobilisation of adequate funding.

Finally, the prospective approach would benefit from being consolidated downstream through standardising the monitoring and assessment of how measures are implemented, enhanced communication and media coverage, as well as applying the results to similar initiatives. As for the sustainability indicators at the focus of the exercise, some technical difficulties still need to be overcome: on the one hand, determining the interval of values corresponding to a state of sustainability sometimes proves controversial, and on the other it may be difficult to flesh out certain indicators (lack of data).

Adaptation of “*Imagine*” to the PEGASO project

The adaptation of “*Imagine*” to the PEGASO project will consist mainly to group some phases and workshops in order to speed up its implementation in the CASES and for the regional assessment. Three main phases seem to be relevant:

- Starting from the issues already selected and proposed by the CASES representatives, the first phase will consist in selecting indicators within the list proposed by the project team – even if some CASES’ specific indicators could be selected. This first phase needs that most of the data is already collected and local stakeholders already informed and invited to a first meeting/workshop.
- In a second phase, the sustainability threshold for each indicator will be fixed. Then the values of each indicator will be assessed for each scenario (trend or “business as usual” scenario and alternative scenario) for the chosen horizon year. One of the inputs of this phase is the description of the overall scenarios and their translation in the CASES context.
- The results of these scenarios will be discussed and presented to the stakeholders in a third phase.

The stake of simultaneous implementations of this approach in several CASES is to keep the consistency with the regional indicators set and scenarios by taking into account some CASES’ specificities and the different scales from local to regional. The implementation of this approach needs a strong involvement of the CASES representatives as a local relay with the stakeholders and as a facilitator during the workshops.

CONCLUSION

With questions relating to the environment and sustainable development coming increasingly to the fore, social and political demands are being reflected in the call for greater public participation in the discussion, design and implementation of long term territorial strategies. Within this context, the territorial approaches developed by the Plan Bleu connect two essential components: (a) the production of territorialised data adjusted to various time scales (foresight analysis and scenario building) and (b) stakeholder participation. The aim is to enhance the knowledge needed for long term strategic decision-making by exploring possible futures using the scenario method on the one hand, and to bring more local stakeholders on board through the collective learning and joint work which gives rise to negotiated consensus on the other. This kind of approach makes sense not only because it bolsters local community for sustainable management of areas or resources, but also within the broader perspective of territorial development, notably by bridging socio-economic divides between diverse and specialised areas (coastal zones which have been made into resorts or urban vs. rural or nature areas) or reducing poverty and inequality within an area.

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APPENDICES – Presentation of prospective studies

A sustainable future for the Mediterranean. The Blue Plan's Environment and Development outlook		
Description of the study	Author(s)	Plan Bleu, Guillaume Benoit, Aline Comeau (dir)
	Sectors	Climate, cooperation and regional integration, population, economy , environmental and development policies, water, energy, transport, urban areas, rural areas and coastal zones
	Geographical Coverage	Mediterranean countries
	Time Horizon	2025
	Number of scenarios	1. Business as Usual 2. Alternative scenario
Methodology	Scale	Regional (the Mediterranean) and National
	Description of the methodology	The study has been developed on the basis of a trend scenario which extends the basic tendencies observed according to major determinants (climate, demography, geopolitics, economics and governance) and an alternative scenario analysis.
	Participation	The work is fruit of a collective expertise based on numerous studies and workshops organized I the last decade by the different components of the Mediterranean Action Plan (UNEP/MAP), other institutions, Mediterranean networks of experts and NGOs, which has mobilized more than 300 experts from all Mediterranean countries as well as from some European countries not bordering the Mediterranean sea.
Purposes	Objective	The study undertaken by Plan Bleu reviews recent trends and hopes to draw people's attention to the known and emerging risks facing man and the environment. It goes on to propose policies to avert them. Reconciling development with the environment is crucial to strengthen solidarity between both rims of the Mediterranean.
Summary	Plan Bleu's study devotes its first part to perspective developing a trend scenario founded on assumptions related to climate, cooperation and regional integration, population, economy and environmental and development policies.	
	Plan Bleu starts from the hypothesis of a growing vulnerability to natural hazards because of an intensification of global warming (less than 1° C by 2025) and an increase of extreme climatic events in Mediterranean area.	
	The EU will strengthen its presence in the Mediterranean by the accession of five coastal states (Croatia, Bosnia-Herzegovina, Montenegro, Albania and Turkey) and by the improvement of some legal instruments aimed at achieving the maintenance of peace, adherence to principles of social market economy, economic convergence and action to protect the Common environment.	
	However Euro-Mediterranean integration is proceeding slowly in part because of limited resources aiming at building a structured cooperation and in part because of the persistence of several conflicts in the Southern and Eastern countries of Mediterranean. Even that, Euro-Mediterranean economic interdependencies are likely to increase. Up to 2025, the baseline scenario assumes continued globalization, liberalized North-South trade (progressive in agriculture) and restrictive migratory policies.	

	<p>In the SEMCs the demographic transition and the convergence of fertility rates with those in northern Europe will generate an increase in population of 137 million people by 2050 (Egypt and Turkey have the greatest population growth). The population is concentrated mainly along the coasts and in the more urbanized areas. In contrast, the countries of the northern Mediterranean will have to face the problems raised by an aging population and by a larger demand for employment coming from the SEMCs.</p> <p>Economic growth remains uncertain for 2025, particularly in the South and East: the baseline scenario assumes for the entire Mediterranean Basin, an average GDP growth rate of 2.7% per year over the period 200-2025 versus 2.5% in 1985-2000. Youth unemployment and revenue gaps between SEMCs and NMCs will be not reduced.</p> <p>Concerning environmental policies they will keep remaining basically top-down, corrective and regulatory instead of participatory. Economic cooperation and sectorial policies (agriculture, energy, water, transport, and tourism) will poorly integrate the environmental component or the sustainability concerns.</p>	
Additional information	Publication Date	2005 (updated in 2008)
	References and contact information	http://www.planbleu.org http://www.planbleu.org/publications/prospectiveUk.html

EuroMed-2030 - Long term challenges for the Mediterranean area		
Description of the study	Author(s)	Directorate for Science, Economy and Society of the EC - DG Research & Innovation in collaboration with a group of experts 'EuroMed-2030'
	Geographical Coverage	Mediterranean countries
	Time Horizon	2030
	Sectors	Demography, Water, Agriculture, Energy, Climate change, Education and Science, Religion and culture, Geopolitics and governance
	Number of scenarios and their title	<ul style="list-style-type: none"> – Managing conflict – Win-win projects – Deeper economic integration – Towards a Euro-Mediterranean Community
Methodology	Scale	Data provided are based on national accounting
	Description of the methodology	The study is developed on three levels. First of all 'trends' focus on the status of the main challenges that affect Mediterranean area nowadays and their potential evolution over the next twenty years. Secondly 'tensions' examine socio-economic pressures that could generate from interactions among trends. Finally 'transitions' aim to propose initiatives able to face tensions. For this purpose they have been used macro-economic projections (demographic, GDP growth, international trade) for the Southern and Eastern Mediterranean Countries, focusing on connections between EU members and SEMCs in economic and social field, most of all in strategic issues as Euro-Mediterranean free trade area, migration, energy, transport, environment, water, agriculture, climate change, technology transfer, marine and maritime issues as well as cultural issues including conflicts, religions and gender.
	Participation	The study was prepared by Directorate for Science, Economy and Society of the European Commission DG Research & Innovation with a group of twenty experts named 'EuroMed- 2030'.
Purposes	Objective	The study aims to improve knowledge of the challenges of the Mediterranean area and to develop a forward-looking analysis able to identify the main challenges that policy-makers are forecast to face in next years in this area. For this purpose the study provides an assessment of the trends, tensions and scenarios for the Mediterranean area by 2030.
Summary	<p>1. A "managing-conflict" transition is necessary because the Mediterranean basin evolves towards to more peaceful and serene future. Tensions that affect the Euro-Mediterranean area come from the legacy of history, the disillusion and disappointment with progress so far in Euro-Mediterranean, difficulties in cooperation, recent specific events as Arab Spring. In order to move towards a transition characterized by a good management of conflicts it is necessary an involvement of civil society (stakeholders from business, NGOs, students and youth) in the framework of economic cooperation and social policy in the Mediterranean. For this to be possible the transition will require an improvement of the existing structures of dialogue and cooperation. Because the tensions be reduced it will be also needed a firm and visible position in foreign and security policy by EU (especially in areas as Cyprus, the Balkans, Western Sahara, Israel) and consequently a stabilization also in terms of the security and military aspects (that means that EU will be asked to develop an effective military capability). This process will allow to European Union to exercise more decisive political action on the international stage and thus to become a more desirable political partner for the Arab world. Existing initiatives for a better understanding of cultures</p>	

	<p>and societies and of their intellectual and artistic heritage should be significantly strengthened too.</p> <p>2. Win Win Transition is a project-based approach to cooperation aiming to fight the slow process of convergence in liberalization of fluxes in goods, services and knowledge through improved procedures of the Barcelona Process managed by the European Commission and by the Co-Presidency and the UfM Secretariat. Thanks to a more pragmatic approach to the original Barcelona objectives, the UfM will support the process of signing of the Association Agreements and the Action Plans, generating stronger South-South integration and guaranteeing a fair regional EU-MPC dialogue on the issues of common interest. Besides knowledge and innovation are promoted in the SEMCs thanks to a common agenda of the EU and the MPC aiming to develop scientific and economic partnership useful to increase the innovative capacity of the SEMCs.</p> <p>3. In “Deeper economic integration” scenario Euro-Mediterranean trade relations need to address more deeply non-tariff barriers and ‘behind the border’ issues. For this reason, it continues the process of creation of the Euro-Mediterranean Free Trade area whose main purpose is just promoting the diversification of trade and investment relations between the EU and the Mediterranean regions, to contribute to more favorable investment climate and to attract both domestic and foreign investment, through increased transparency, predictability and sustained economic growth.</p> <p>4. “Towards a Euro-Mediterranean Community” is an integrated scenario focusing on development in social and political convergence in Mediterranean area after solution of lack of a shared vision, lack of political will, lack of trust, lack of resources and lack of suitable institutions. Cooperation and a deeper integration will be achieved through improvement of European Neighbourhood Policy as for example a stake in the internal market, implementation of four freedoms, extension of European financial instruments to the SEMCs. Besides multiple existing networks in the field of economic and social cooperation will be improved together with all those non-governmental types of cooperation in migration, education, culture which rank below highly institutionalized activities and still constitute the bulk of sustainable measures in building trust in Euro-Mediterranean integration.</p>	
	Publication Date	2011
	References and contact information	<p><i>Directorate-General for Research and Innovation of European Commission</i></p> <p><i>Domenico Rossetti di Valdalbero (domenico.rossetti-di-valdalbero@ec.europa.eu)</i></p>
Additional information		

Tomorrow, the Mediterranean - Scenarios and projections for 2030		
Description of the study	Author(s)	IPEMED
	Sectors	Growth, Employment, Migration, Energy, Agriculture
	Geographical Coverage	Mediterranean countries
	Time Horizon	2030
	Number of scenarios and their title	1. BAU scenario 2. Crisis in the Mediterranean region 3. Mediterranean convergence scenario
Methodology	Scale	Data provided are based on national accounting
	Participation	The study has been undertaken by IPEMED in partnership with CARIM, CIHEAM, FEMISE, OME.
Purposes	Objective	The general objective of the IPEMED study is promoting foresight methodology throughout the Mediterranean area as a new decision-making tool. For this purpose the study proposes a serious foresight analysis concerning the next developments in the field energy, agriculture, water and the environment, population and migration and foreign direct investment.
Summary	<p>1. BAU scenario: The current scenario proposed by IPEMED assumes an increase on one side of the intra-Mediterranean divergence and on the other hand, of intra-European gaps. At Euro-Mediterranean level, in accordance with past trends, the European growth rates will be under 2% per year, while South and East of the Mediterranean and the Balkans will improve their GDP performance until to get a growth of 3.4% per year. Consequently, the Mediterranean economic landscape will be dominated by Croatia, Serbia and Turkey, and to a less extend Tunisia and the other Balkans countries, would get closer to the per capita income of Portugal, deepening the gap with other North African countries (Algeria and Egypt) and the Middle East (Lebanon and Jordan) whose growth would be less dynamic. At the intra-European level Greece and Portugal will continue to report difficulties of their balance of payment and public debt. If at the institutional level some results in terms of agricultural and commercial liberalization in the Euro-Med will be achieved, at real competition from Asian markets requires countries to some economic policy choices by the heavy consequences for society. Countries are obliged to adopt tight monetary policy and wage restraint together with industrial specialization in low-cost products, resulting in a detriment of purchasing power and domestic demand. Not only Mediterranean agricultural production declines under stiff competition from products from afar (especially from Chile, Australia, Brazil and China) but in the South of the Mediterranean there is a marginalization of inland rural areas. Beside, this phenomenon the massive migration, the urbanization especially along the coasts, the increase of the energy and food demand will determine deeper impacts in terms of pollution, loss of biodiversity and paving the coastline in the South and East of the Mediterranean. The environmental pressures are forecast to raise seriously: in the SEMCs not only the pressure on water resources becomes unbearable and the contribution to the climate change worrisome but the increase in the dependence on fossil fuels, led by the augmentation of the population, will bring to a very strong growth of their CO2 emissions (of about 100%).</p> <p>2. “Crisis in the Mediterranean region”: in Euro-Mediterranean area debt crisis and a not favourable situation of public finances severely limit the potential growth of the Euro-Mediterranean nations. The critical financial situation, inevitably linked to trade flows, generates a reduction of trade and investment by the Euro-Mediterranean countries mainly in North Africa. Here the economic instability will increase the discontent given by the non-completion of the political transition. In contrast, in Turkey, in the Mashreq and the Balkans</p>	

			<p>the transfers of capital coming from Northern Europe and the emerging countries, attracted by an economic climate conducive to high-yield investments, are stable. From an environmental point of view low progress in energy efficiency (in the Arabic Mediterranean and the Balkans), the lack of renewable energy development and the continued use of fossil energy prevent a reduction of environmental impacts coming from energy demand. Regarding agriculture, the dichotomy of intensive farming for export under-equipped alongside subsistence crop farming continues in the absence of productivity gains. Water conflict intensifies. Food dependency and rural poverty go hand in hand and accentuated social imbalances, fueling a vicious circle of instability.</p> <p>3. “Mediterranean convergence scenario”: This is a scenario of cooperative type, it assumes the creation of an integrated regional system that is based on establishment of the four EU freedoms, access to the European domestic market and standardized norms allowing the emergence of a regional preference system. Against the background of this institutional framework not only productivity and the employment rate of the entire Mediterranean basin increase, but also improve the social conditions and processes of redistribution.</p>
Additional information	Publication Date	2011	
	References and contact information	www.ipemed.coop http://www.ipemed.coop/adminlpemed/media/fich_article/1323859454_Tomorrow_the-Mediterranean-2030_eng.pdf	

	PARME - Workshop on Mediterranean Forward-thinking Atelier de Réflexion Prospective PARME. Partnerships and Research in the MEditerranean	
Description of the study	Author(s)	Agropolis (Montpellier, France) / French National Agency for Research (Agence Nationale pour la Recherche / ANR)
	Sectors	Societies, territories, natural resources (media, water and energy), agriculture, food and health
	Geographical Coverage	Mediterranean countries
	Time Horizon	2030
	Number of scenarios and their title	1. Trends 2. Disruptions and crises, controversies and uncertainties 3. Signals, seeds of change and actual transitions
Methodology	Scale	Several (according to the studies assessed)
	Description of the methodology	The study was conducted in four phases: (i) a summary of 80 prospective studies involving the Mediterranean, conducted over the past decade, (ii) the development of a common framework of forward thinking on the major issues identified in the previous phase and the establishment of thematic working groups on these key issues, (iii) the identification of research priorities to address the major issues of each topic, (iv) a cross-sectional analysis of proposals in to put forward a formulation facilitating their integration of a systemic point of view, leading to the final report. The study is based on a cross-sectoral and transdisciplinary approach.
	Participation	130 experts belonging to sixty organizations in ten countries and from various disciplines: agronomy, energy, environmental science, geography, economics, political science, human and society
Purposes	Objective	The general objectives of the ARP / PARME study are: stimulating forward thinking around new scientific issues and achieving syntheses of prospective studies.
Summary	<p>1. Trends: The current scenario confirms an increase in both the world's population (8 billion people in 2030) and the Mediterranean (due to the demographic transition and then lowering the birth rate in SEMCs). Because of population growth there will be an increase in the rate of coastal urbanization and increased migration to the countries of Northern Mediterranean. Agricultural issues and food security will be increasingly important in this period. Agriculture will keep being economically important in the area, but the globalization of trade, particularly agricultural products (meat, cereals,) with Latin America (Brazil, Argentina, Uruguay) will increase food dependence of the SEMCs. Agriculture in the MENA will be strongly influenced by the weakening of family farming and the digging of a dual society in agriculture partly due to the spatial reconstruction of the territories (land distribution, concentration of large farms, loss of arable land peri-urban) and degradation of agro-ecosystems. The increase in population and changes in lifestyles will increase the dependence of the Mediterranean energy and food resources. Despite the rise slow but overall renewable energy (solar, micro-hydro, geothermal, marine energy such as biomass) and the development of new technologies for transport and storage, the transition energy is always characterized by the dominant use of fossil fuels in the energy mix (oil, gas and coal). Water resources are also subjected to high pressures whether or anthropogenic climate change. Demand for drinking water, industrial or agricultural, should greatly increase as the availability of water, including coastal areas will be in sharp decline. Tourism development and heliotropism (including seasonal retirees) will add to this demand and exacerbate competition</p>	

Additional information	<p>with other uses of water. Aquatic ecosystems, providing procurement services and regulation as wetlands (natural purification and filtration of water) will be increasingly at risk because of growing urbanization particularly on the coast. Management policy for the water supply has already reached its limits, we are moving towards a policy of demand management including implementation of new resources: desalination, wastewater reuse, sharpening operation reserves of non-renewable.</p> <p>2. Disruptions and crises, controversies and uncertainties: There are many crises elements that may further complicate the situation in the Mediterranean. The current problems affecting the agricultural world could cause actual food crises: for example the volatility of agricultural prices linked to international trade and speculation on global natural resources, the climatic disturbances, the widespread overexploitation of living marine resources causing regression of important fisheries such as tuna, difficult access to water and sharing use may cause conflicts both in a national context (agriculture, tourism) or across borders (water supply, agriculture, aquifers) if appropriate policies to water management were not established. These elements are linked to other factors of potential crisis: an even more degraded biodiversity which reduces ecosystem resilience to external aggressions such as an epidemic, and besides, risks connected to water management.</p> <p>3. Signals, seeds of change and actual transitions: Some signs of change are already present in the current economic, social and environmental Mediterranean dynamics. Starting from this, ARP / PARME studies suggests some important transitions. It could be observed increasingly implementing awareness programs and training policies and citizens / users on health issues and management of water resources (development of participatory management in the local governance systems). It will also be achieved a strengthening regional cooperation on water resources in particular, a decentralized energy systems and water supply, mobilization and recognition of local knowledge, particularly with regard to water management and crop with hybridization with technical advances, product specifications with the development of protected geographical indication, policies of agricultural biodiversity conservation (in situ and ex situ).</p>	
	Publication Date	2011
	References and contact information	www.agropolis.fr http://www.agropolis.org/project-management/workshop-mediterranean-prospective-analysis.php agropolis@agropolis.fr

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Appendix 3

Programme for the Arles Regional Workshop

Pegaso Project
People for Ecosystem based
Governance
in Assessing Sustainable development
of
Ocean and coast

Funded by the European Union
under FP7 – ENV.2009.2.2.1.4
Integrated Coastal Zone Management

Regional Envisioning Workshop

Mediterranean Basin

Venue, Date Arles, 13. – 15. November 2012

Date / version 5.11.2012 (v2.0)

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1. Aims and Objectives of the Regional Workshop

The purpose of the PEGASO Regional Workshop is to develop a more detailed vision of the future for the coastal zones of the Mediterranean within the framework of the ICZM Protocol. The outputs from the meeting will be taken forward to a meeting in Istanbul in December 2012 that will further develop the vision for the Black Sea.

The starting-point for the workshop discussions are two key of the guiding principles of the ICZM Protocol¹, namely:

- balanced use of the coastal zone; and,
- the preservation of the wealth of natural capital in coastal zone

The workshop will identify what the implications of these policy objectives are in the medium to long term, and explore what geographical differences we might need to take into account when planning for the future.

The meeting brings together experts and decision makers working on coastal zone issues at different scales. Their expertise will be used to analyse the impact of the main drivers of change affecting the two policy objectives across the two sea basins. The meeting will also enable PEGASO CASE Partners to shape the PEGASO Regional Assessment and explore the implications of regional trends and pressures for their own areas.

The outcome of the meeting will be draft ‘vision statement’ that can be taken forward to the Black Sea workshop and the subsequent discussions within the PEGSO Project.

The meeting will be highly interactive. In addition to developing a vision that can be taken forward for discussion, the meeting has been designed to help people attending the workshop to think about the kinds of deliberative processes needed to support ICZM. Thus the workshop will:

- Allow people to undertake some introductory ‘visioning exercises’ for the coastal zone that might be useful when using participatory methods to develop ICZM strategies.
- Demonstrate how scenarios can be used to examine future visions as a way of developing more resilient planning approaches. In the workshop we do not have time to create a new set of ICZM scenarios, but we can make progress by looking at the existing scenario work done by Plan Bleu.
- Provide people with some experience of using the kinds of information that is now becoming available to support planning, such as indicators and environmental accounts. The meeting will also provide some insights into analytical tools such as cumulative impact assessment.

¹ The proposition of ‘balanced use’ summarises the themes covered in principles mainly (h) and (b) in the text of the ICZM Protocol, Article 6; the ‘preservation of natural capital’ is a distillation of principles (a), (j) and (g). For further discussion see “Common conceptual Framework for the implementation of ICZM” (Task 2.1 deliverable) and the “Indicators: Methodological paper for the selection and application of PEGASO ICZM indicators”, Task 4.1)

2. Workshop Programme

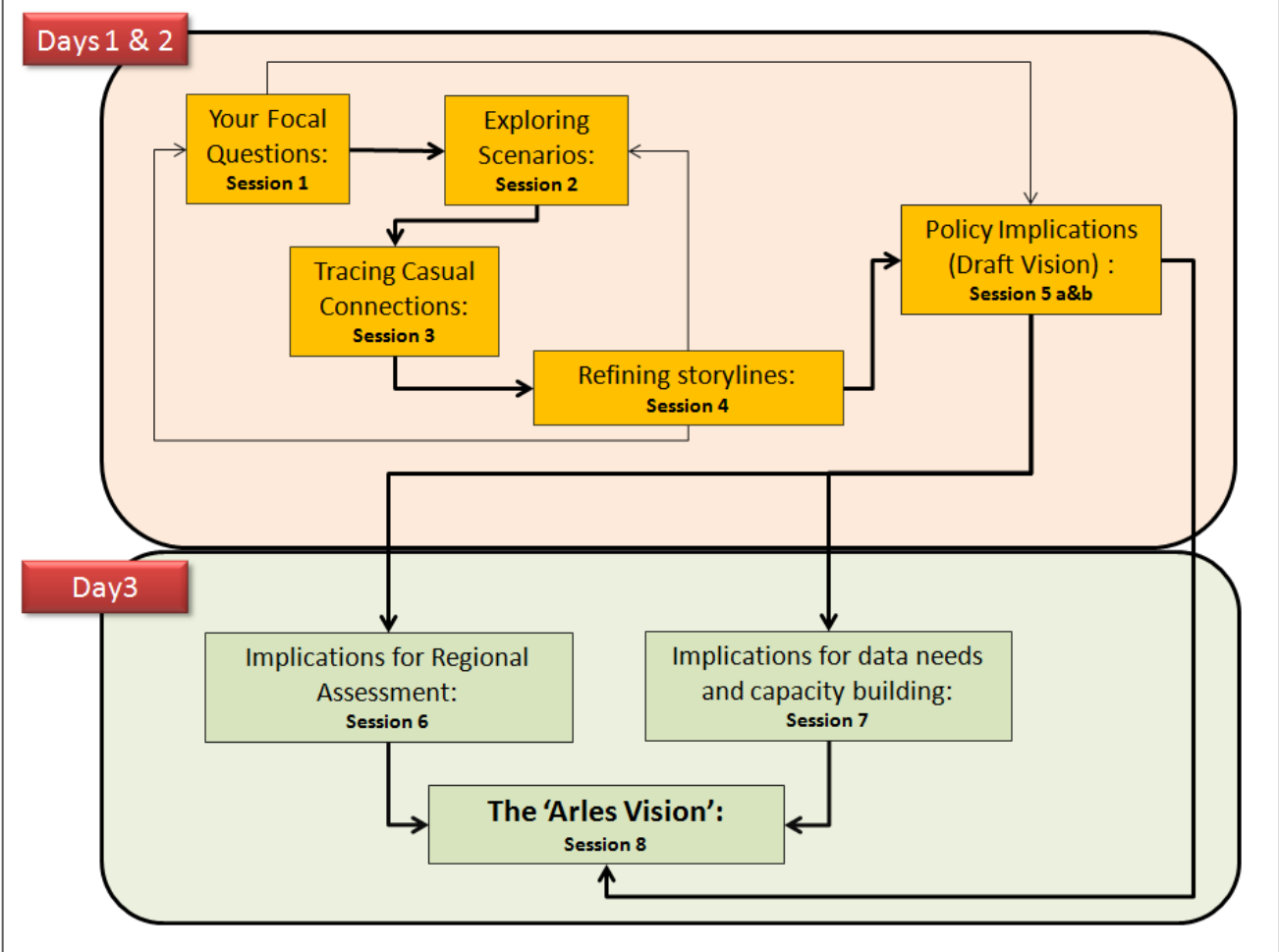
The programme for the workshop is shown below.

The sessions have been designed to build on each other, and give participants time to reflect on the materials and methods so as to provide feedback.

Figure 1 is a 'road map' of the workshop, showing how the activities are linked, and how by the end of the meeting we can develop a vision statement that can be taken forward.

During Days 1 & 2 members of the PEGASO Consortium will work with our end users and other guests. Day 3 will provide PEGASO partners with an opportunity to talk through the implications of the workshop for their work and plan next steps.

Figure 1: Workshop Road Map



Day 1

Time slot	Session	Activities and Issues
09.00-09.30	Registration & Coffee	Registration in main meeting room
09.30-10.45	Introduction and Orientation	<ul style="list-style-type: none"> Aims of the Workshop (RHY, FB, JLT) Tour de table
10.45-12.15	Session 1 (Breakout): Thinking about the future: identifying the focal questions and the drivers of change at local and regional scales relevant to ICZM	<ul style="list-style-type: none"> Breakout Scenario Groups are established Groups present their preparatory thinking to each other in terms of key questions concerning ICZM, the things likely to drive outcomes and the uncertainties surrounding the issues
12.15-13.00	Plenary	<ul style="list-style-type: none"> Report back on main cross-sectoral issues identified in break out groups and any geographical contrasts Discussion on priority issues, opportunities and key threats to coastal zone
13.00-14.00	Lunch	
14.00-14.30	Introduction to some existing scenarios	<ul style="list-style-type: none"> Plan Bleu introduces the Business as Usual (BAU, or base-line) and alternative scenario (AS). (JLT)
14.30-17.00	Session 2 (Breakout): Futures of fear and futures of desire: reviewing some initial storylines based on <i>Sustainable Future for the Mediterranean</i>	<ul style="list-style-type: none"> Breakout Scenario Groups are re-established Groups explore their focal questions and drivers in context of BAU and AS and identify alternative outcomes for ICZM. Groups review range of uncertainties associated with each driver and identify range of projections for each; consider the period up to 2025 and between 2025 and 2050. Groups consider whether BAU and AS capture the <u>full</u> range of plausible futures – do any additional futures or variations that need to be considered
	Coffee will be provided at 15.30	
17.00-18.00	Plenary	<ul style="list-style-type: none"> Questions about the existing scenarios (trends, sources, alternatives etc.) Preliminary reflections on adequacy of existing scenarios. Can we identify other potential storylines? Are important geographical differences likely to emerge? What are the key trends beyond 2025 for each scenario?

Day 2

Time slot	Session	Activities and Issues
09.00-10.00	Introduction	<ul style="list-style-type: none"> • Introduction to causal chain analysis (RHY) • Introduction to accounts and their potential role in scenarios (RHY) • Introduction to cumulative impact analysis (FM)
10.00-11.15	<u>Session 3 (Breakout):</u> Working through the measures of change and uncertainties using indicators and accounts to think about the future	<ul style="list-style-type: none"> • Establish 'sector' groups (we can vote on the priorities for the sectors to be considered) • Each group works through a causal chain analysis and prepares a poster on their sector which is brought to the plenary room.
11.15-11.30	Coffee	
11.30-12.30	<u>Session 4 (Breakout):</u> Refining the storylines: identifying other perspectives, geographical differences (across regions and between CASES) and alternative development paths	<ul style="list-style-type: none"> • Re-establish the scenario groups • Members share experiences and insights gained through sector analysis • Group looks at adequacy of existing scenarios and makes recommendations on alternative/additional trends and storylines etc.
12.30-13.00	Plenary	<ul style="list-style-type: none"> • Review of adequacy and coverage of proposed BAU and AS
13.00-14.00	Lunch	
14.00-14.30	Introduction to wrap-up session	<ul style="list-style-type: none"> • Review purpose of workshop and scenario building
14.30-15.25	<u>Session 5a (Breakout):</u> Reviewing the focal questions, identifying policy implications	<ul style="list-style-type: none"> • Initial scenario groups review their focal questions and revise/add in light of workshop discussions • Groups make draft recommendations for taking regional assessment of issues forward
15.25-15.35	Coffee	
15.35-16.30	<u>Session 5b (Breakout):</u> Reflections on scenarios and regional assessment at CASE level	<ul style="list-style-type: none"> • Groups from around the cases represented at the workshop and members reflect on how workshop outcomes can inform their work with end-users
16.30-17.30	Plenary	<ul style="list-style-type: none"> • General discussion and agreement on recommendations for taking visioning exercise forward and for input into regional assessment

End users and other guests have to opportunity to leave the workshop at the close of day 2

Day 3

Time slot	Session	Activities and Issues
09.00-09.30	Introduction	<ul style="list-style-type: none"> • Introduction and initial de-brief on workshop • Identification of key issues to discuss
09.30-11.15	<u>Session 6a (Breakout):</u> Reflections for the Regional Assessment	<ul style="list-style-type: none"> • Discussion of relevance and role of CASE partners and issues at <u>local</u> scales
11.15-11.30	Coffee	
11.30-12.30	<u>Session 6b (Breakout):</u> Reflections for the Regional Assessment	<ul style="list-style-type: none"> • Discussion of relevance and role of CASE partners and issues at regional scales
12.30-13.30	Lunch	
13.30- 14.00	<u>Session 7 (Plenary):</u> Reflections on implications of 'vision' for data, information capacity building and outreach	<ul style="list-style-type: none"> • Plenary discussion of next steps (BS workshop/Rabat input)
14.00-15.00	<u>Session 8 (Plenary):</u> Finalise Arles Vision Statement	<ul style="list-style-type: none"> • Review and revise text of initial draft of Arles Vision Statement
15.00-15.30	Wrap-up	
15.30	Close and Departure	

3. Workshop Briefing and Preparation

The workshop will involve an intense set of discussions and activities and so it would be valuable if participants could undertake some preliminary thinking and preparation.

We realise that you are all busy people, but if you can spare a little time it will ensure that much more rapid progress can be made. If you have to prioritise then the preparation on the focal questions (b, below) and the scenarios (c) are the most important.

a. The Arles Vision Statement

The purpose of the Arles Vision Statement is to have an identifiable and shared output from the meeting. It will be a short document that can be used to stimulate further discussion about future ICZM strategies at the regional Workshop for the Black Sea. It can potentially feed into the wider discussions at the PEGASO meeting in 2013 in Rabat.

The contents of the Vision Statement will mainly emerge from the workshop discussion and activities. However, it you be useful if you could give some preliminary thought to what it might contain given your experience. To stimulate your thoughts [Appendix 1](#) provides an example of a vision statement developed at an *Ecosystem Services Partnership* (ESP) meeting in 2011. We have deliberately chosen an example that does not deal with coastal zone issues in order not to influence you. The ESP message deals with ecosystem services.

What should an equivalent message contain in relation to the two key issues of ‘balanced use’ and ‘preservation of natural capital’ that are being considered at the workshop? Bring along your thoughts to discuss at the workshop

b. Identifying the focal questions (Preparation for Session 1)

We want to ensure that the workshop discussions are based on the real issues that concern you in relation to the goals of ‘balanced use’ and ‘preservation of natural capital’. To start the discussions off therefore it would be valuable if you could:

- **Task:** Bring along to the workshop some simple, visual materials that illustrate the problems of ‘balanced use’ and ‘preservation of natural capital’ in the coastal zone as you see them. The materials can be postcards, pictures, maps or data – anything that you think will be useful to explain and communicate to others in your group what the issues are as you look forward to the future.
 - *This is the kind of exercise you might do with stakeholders (especially the public) to encourage them to talk about their visions for the future. At the workshop we want to use the material you bring along to build up a **rich picture** of the issues affecting the future of the coastal zone. In the workshop we will use the discussion of these materials to identify a set of **focal questions** that can be explored using scenarios.*

c. Futures of fear and futures of desire (Preparation for Session 2)

One of the reasons that we undertake visioning exercises with stakeholders is to better understand their goals and values, and the kinds of policy and management response that might be needed when planning for the future. The visions can be used in several ways:

- They can be used to build scenarios describing 'desired futures' for the coastal zone that can be discussed critically between stakeholders. These kinds of discussion can be helpful in formulating management or policy goals in a clear way, so that plans can be developed to try to move in the direction that people want.
- Under a different approach, the visions can be used to look at the implications of current trends or other development pathways for the coastal zone that might take us away from where we would like to be. These types of scenarios describing more troubling 'futures of fear or fate' can help us identify the uncertainties and risks that might affect our plans, and think about ways of making our policy or management responses more robust or resilient.

A key aim of the workshop is to allow people to work with scenarios and think about them as a tool in decision making. The time available in the workshop does not allow a full scenario building exercise to be undertaken, but the meeting does allow us to use some existing scenarios to see they can help in planning for the future.

To stimulate thinking in the workshop we will look in detail at two scenarios developed for the Mediterranean Basin by Plan Bleu. They will be giving a briefing on the scenarios at the workshop, but it would also be useful if you could familiarise yourself with some of their key characteristics before the meeting. The Table in Appendix 2 provides a summary, which highlights the contrasts between them using a set of 'cross-cutting issues by sectors':

- The 'Business as Usual' (BAU) is an extrapolation of current trends, which (depending on your perspective!) might be regarded as a future of 'fear or fate'; it describes a development pathway for the Basin that might result if current trends continue.
- The 'Alternative Scenario' (AS) is more of a visionary statement describing the kinds of development that we would need if the goals of ICZM are to be realised.
- **Task:** Of course many different future scenarios could be developed and used in an exercise such as this. The purpose of scenario building is not so much to predict the future but to identify a plausible range of futures that can be useful to us when we are developing management or policy responses. Thus the Plan Bleu scenarios are a good starting point.
 - Review the material for the two scenarios and focussing on the BAU storyline bring along your thoughts on the following questions:
 - Do the trends described in the BAU scenario capture the pressures or things that are driving change that you are dealing with in your work? Can you identify or think of any important variations?
 - How do the descriptions relate to the geographical areas that you are familiar with in your work? Are some of the trends described more important or worrying than others? Should we think about any geographical differences?
 - In terms of the focal questions or issues that you identified earlier, how are regional

pressures likely to affect the outcomes or are local factors more significant?

- This is also the kind of exercise you might do with stakeholders (both experts and the public). By looking at different scenarios we can encourage people to look at their visions more critically, and plan in more effective ways. At the workshop we want to use the scenarios to see how we can use ‘future thinking’ to learn about today. In the workshop we will use the Plan Bleu scenarios as a starting point and look at how they can be refined or whether additional scenarios might be useful to bring out the range of possibilities that might confront us.

A more detailed account of the scenarios can be found in a document prepared by Plan Blue as part of their input to the PEAGO Project, *Building on the Mediterranean Scenario Experiences: Cross-cutting approaches between regional foresight analysis and participatory prospective*.

d. Working through the measures of change and uncertainties (Preparation for Session 3)

If scenarios are to be useful as planning tools then they must help us understand the consequences of the different assumptions we make (or might make) in our decision making. To do this their ‘internal logic’ must be consistent. The logic must be based on our best understanding of how the different drivers of change impact on society and the environment. Thus we need to clear about the cause and effect relationships in the system that is being described by the scenarios (in our case the ‘coastal zone’).

There are many ways of doing this. One widely used framework that can be used is the so-called DPSIR model that seeks to describe the relationship between Drivers, Pressures, States, Impacts and Responses (Figure 2). Some definitions are provided in Table 1.

Figure 2: The DPSIR Model (for definitions see Table 1)

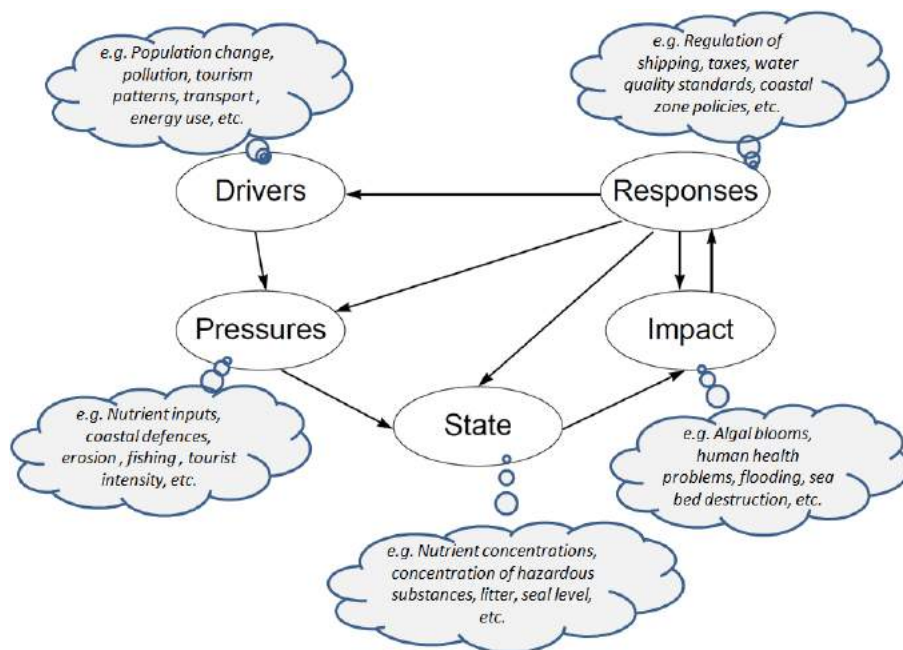


Table 1: Definitions of drivers and pressures and their correspondence within DPSIR and MA frameworks

DPSIR	Millennium Assessment	Others common terminology	Common definition
Drivers or Driving Forces	Indirect drivers	Underlying drivers, stressors, root causes	Refer to fundamental processes in society (primarily demographic, economic, socio-political, scientific and technological) that operate <i>diffusely</i> , often by altering one or more direct drivers. The influence of indirect drivers is established by understanding their effect on direct drivers (Nelson et al., 2005).
Pressures	Direct drivers	Primary drivers, primary causes, stressors.	Refers to physical, biological or chemical processes and social and economic sectors of society that tend to influence <i>directly</i> changes in ecosystem goods and services. A direct driver unequivocally influences ecosystem processes and can therefore be identified and measured to differing degrees of accuracy (Nelson et al., 2005). They include land cover change, climate change, air and water pollution, irrigation, use of fertilizers, harvesting, and the introduction of alien invasive species.

Note: Different areas of study have used different terms to describe how immediate (or close) the actions of the casual factors are to the changes they trigger. In the workshop we will use the DPSIR framework – but others may be more familiar with the terminology used in say, the Millennium Ecosystem Assessment (MA). This Table is taken from PEAGO Project, *Regional Assessment: Identification of multi-scale drivers of change, common threats/pressures, conflicting uses, and root causes*, where further discussion can be found; it also provide the full reference to Nelson et al. (2005).

The DPSIR model was developed as a framework for creating environmental indicators and is used widely. However, it is also as useful framework for making a ‘causal analysis’ that can be used to communicate internal logic on which any set of scenario elements are based.

In Session 3 of the workshop we will can use DPSIR model with the scenarios to make a set of ‘what-if’ analyses for the issues that we think are important, such as those highlighted by our ‘focal questions’.

- **Task:** If you have not used the DPSIR model prepare for the workshop by making sure that you are familiar with the terminology. If you want to go further, use the diagram and definitions above to represent the different elements of the focal questions or issues that you identified in Task 1.
 - Look at the questions that you wrote down, have you identified any drivers or pressures? What states might be changing and have you descried any impacts? Or is you question mainly about responses? Don’t be confined to the examples given in the diagram.
 - If you find the DPSIR model helpful you might like to rephrase you focal questions so that they more clearly capture some of the important cause-effect relationships that need to be considered.
 - Finally, you might like to think of some different assumptions that you could make about the drivers and pressures that relate to you focal questions, because this might help you to see how the assumptions in the different scenarios play themselves out in the future.

A more detailed discussion of how we might analyse the drivers of change can be found in a

document prepared by IOC UNESCO as part of their input to the PEAGO Project, *Regional Assessment: Identification of multi-scale drivers of change, common threats/pressures, conflicting uses, and root causes*.

- This is also the kind of exercise can be quite technical and in scenario building it is probably the kind of thing that you would do with experts rather than the public. However, if people are to have confidence in what scenarios can tell us about the consequences of different future assumptions future, it is necessary to trace impact through from their causes and be able to show that the analysis is based on the best science available. The workshop will enable you to use some of the tools that might be employed.

4. Final Thoughts

As you can see from this set of briefing materials the workshop will be very demanding! However, we hope that it will provide you with the opportunity of sharing you experience with others. We also hope that it will allow the group to develop a clearer understanding of regional issues and differences that might be important in the future, and explore how local case studies can be used to test and build-up a realistic picture of the way our coastal zones are evolving.

5. Further Reading

Burkhard, B.; de Groot, R.; Costanza, R.; Seppelt, R.; Jørgensen, S.E. and M. Potschin (2012): Solutions for Sustaining Natural Capital and Ecosystem Services. *Ecological Indicators* 21: 1-6.

Haines-Young, R. and M. Potschin (2011): Integrated Coastal Zone Management and the Ecosystem Approach. PEGASO Internal Deliverable ID2.1, September 2011, 11 pp. Also available as CEM Working Paper No 7. under: <http://www.nottingham.ac.uk/CEM/WorkingPapers.html>

Morisseau, F.; Nowell, M. and F. Breton (2012): Cumulative Impact Index. A PEGASO concept note. V1.0 (06.03.2012).

also recommended: Benjamin S. Halpern, Carrie V. Kappel, Kimberly A. Selkoe, Fiorenza Micheli, Colin M. Ebert, Caitlin Kontgis, Caitlin M. Crain, Rebecca G. Martone, Christine Shearer, & Sarah J. Teck (2009): Mapping cumulative human impacts to California Current marine ecosystems. *Conservation Letters* 2 138–148

Sanna, S. and J. Le Tellier (2012): Building on the Mediterranean Scenario Experience: Cross-cutting approaches between regional foresight analysis and participatory prospective. PEGASO Project Internal Deliverable ID4.3.3 - Task 4.3 "Scenarios" 26th of October 2012 / V2. In collaboration with Jean-Pierre Giraud and Antoine Lafitte

Santoro, S.; Barbieri, J.; Lescrauwaet, A.-K.; Giraud, J.P. and A. Lafitte (2011): Task 4.1 Indicators: Methodological paper for the selection and application of PEGASO ICZM indicators. PEGASO Draft Deliverable V1.0, 03.11.2011

Santoro, F. and J Barbieri (2012): Task 5.2 Regional Assessment. Identification of multi scale drivers of change, common threats/pressures, conflicting uses, and root causes.

Appendix 1: An example of a vision statement from Burkhardt et al., (2012)

‘Salzau Message’ on Sustaining Ecosystem Services and Natural Capital

The human population of earth is likely to increase to 9 billion people by the end of the century, the global climate is being transformed, biodiversity loss continues, and conventional, fossil-based economies are no longer a viable option. Business as usual is a utopian fantasy. If we are to improve the sustainable well-being of humanity, we need to sustain and restore ecosystem services and natural capital. Stakes are high. The potential for irreversible, negative, outcomes is alarming, and a precautionary approach to decision-making should therefore be adopted.

We, the undersigned, believe that solutions to providing a sustainable and desirable future require broad recognition of the basic facts about ecosystem services and natural capital, and advances in two key areas: (1) integrated measurement, modeling, valuation and decision science; (2) adaptive management and new institutions, including the new Ecosystem Services Partnership discussed below.

Basic Facts about Ecosystem Services and Natural Capital

In recent decades, a shared understanding has emerged about *ecosystem services* and *natural capital*, including:

- Ecosystem services (ES) are the contributions of ecosystems - in combination with other inputs - to human well-being.
- ES, and the natural capital assets that produce them, represent a significant contribution to sustainable human well-being, a contribution that is increasingly being recognized.
- Ecosystems, ecosystem functioning, and ES are being threatened and degraded by human activities, and the situation will be exacerbated by climate change and biodiversity loss. At the same time, knowledge about how to steward and restore ecosystems is rapidly growing.
- An ES approach helps to identify and quantify the ecological and socio-economic trade-offs and synergies on which decision-making should be based.
- Many ecosystem services cannot (or should not) be privately owned. Therefore, they are for the most part ignored by conventional markets.
- Many ES are such that providing benefits to one person does not reduce the amount of benefits available for others (they are “non-rival” and “non-excludable”). They are therefore best treated as “public goods”.
- While tremendous progress has been made in improving our understanding of how ecosystems

function and how humans benefit from them, there will remain enormous uncertainties about how ES are provided, the magnitude of their benefits, and how human activities affect their provision.

- Adaptive Management is an approach that allows one to learn from the system dynamics and manage under this uncertainty.

1. Integrated Measurement, Modeling, Valuation and Decision Science in support of Ecosystem Services:

The scientific community needs to continue to develop better methods to measure, monitor, map, model, and value ecosystem services at multiple scales. Moreover, this information must be provided to decision makers in an appropriate and viable way, to clearly identify differences in outcomes among choices. At the same time, we cannot wait for high levels of certainty and precision to act. We must synergistically continue the process of improvement of measurements with evolving institutions and approaches that can effectively utilize these measurements.

a. Trade-offs

Ecological conflicts arise from two sources: (1) scarcity and restrictions in the amount of ES that can be provided and (2) the distribution of the costs and benefits of the provisioning of the ES. ES science makes trade-offs explicit and, thus, facilitates management and planning discourse. It enables stakeholders to make sound value judgments. ES science thus generates relevant social-ecological knowledge for stakeholders and policy decision makers and sets of planning options that can help resolve social conflicts.

b. Accounting and Assessment

Accounting looks at the flow of processes or materials and is objective, while assessment evaluates a system or process with a goal in mind and is normative. Both are integrating frameworks that have distinctive roles. Both ecosystem service accounting and assessment need to be established and pursued in a broader socio-ecological context. We also need to balance expert and local knowledge across scales.

c. Modeling

We need modeling to synthesize and quantify our understanding of ES and to understand dynamic, spatially explicit trade-offs as part of the larger socio-ecological systems. Further participatory development of integrated, dynamic, spatially explicit models that include ES are needed. These models can incorporate and aid accounting and assessment exercises and link directly with the policy process at multiple time and space scales.

d. Bundling

Most ES are produced as joint products (or bundles) from intact ecosystems. The relative rates of production of each service varies from system-to-system, site-to-site, and time-to-time, but we must consider the full range of services and the characteristics of their bundling in order to prevent creating dysfunctional incentives and to maximize the benefits to society. For example, focusing only on the carbon sequestration service of ecosystems may in some instances reduce the overall value of the full range of ES.

e. Scaling

ES are relevant over a broad range of scales in space, time, and complexity. We need measurement, models, accounts, assessments and policy discussions that address these multiple scales, as well as interactions and hierarchies among them.

2. Adaptive Management and New Institutions for Ecosystem Services:

Given that significant levels of uncertainty always exist in ecosystem service measurement, monitoring, modeling, valuation, and management, we should continuously gather and integrate appropriate information regarding ES, with the goal of learning and adaptive improvement. To do this we should evaluate the impacts of existing systems and design new systems with stakeholder participation as experiments from which we can more effectively quantify performance and learn.

a. Property rights

Given the public goods nature of most ecosystem services, we need institutions that can effectively deal with this characteristic using a more sophisticated suite of property rights regimes. We need institutions that use a balanced combination of existing private property rights systems, and new property rights systems that can *propertize* ecosystems and their services without privatizing them. Systems of payment for ecosystem services (PES) and common asset trusts can be effective elements in these institutions.

b. Scale-matching

The spatial and temporal scale of the institutions to manage ecosystem services must be matched with the scales of the services themselves. Mutually reinforcing institutions at local, regional and global scales over short, medium and long time scales will be required. Institutions should be designed to ensure the flow of information between scales, to take ownership regimes, cultures, and actors into account, and to fully internalize costs and benefits.

c. Distribution Issues

Systems should be designed to ensure inclusion of the poor, since they are more dependent on common property assets like ecosystem services. Free-riding should be prevented and beneficiaries should pay for the services they receive from bio-diverse and productive ecosystems.

d. Information Dissemination

One key limiting factor in sustaining natural capital is shared knowledge of how ecosystems function and how they support human well-being. This can be overcome with targeted educational campaigns, clear dissemination of success and failures directed at both the general public and elected officials and through true collaboration among public, private and government entities.

e. Participation

Relevant stakeholders (local, regional, national, and global) should be engaged in the formulation and implementation of management decisions. Full stakeholder awareness and participation contributes to credible, accepted rules that identify and assign the corresponding responsibilities appropriately, and that can be effectively enforced.

f. Science/Policy Interface

ES concepts can be an effective link between science and policy by making the trade-offs more transparent. An ES framework can therefore be a beneficial *addition* to policy-making institutions and frameworks and to integrating science and policy.

ECOSYSTEM SERVICE PARTNERSHIP

The new Ecosystem Services Partnership (ESP - <http://www.es-partnership.org/>) seeks to enhance this integration by uniting the ecosystem services science and policy community and coordinating collaborative efforts on a global, national and local level. It aims to enhance and encourage a diversity of approaches, where needed, while reducing unnecessary duplication of effort in the conceptualization and application of ecosystem services. By increasing efficiency, and promoting better practice, the ESP aims to increase the effectiveness of ES science, policy, and applications.

Signed by:

(see published version)

Appendix 2: Table: Summary of scenarios (by a cross-cutting approach and by issue) detailed in the text of the PEGASO ID4.3.3 drafted by Plan Bleu (October 2012)

	« Business as Usual » scenario	Alternative scenario
Cross-cutting view	<ul style="list-style-type: none"> – Growing vulnerability to natural hazards because of an intensification of global warming (less than 1°C by 2025) and an increase of extreme climatic events in the Mediterranean area. – EU will strengthen its presence in the Mediterranean by the accession of five coastal States (Albania, Bosnia-Herzegovina, Croatia, Montenegro, and Turkey) and by the improvement Euro-Mediterranean cooperation. – Economic growth remains uncertain by 2025, but Euro-Mediterranean economic interdependencies are likely to increase. – Environmental policies: they will keep remaining basically top-down, corrective, and regulatory instead of participatory. 	<ul style="list-style-type: none"> – More efficient management of natural resources on the basis of sustainable consumption patterns. – Process of economic and social convergence in SEMCs with the European countries that takes place in the form of integration of production systems through the development of a Mediterranean network of synergies and collaboration. – Euro-Mediterranean integration: establishment of the four EU freedoms (persons, goods, services and capitals), access to the European domestic market and standardized norms allowing the emergence of a regional preference system. – New impetus to trade flows from the Middle East and the Maghreb to the European countries and the Gulf countries.
Demography	<ul style="list-style-type: none"> – Fertility rates in the SEMCs will converge towards levels of NMCs. – Demographic growth rates in the NMCs slacken. – Accentuation of differences in the age structure between the SEMCs and the NMCs. – Demographic growth in the SEMCs will determine increased demand for labour, for higher educational facilities, for housing, water, energy, transport... 	<ul style="list-style-type: none"> – The expansion of the labour market favoured by the regional integration process will limit the migration of qualified workers from the SEMCs. – Countries such as Algeria, Croatia, Serbia, Tunisia, and Turkey will stop being countries of emigration and will become one of the main Mediterranean destinations of migration.

	« Business as Usual » scenario	Alternative scenario
Coastal development	<ul style="list-style-type: none"> – Increase in urbanization in coastal areas because of the increase of population and because of the doubling of tourist flows. – Coastal overdevelopment, sprawl of large conurbations and saturation of coastal areas, together with an enormous increase in transports will not only worsen degradation of biodiversity but will increase natural and social risks in nearly 50% of the coastline. – Degradation of coastal environment because of the global warming (increased submersion of lower lying coasts, particularly deltas, lagoon coastlines, marine marshes, mangroves, coral reefs and certain islands; accelerated cliff and beach erosion; increased salinity in the estuaries). 	<ul style="list-style-type: none"> – Sustainable management of the Mediterranean natural and cultural coastal heritage thanks to the implementation of policies aiming at the protection of ecosystems, at ensuring a quality environment for local populations and at the development of sustainable tourism. – Strategic urban planning through multilevel cooperation (cities, regions, States).
Urbanization	<ul style="list-style-type: none"> – The considerable increase of urban population (expected to amount to 220 million in 2025 against 151 million in 2005) – A raise of urbanization of coastal regions (one third of the urban population in 2025 will focus right on the Mediterranean coasts) – Wild urbanization in SEMCs will limit access to water, sanitation, and other basic facilities to urban-dwellers – In SEMCs waste production levels will increase. – Losses of agricultural land contributing to extending artificial land cover 	<ul style="list-style-type: none"> – Sustainable urban development based on urban regeneration, on urban renewal, on the promotion of Mediterranean cultural heritage – Integration of transport and urban planning, protection of farmland and natural areas, creation of green areas, promotion of hinterland tourism and urban tourism, improvement of maritime and rail transport – Reduction of total waste production in Mediterranean countries – Amelioration of participatory process and improvement of Euro-Mediterranean cooperation (at local level and national level) in governance of urban development
Tourism	(Only drivers and current trends) <ul style="list-style-type: none"> – The market share of Mediterranean destinations in total tourist arrivals worldwide will decrease slightly from 32% in 2010 to 28% in 2030. – Sharp increase in touristic flows towards Balkans and the Middle East (Turkey) forecast to become the new main important destinations in the area. – Environmental pressures coming from tourism on landscapes, biodiversity, and quality of the urban environment and natural resources quality are expected to grow. – Problems related to drinking water quantity and quality, seawater quality, energy consumption, and noise could seriously affect those areas which are expected to face a growth in touristic arrivals. 	
Cruise sector	(Only drivers and current trends) <ul style="list-style-type: none"> – Cruise tourism sector has high growth potential in Mediterranean Sea. If one focuses on the five-yearly rate of change over the past 25 years, cruises increased by only 3% between 1985 and 1990, then fell sharply (by 45%) between 1990 and 1995, before experiencing 15 years of rapid growth (106% between 1995 and 2000, 55% between 2000 and 2005 and 57% between 2005 and 2009). 	

	« Business as Usual » scenario	Alternative scenario
	<ul style="list-style-type: none"> – Greece, Italy, Spain, France are the major Mediterranean cruise destinations. – In Italy and France the cruise segment has high added value compared with the tourism sector in general. In Italy, cruises generate, per night, four times more revenue than tourism (over €800 per night compared to over €200 for tourism in general) and in France, the ratio is six to one (about €600 for cruises and €100 for tourism in general). – 35% of Mediterranean ports that receive cruises are Italian and 34% are Greek, pointing to an almost identical number of ports in both countries. In contrast, 63% of ports of departure are located in Italy (France comes in 2nd place with 13%) and 42% of ports of call are in Greece (Italy 2nd with 28%). – In order for the cruise industry to stimulate regional development, countries must combine cruise ship production with a high ratio of ports of departure to ports of call and a considerable number of overnight stays. In the Mediterranean, only Italy manages to combine these different factors. – Inability of the dominant model of Mediterranean tourism development to meet sustainable tourism objectives because of an inefficient governance of tourism on the international, national and local scales. 	
Marine and Coastal Protected Areas (MCPA)	<ul style="list-style-type: none"> – The 2010 Aichi target of protecting 10% of Marine and Coastal Areas by 2020 is currently far from being achieved in this region. – Slight increase in the protected surface, along with a stagnation, or even decline, of the budgets of existing MCPA, sometimes leading to an abandonment of some MCPA that are generally perceived as obstacles to local economic growth. 	<ul style="list-style-type: none"> – Awareness raising on local benefits brought by MCPA leading to easier local acceptance, a deeper implication of local stakeholders in MCPA management including compensatory measures for the sectors that are negatively affected, and eventually the multiplication of MCPA until the Aichi target is reached.
Water resources	<ul style="list-style-type: none"> – Climate change, reduced rainfall, excessive pressure on water resources, and reduction of renewable water resources will result in a substantial water shortage affecting almost 290 million people in the SEMCs. – Aquatic ecosystems, providing procurement services and regulation as wetlands (natural purification and filtration of water) will be increasingly at risk because of urbanization, particularly on the coasts. – In terms of management policy for the water supply, implementation of desalination or wastewater reuse techniques is coming increasingly to meet the more and more growing demand. – Development of new forms of water production: desalinization of sea water or brackish water. 	<ul style="list-style-type: none"> – Improved water demand management: water savings. – Implementation of sustainable policies able to promote improved water and soil conservation, and increased recourse to the artificial replenishment of water tables in arid areas.

	« Business as Usual » scenario	Alternative scenario
Energy	<ul style="list-style-type: none"> – Primary energy demand in the Mediterranean will grow over the next few years because of high demographic growth combined with rapid urbanization and major socio-economic development needs. – The increase in energy demand will be more pronounced in Southern Mediterranean countries in parallel with their demographic and economic growth. – The energetic infrastructure of the SEMCs is developing fast and the construction sector is expected to double by 2030. – The Mediterranean energy mix will still be dominated by fossil fuels and the region will enter the natural gas era from 2020. – The power generation industry will continue to expand. – Renewable energies will grow strongly, by the equivalent of two Mediterranean Solar Plans by 2020 and two others between 2020 and 2030. – Energy efficiency offers significant and attainable potential and is a priority. – Environmental challenges exacerbated: climate change, interaction with water resources. – Energy dependence could thus hit 40% by 2030, which would exacerbate tension around the security of supply. 	<ul style="list-style-type: none"> – Sustainable and efficient use of energy resources thanks to a rapid improvement in use of renewable energies: solar, wind, geo-thermal energy and hydroelectricity. – Thanks to a reduction of 18% in energy dependency (compared with 38% in the trend scenario) and of 860 million tons less of CO₂ in greenhouse gas emissions the new trend will take to the creation of numerous jobs in the innovative sectors of the 'post-oil' era.
Transports	<ul style="list-style-type: none"> – Massive growth of transport by 2025: a 2.6 fold increase in land freight traffic, 3.7 fold in maritime freight traffic, and a virtually two-fold increase in passenger traffic. Impacts on environment are dramatic because of the raise of congestion, noise pollution, greenhouse gas emission and local pollution. 	<ul style="list-style-type: none"> – The intermodal rail transportation system and maritime reach up 20% of the mode of transportation choices: that means a limitation of the road primacy. – Extended and stricter implementation of rules to combat pollution from ships. – Sustainable policies aiming at guaranteeing efficiency will need to be adopted at all governance levels: Euro- Mediterranean, national, regional, and local.

	« Business as Usual » scenario	Alternative scenario
Maritime transports	<ul style="list-style-type: none"> – Mediterranean basin as the main transit area for trade flows between Asia and Europe. – Economic growth gives new impetus to the mass movement of goods. – Greater flow of investment in port and logistics platforms. – Governments envision scale-ups and construction of deep water ports. – Increase by a factor of 2.2 over twenty-year container handling capacity. 	<ul style="list-style-type: none"> – Significant investments in ports and the support of proactive public policies in terms of the development of rail transport: connections to ports, logistics platforms, and institutional reform. – Leading groups hold control over logistic chains. – Development of logistic platforms connected to the railway would reduce the pressure on coastal and ease road congestion. – Intra-Mediterranean exchanges remain quite low with respect to exchanges with Asia and do not alter the status of the Mediterranean as a “transit sea”. – Proactive policies help multiply railway traffic by facilitating good connection of the ports with the railway network.
Agriculture	<ul style="list-style-type: none"> – Increasingly problem of water shortage, desertification, increase of population, not-planned urbanization and enhancement of tourism will threaten Euro-Mediterranean agriculture. – Maintaining or enhancing desertification and rural poverty in SEMCs. – Growing vulnerability to the risk of fires and floods. – Irreversible loss of biodiversity. – Weakening of family farming. – Fluctuations of agricultural products prices. 	<ul style="list-style-type: none"> – Agricultural competitiveness increases. – Modernized crops subsistence farming. – Development of little and medium agriculture. – Promotion of high quality food products, corresponding to the Mediterranean cultural and gastronomic traditions.
Fisheries	<ul style="list-style-type: none"> – Widespread overexploitation of living marine resources. – Economic and demographic drivers will provoke an increase in intensive fish farming (aquaculture) and in fishing activity. – Development of new techniques and increase in boat size will determine ever more acute fishing pressure with increasing risks for environment and especially for some major fish species (e. g. Red tuna). 	

Appendix 4

Structure of the Rabat Workshop

Workshop Programme and Briefing

The workshop took place on days 3 & 4 of the 3rd Annual Meeting. Only the programmes for those days are provided here.

Day 3 – Thursday 21 st of March 2013 Pegaso partners and end users workshop		
09:00 - 10:30	09:00- 10:00	Session with the Pegaso partners and the end users to present them the Pegaso achievements Chair: Françoise Breton
	10:00- 10:30	Introduction to the WS Denis Bailly
Implementing ICZM - exploring the barriers, opportunities and options		
11:00 - 13:00	11:00 -13:00	Exercise part 1: Causal network exercise with the focus on balanced urban development and natural capital conservation
	13:00	Lunch break
14:00 -17:30	14:00 -14:15	Briefing Roy Haines-Young
	4:15 -16:30	Exercise part 2: Use networks to explore impacts of different stressors
	6:30-17:30	Review and questionnaire; Introduction Roy Haines-Young
Day 4 – Friday 22 nd of March 2013		
09:00-13:00	09:00 -10:30	Presentation of the Questionnaire Results and the Bayesian Belief Network tool (BBN) by Roy Haines-Young
	11:00 -12:30	What if" discussion based on network design and questionnaire results Chair: Denis Bailly
	12:30 -13:00	Wrap up and introduce the longer process of the network exercise in Pegaso Closure of the workshop
	14:00 -16:00	BBN Surgery Session hosted by UNOTT

BRIFING FOR WORKSHOP MODERATORS, Rabat, March 2013

Thursday, 22ND MARCH

Exercise Part 1 (11.00-13.00): The aim here is to get people to discuss the relationship between the pre-defined variables that affect 'balanced urban development' and 'integrity of natural capital', and up to 12 major influences (Table 1 – you can share this with the group). We will then ask them to identify the wider pressures or drivers that affect these variables – say up to 6. We will allow them no more than 20 arrows to indicate all the relationships. UNOTT will organise the materials.

- This work will require people in groups of 5-6. We can split by language groups, but otherwise should attempt to have the same mix of expertise, experience, gender etc. in each group. There should be no attempt to split the BS and MED.
- The groups will work on flip-chart paper as a base and organise their ideas using cards which can be stuck on when the final influence diagram is agreed in the group. PLEASE MAKE SURE THE FINAL DIAGRAM IS FIXED TO THE PAPER SO WE CAN PHOTOGRAPH IT. PUT THE MODERATORS NAME ONTO THE PAPER.
- For each influencing variable groups should:
 - a. Indicate how strong, relative to the others, their influence is.
 - b. How they would measure these influencing variables (possible indicators?)
 - c. Groups should record on the yellow sheets which geographical factors may affect the strength of influence of the different variables.
- For the findings a-c groups should record their thoughts on the feedback sheet that can be fixed to the poster.

Exercise Part2 (14.00-16.30): The aim here is to use the diagram constructed in the morning to identify which influencing variable can be controlled under the 'best-' and 'worse-case' scenarios.

NOTE: the best and worse case scenarios define themselves by what people think is significant and what people think is controllable or not. **By controllable we mean that policy or management interventions can achieve outcomes that are positive given the aims of ICZM.**

- This work will require people to be in the same groups as the morning. Use the template in Figure 1 to draw up a grid on the large sheet of flip chart paper for the group to work on. Use Post-It stickers to locate the variables on the grid according to whether they are controllable or not under the best and worst case scenarios. This will enable people to move the variables around and have a discussion.
- For each scenario the groups will be asked to provide on the feedback sheets:
 - a. Findings in a table that lists for each influencing variable whether it is controllable or uncontrollable under each scenario.
 - b. Summaries (three bullet points) on the distinctive features of the best and worst case scenario. For example you might ask what variables are 'barriers' and which are 'enablers' in different contexts.
 - c. Notes on any important geographical differences in the degree to which the influencing variables are controllable in different places.
 - d. Groups should consider the implications for management/future strategies of those factors that change from controllable to uncontrollable under the two scenarios and record these on the feedback sheets.

Final Session Day 1 (16.30-17.30):

The group work should last 1.5 hours, and the final part should be taken up with:

- A tour of the tables to look at what other groups did (40 minutes)
- People starting to fill in the questionnaire (RHHY can introduce the structure and purpose of this to kick it off) (5 minutes)
- Immediate general feedback and discussion (45 minutes)

Tour of the other tables: People should be encouraged to review the work of other tables. One from each group to remain behind to explain what has gone on and what was concluded at each table. People can take this duty in turn so that everybody has a chance to look at the other groups.

Questionnaire

During the period when people are moving about they can also start to fill in the questionnaire. There will be a short briefing session to orientate people about the aims of the questionnaire. Basically the exercises undertaken in the workshop maps on to the questionnaire and will ensure that people are sufficiently familiar with the concepts for them to fill it in quickly. **Emphasise that people can use their judgement when answering the questionnaire and don't have to base their answers on what their groups did.**

The answers to Q13 will be more general than the others and illustrate the kinds of thing the 'Pegaso Platform' might do to develop a shared understanding or view.

- We will ask people to complete the questionnaire by 20.00 via the internet
- Paper copies will be available as backup (only use if instructed)
- HOWEVER, IT IS ESSENTIAL THAT WE HAVE THE INTERNET/COMPUTERS AVAILABLE. Could facilitators help here?
- The questionnaire is at: https://www.surveymonkey.com/s/Rabat_Workshop_Questionnaire

Friday, 22nd March

09.00-10.30: DB to introduce aims of session and UNOTT to provide overview of BBN approach and feedback on results of questionnaire etc.

- UNOTT will e-mail the calibrated BBN to facilitators for morning session.

Exercise Part3 (11.00-12.30): The aim of this session will be to review the influence diagram from yesterday on basis of the BBN provided, and to explore Day 1 scenarios using the pre-cooked BBN that has been calibrated using the questionnaire.

- This work will require people in the same groups as the previous day.
- Report back via feedback sheets up to three new/additional insights gained from BBN about the scenarios, facilitators should have this on their lap-tops to show effects of changing inputs.
- Also report back on the feedback sheets discussion of:
 - a. Role of such work in decision making
 - b. The contribution that such work might have in developing national and/or local Action Plans for ICZM

12.30-13.00: DB to lead wrap-up session.

Appendix 5

Output from the Rabat Workshop

Rank	Group	Influencing variable	Best Case Scenario	Worst Case Scenario
1	2	Balanced economic activities	Uncontrollable	Uncontrollable
2	2	Population density	Uncontrollable	Uncontrollable
3	2	Spatial planning	Controllable	Uncontrollable
4	2	Waste management	Controllable	Controllable
5	2	Quality of urban services	Controllable	Uncontrollable
6	2	Artificialization of the coast	Controllable	Uncontrollable
7	2	Percentage of protected areas	Controllable	Controllable
8	2	Quality of ecosystems	Controllable	Uncontrollable
9	2	Pollution	Controllable	Uncontrollable
10	2	Invasive species	Controllable	Uncontrollable
11	2	Ecosystem services	Controllable	Uncontrollable
12	3	Economic Activity	Uncontrollable	Uncontrollable
13	3	Social Needs	Uncontrollable	Uncontrollable
14	3	Accessibility	Controllable	Controllable
15	3	Fragmentation	Controllable	Uncontrollable
16	3	Law Enforcement	Controllable	Uncontrollable
17	3	Communication	Controllable	Uncontrollable
18	3	Waste Management	Controllable	Uncontrollable
19	3	Sustainable Use Of Natural Capital	Controllable	Controllable
20	3	Oil And Gas Extraction	Controllable	Controllable
21	3	Protection Of Biodiversity	Controllable	Uncontrollable
22	3	Landscape Change	Controllable	Controllable
23	1	Ecological Restoration	Controllable	Uncontrollable
24	1	Efficient Waste Disposal	Controllable	Uncontrollable
25	1	Efficient Water Management	Controllable	Uncontrollable
26	1	Demographyc Pressure	Controllable	Controllable
27	1	Job Opportunities	Controllable	Controllable
28	1	Urban Planning	Controllable	Uncontrollable
29	1	Infrastructure	Controllable	Controllable
30	1	Urban Policies	Controllable	Uncontrollable
31	1	Biodiversity Conservation	Controllable	Uncontrollable
32	1	Economic Orientation	Uncontrollable	Uncontrollable
33	5	Destruction Of Natural Capital	Controllable	Uncontrollable
34	5	Intensity Of Damaging Activities In The Coastal Areas	Uncontrollable	Uncontrollable
35	5	Human Pressure On Natural Capital	Controllable	Uncontrollable
36	5	Delineated And Managed Protected Marine Areas	Controllable	Controllable
37	5	Principle Of Compensation For Destruction Of Natural Capital	Controllable	Controllable
38	5	Intensity Of Economic Activities In Coastal Zones	Controllable	Uncontrollable
39	5	Extension Of Coastal Set Back	Controllable	Controllable
40	5	Demography	Controllable	Controllable
41	5	Territorial Resources	Controllable	Uncontrollable
42	5	Policy Planning	Controllable	Uncontrollable
43	5	State Of The Economy	Controllable	Uncontrollable
44	4	Regulation Enforcement	Controllable	Uncontrollable
45	4	Education Awareness	Controllable	Uncontrollable
46	4	Human pressure on natural capital	Controllable	Uncontrollable
47	4	Delineated and managed protected marine areas	Controllable	Uncontrollable
48	4	Principle of compensation for destruction of natural capital	Controllable	Uncontrollable
49	4	Intensity of economic activities in coastal zones	Controllable	Uncontrollable
50	4	Extension of coastal set back	Controllable	Uncontrollable
51	4	Urban development on agricultural land	Controllable	Uncontrollable
52	4	Non –coastal related development in coastal zones	Controllable	Uncontrollable
53	4	Intensifying use of already existing urban areas	Controllable	Uncontrollable
54	4	Human development in pristine areas	Controllable	Uncontrollable
55	7	Demography	Uncontrollable	Uncontrollable
56	7	Policy planning	Controllable	Controllable
57	7	State of the economy	Controllable	Controllable
58	7	Regulation enforcement	Controllable	Controllable
59	7	Education awareness	Controllable	Uncontrollable
60	7	Territorial resources	Controllable	Uncontrollable
61	6	Extent of coastal set back	Controllable	Controllable
62	6	Linear urban development	Controllable	Controllable
63	6	Political decisions over area development	Controllable	Uncontrollable
64	6	Local domestic product	Controllable	Controllable/Uncontrollable
65	6	Economic activity	Controllable	Controllable
66	6	MPAs and artificial reefs	Controllable	Controllable/Uncontrollable
67	6	Water use	Controllable	Controllable
68	6	Human impact on ecosystems	Controllable	Controllable
69	6	Coastal maintenance	Controllable	Controllable
70	6	Waste management	Controllable	Controllable
71	6	Coastal erosion	Controllable	Controllable
72	6	Natural hazzards	Uncontrollable	Uncontrollable
73	6	Flooding	Controllable	Uncontrollable
74	6	Biodiversity	Controllable	Uncontrollable

Appendix 6

Scenario Fact Sheet

WP4 Multi-scale tools, Methods and Models for Integrated Assessment	Final publishable summary factsheet
Task 4.3 “Scenarios”	
<p>Main S&T results</p> <p>Work performed: We have taken stock of existing scenario studies and assessed their relevance for thinking about the future of ICZM in the Mediterranean and Black Sea Basins. In addition, we have developed and tested participatory scenario tools designed to help people identify the barriers and opportunities for achieving the key ICZM goals of ‘balanced urban development’ and the ‘preservation of natural capital’. The tools developed have used Causal Chain Analysis and Bayesian Belief Networks to represent and explore the interrelationships between the direct and indirect drivers of change and their impacts in the coastal zone.</p> <p>Key Activities: On the basis of our review of the ‘state of the art’ for scenarios and ICZM issues, we have initiated a series of workshops designed to allow members of the PEGASO Consortium and the End-User Community to discuss the future barriers and opportunities facing those concerned with implementing integrated approaches to coastal zone management. These meetings have enabled us to prioritise what are thought to be the major barriers to progress, and begin identify strategies for overcoming them. These activities have also given us insights into when and where participatory scenario methods are most usefully applied, and where their application is more difficult.</p> <p>Main Results Achieved: In the context of taking ICZM thinking forward, we found that it is important for people to understand the difference between visioning methods and scenario techniques more widely. In terms of a vision for the future, it was found that the most useful starting point for discussion for both sea basins are the ‘ICZM principles’ themselves. These principles can be used to represent a normative scenario storyline for the future, which describes the set of policy and management aspirations that are needed to achieve sustainable development. If accepted ICZM principles are used in this way to create a normative scenario, participatory scenario tools can then be used effectively to look at the feasibility of achieving such a vision under different assumptions about the major drivers and pressures.</p> <p>The workshops also help in the thinking about the “integrated Assessment” for the Mediterranean and black Sea Basins which output is shown through Task 5.2.</p> <p>Lessons Learned: While participatory scenario methods can be effective in building shared understandings and visions, they are time consuming to apply. They also require considerable preparatory work, so that stakeholders have sufficient information and understanding to apply the methods effectively. These issues are especially critical at local scales. Nevertheless, there is a prospect of overcoming some of these barriers by further developing internet-based resources. The participatory workshops undertaken during PEGASO showed that on-line questionnaires can be used to support causal chain analysis and the construction of Bayesian Belief Networks. We also found that the time-scales over which decision makers wanted to look to the future were much shorter (15-20 years) than most published scenario studies (circa 50 years). The difference between thinking about plausible (possible) futures and projections of what <i>will</i> happen given current trends and conditions must constantly be clarified in this kind of work.</p>	

Proposed Follow-up Action: We have identified some key actions for the Governance Platform in relation to taking scenario thinking forward. In addition to further capacity building and training in futures thinking, the Platform could usefully undertake a wider consultation on the impact of the different drivers and barriers in different geographical locations. Such work would allow more effective integration with the results achieved for the ICZM indicators and environmental accounting. These activities could exploit the internet tools that have begun to be developed in PEGASO, and create a more interactive approach to scenario building at regional scales. Such work could also usefully support further modelling exercises such as that undertaken for the issue of sea-level rise and land use impacts in Greece.

Potential impact and use of final results

Scientific Impact: The development and application of BBN tools for participatory scenario construction. In addition scenario development was undertaken at local scales in some of the PEGASO Cases. The work looked at such issues as future sea level rise in Greek Cyclades and the subsequent effects on coastal zone and its socio-economic consequences. The Bouches du Rhône CASE in France also demonstrated the importance of including local stakeholders in the development process to ensure acceptance of the scientific tools for the ICZM that have been developed in PEGASO, and hence the perennity of the outcomes.

Societal and Economic Impact: Better understanding of scenario methods in the user community, linkage of futures thinking to ICZM principles and indicators. Using a participative approach for the territorial diagnostic analysis and ecosystem accounting, the work in the Bouches du Rhône achieved an open dialogue between scientists and local stakeholders. This dialogue was successful in creating tools that will be useful to the management of the coastal region after the end of the PEGASO project.

Further information and contacts

Links to wiki articles:

- [http://www.pegasoproject.eu/wiki/Scenarios_\(PEGASO\)](http://www.pegasoproject.eu/wiki/Scenarios_(PEGASO))
- http://www.pegasoproject.eu/wiki/Scenario_testing
- <http://www.pegasoproject.eu/wiki/Scenarios>

Contact: Task leader: Marion.Potschin@Nottingham.ac.uk (UNOTT, P9)

PEGASO Partners involved in Task 4.3: Plan Bleu (P3), VLIZ (P10), UNIVE (P11), JRC (P12), HCMC (P14), NIOF (P19), UOB (P20), MHI (P21, deputy task lead), TdV (P23)

Publications

Guelmami, A., Ernoul L. and E. Le Gentil (2013): Application of ICZM tools: Experience from the French PEGASO study site. Global Congress on Integrated Coastal Management: Lessons Learned to Address New Challenges. 30 October – 03 November 2013, Marmaris, Turkey.

Liquete, C.; Zulian, G.; Delgado, I.; Stips, A. and J. Maes (2013): Assessment of coastal protection as an ecosystem service in Europe. *Ecological Indicators* **30**: 205-217.

Macias D, Garcia-Gorritz E, Stips A (2013) Understanding the Causes of Recent Warming of Mediterranean Waters. How Much Could Be Attributed to Climate Change? *PLoS ONE* **8(11)**: e81591. doi:10.1371/journal.pone.0081591

Sanna, S. and J. Le Tellier (2012): Building on Mediterranean Scenario Experiences. Cross-cutting approaches between regional foresight analysis and participatory prospective. PEGASO project (EU - FP7), Internal Deliverable ID4.3.3. Pdf available at: http://planbleu.org/sites/default/files/publications/pegaso_scenarios_planbleu_0.pdf

University of Nottingham (2014): Scenarios Tools for ICZM: Lessons and Applications'. Deliverable D4.3, available from PEGASO website from February 2014.

Appendix 7

Scenario – WIKI reference

WP4. Multi-scale tools, methods and models for integrated assessment
Task 4.3. SCENARIOS

Tool Fact Sheet

Tool: Scenarios

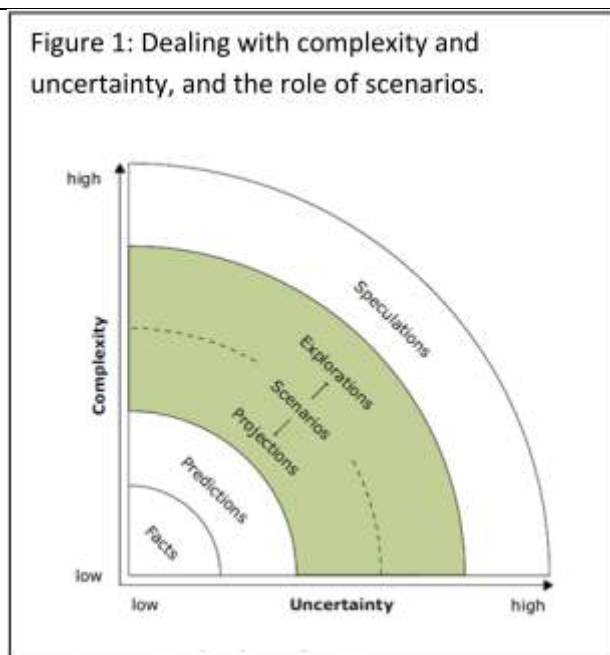


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Scenarios are “sets of plausible stories, supported with data and simulations, about how the future might unfold from current conditions under alternative human choices” (Polasky et al., 2011).



What are scenarios?

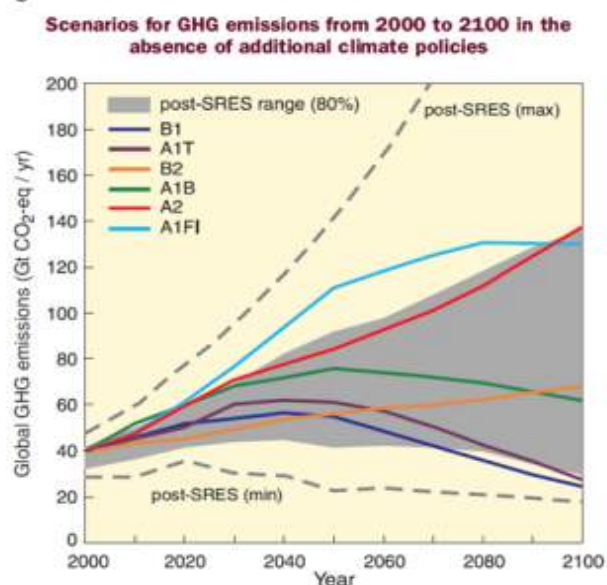
Scenarios have become important management and policy support tools. Broadly their purpose is to allow decision makers to think through the implications of different assumptions about the ways ecosystems might respond to different drivers of change (Ash et al., 2011; Alcamo, 2010). This is of course a difficult task because in practice it is very hard to make predictions about the future for anything other than simple, well behaved systems. Scenario thinking is therefore intended to help us cope with more complex situations involving a high degree of uncertainty (EEA, 2007) (Figure 1). As this figure suggests they sit in the ‘middle ground’ between ‘hard facts’ and robust predictions, on the one hand, and mere speculation on the other. Polasky et al. (2011) have suggested that one way to think about scenario methods is that they provide us with tools to help us think creatively about the future. Many other commentators

have made a similar point and suggested that in this context we must accept that there is no one way in which they might be used. Zurek and Henrichs (2007) for example, have argued that scenarios can be employed to:

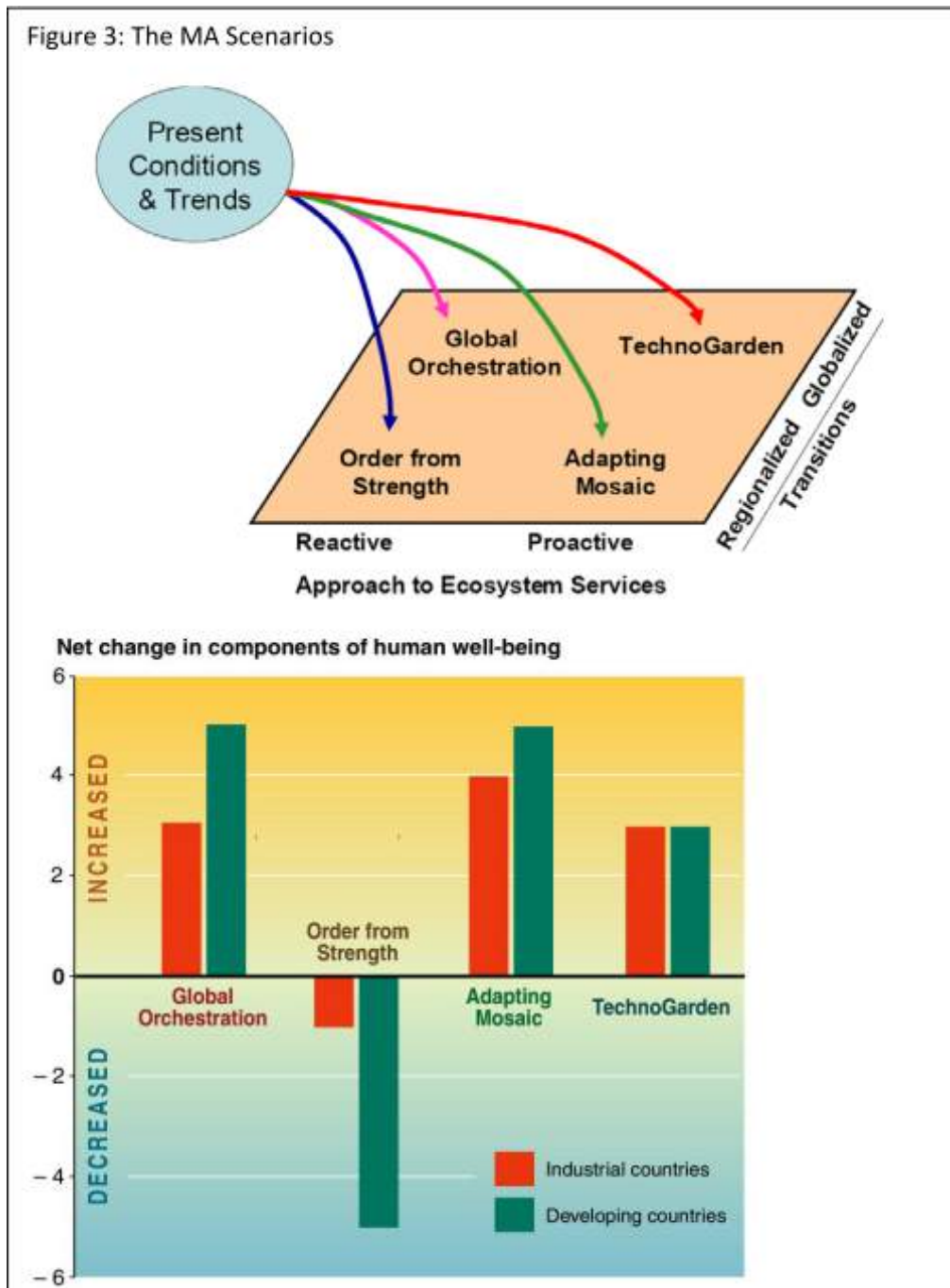
- Help structure choices that we need to make by revealing their possible long-term consequences.
- Support strategic planning and decision-making by providing a platform for thinking through the implications of various options in the face of future uncertainties.
- Helping to facilitate stakeholder participation in the strategic development process — by allowing them to voice of conflicting opinions and world views.

There are many examples of the use of scenarios. Some of the most widely discussed are those dealing with future climate change. The Special Report on Emissions Scenarios (SRES) of the Intergovernmental Panel on Climate Change (IPCC), developed six potential futures, based on different assumptions about economic growth, population change, technological change, and cultural and social factors (Nakicenovic et al., 2000) (Figure 2).

Figure 2: The IPCC SRES Scenarios



Other notable studies include the Millennium Ecosystem Assessment (MA, 2005). The latter developed four scenarios describing alternative, global ecosystem futures based on different approaches to managing ecosystem services (proactive vs reactive) at different spatial scales (global vs regional). The scenarios made very different projections for human well-being as it relates to ecosystem services in developed and developing societies (Figure 3).



Current Approaches to Developing Scenarios

Although scenario methods have been widely applied, their use and in particular how we might evaluate their effectiveness is still being actively discussed. On balance, the literature suggests that there is no single approach that is acceptable to all situations. This has come about because as Bradfield et al. (2005) observe, many different terms have been used in association with the scenario concept, such as 'planning', 'thinking', 'forecasting', 'analysis' and 'learning' are all of which variously used in describing the different motives for using scenario tools. The tension between the 'forecasting' and 'learning' perspectives is particularly important to

consider, and it is one that has recurred throughout the discussions about the way scenarios might be used in Pegaso.

When scenarios are used to make forecasts, or projections about the future, the work generally represents scenarios as distinct 'products'. Thus for Polasky et al. (2011) scenarios are essentially: "sets of plausible stories, supported with data and simulations, about how the future might unfold from current conditions under alternative human choices". This kind of application is illustrated by the SRES and MA studies described above. In these studies the scenarios are 'products' in that they are well defined, general in character and capable of being taken by others and applied in different situations. Looked at in this way, scenarios are essentially quantitative or qualitative modelling exercises. Although this is a legitimate use of scenarios, other commentators have argued that scenario building can be valuable in other ways. Most importantly they suggest it can be used to facilitate social learning.

O'Neill et al. (2008) have described what they see as a 'process-perspective' on scenarios, which emphasises the importance of them as a way of encouraging social learning within and between diverse groups. The scenario building exercise can, they suggest, help to find synergies between different viewpoints, of consensus building, and of developing shared responsibilities for problem solving. From this perspective, the scenarios products themselves are perhaps less important than the dialogue generated in their production, and the legacy that those dialogues leave. Looked at in this way, scenarios are firmly part of capacity building and training, and have strong links to the use of participatory processes.

Taking Scenarios forward in Pegaso

In looking to the way scenarios might be used in Pegaso, it is important to note that there is no single 'right way' but that a different approach might be appropriate in different situations. Thus it is apparent that there are many global or regional studies that have already developed scenarios that should be discussed and updated and even extended within Pegaso. One such study is Plan Bleu's *Sustainable Development Outlook for the Mediterranean*, which has attempted to look at development frameworks through to 2025. Another example is the set of scenarios for the Black Sea, developed by the enviroGRIDS Project (enviroGRIDS, 2012). As part of the scenario work in Pegaso we will be looking at these and other scenario studies and making a review of their relevance and implications in the content of ICZM issues in the Mediterranean and Black Sea Basins.

The review of existing scenario studies and their development for helping us to understand ICZM issues could be part of the Pegaso Platform, and used by people and organisations to stimulate debate about future management and policy options.

In addition, so as to support the work on participatory methods within Pegaso, more interactive scenario tools will be looked at. These include the participatory methods developed in Plan Bleu's Imagine initiative. Imagine allows us to work with stakeholders at more local scales to explore questions about desired futures by using **indicators** and discussing **limits** of acceptable change. We will also be looking at how Bayesian Belief networks can be used to construct scenarios using participatory methods.

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Also see CEM working papers at www.nottingham.ac.uk/CEM/

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