Proposal title:
Interaction in coastal waters: A roadmap to sustainable integration of aquaculture and fisheries

Proposal acronym: **COEXIST**

Type of funding scheme: **Collaborative project, small or medium scale focused research project**

Call: **FP7-KBBE-2009-3**
Work programme topic addressed: **KBBE-2009-3-1-2-15: Sustainable use of seas and oceans: integration of aquaculture and fisheries in the coastal zone**

Name of Coordinating person: **Øivind Bergh**

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Table of Contents

1. Scientific and/or technical quality, relevant to the topics addressed by the call

1.1. Concept and objectives

Coastal areas are subject to an increase in competing activities and protection (Natura 2000, Marine Strategy Directive) and are a source of potential conflict for space allocation. The maintenance and/or, the development of small scale coastal fisheries and aquaculture are highly dependent on the availability and accessibility of appropriate sites. Activities include not only fisheries and aquaculture, but also tourism, wind farms, Marine Protected Areas (MPAs) etc. There is good reason to believe that the competition for such sites will increase, emphasizing the need for improved management tools supporting policies for space allocation along the entire European coastline.

COEXIST is a broad, multidisciplinary approach to evaluate these interactions with the ultimate goal to provide a roadmap to better integration, sustainability and synergies among different activities in the coastal zone.

1. The project will study the **interactions between capture fisheries and aquaculture** and evaluate mutual **benefits and possible bottlenecks for concomitant development** of these activities in the coastal zone within the context of the ecosystem approach to management.
2. It will propose, develop and **evaluate the efficiency of spatial management tools** (zoning, closed areas, etc) to promote different forms of coastal aquaculture and fisheries at different scales (e.g. local, regional) and it will exploit mutual opportunities (e.g. artificial reefs, protected areas, wind farms, tourism etc) within a context of competition for space by multiple users.
3. The project will address differences in **acceptance** of activities (fisheries, aquaculture, and other use of the coastal zone) by the society.
4. A detailed strategy for communication and **involvement of stakeholders** and for **dissemination** of results to general and targeted audiences is integrated in the project.

By these actions, the project will **support the new European Maritime Policy and spatial planning of coastal areas**. Case studies, supported by national projects will be used to provide data for further analysis through the integrated work packages This will include detailed comparative analyses and integrated models for the regional seas, as well as a synthesis on the European scale. COEXIST will address interactions on a biological and biogeochemical level, as well as a socio-economic level, and the governance and legal aspects.

Ultimate Project Outcomes

Characterization of relevant European coastal marine ecosystems, their current utilisation and spatial management

- Description of major present and possible future interactions between aquaculture and fisheries, using dynamic models to account for spatial use, environment and ecology, and socio-economics.
- Identification of aquaculture and fisheries specific objectives (e.g. socioeconomic, biophysical and governance), within the framework of sustainable development of coastal zones, and assessment of the degree to which these objectives are currently being achieved.
- Review of the current governance regimes applicable to management of fisheries and aquaculture, inventory of the individual spatial management tools currently utilized, and evaluation of their efficiency and effectiveness with respect to the goals identified in the Blue Book for a European Maritime Policy.

Evaluation of spatial management tools for combining coastal fisheries, aquaculture and other uses, both now and in the future

- Evaluation of benefits and possible bottlenecks for concomitant development of fisheries, aquaculture and other major activities in the coastal zone
- Modelling of future scenarios for fisheries, aquaculture and other activities per case study and discussion of options of spatial management with stakeholders
- Extrapolation of generic conclusions that are valid beyond the maritime regions of the case studies
- Identification of best practices for the integration of fisheries, aquaculture, and other uses in coastal zone management and, where needed, proposal for improvement of suitable spatial management tools

1.2. Progress beyond the state of the art

Main legislative frameworks

There exist several treaties and legislative frameworks of different spatial applicability which are related to the management of marine ecosystems in this area. The following legislative items are of particular relevance in this proposal:

- EC Habitats Directive (Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora).
- Birds Directive (Council Directive 79/409/EEC on the conservation of wild birds).
- Marine Strategy Directive (Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive).
- Biodiversity Communication 2006 (Communication from the Commission COM/2006/0216 final: Communication from the Commission - Halting the loss of biodiversity by 2010 - and beyond - Sustaining ecosystem services for human well-being).
- Integrated Coastal Zone Management (Commission Communication on the evaluation of Integrated Coastal Zone Management (ICZM) in Europe, COM(2007)308 final of 7 June 2007).
- Water Framework Directive (Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy).
- CFP and ecosystem approach (Communication from the Commission to the Council and the European parliament. The role of the CFP in implementing an ecosystem approach to marine management. Brussels, 11.4.2008 COM(2008) 187 final).
- Convention on Biological Diversity (CBD) (Concluded at Rio de Janeiro on 5 June 1992).
- OSPAR Convention (Commission for the Protection of the Marine Environment of the North East Atlantic).

Country- and sector-specific legislative items are also relevant to the development of an integrated ecosystem approach, including the differences in how the European legislation is transposed into national law of Member States or Associated Countries. These legislation and governance aspects will be reviewed and analyzed in **WP2**.

Spatial management tools in the coastal zone

COEXIST evaluates the efficiency of existing spatial management tools with regard to promoting different forms of coastal fisheries and aquaculture and the exploitation of mutual opportunities.

Management of marine areas is challenging due to a number of complexities not inherent in terrestrial area management (Day 2008). These complexities include:

1. The *high degree of interconnectedness* of the marine environment in all dimensions. Any marine managed area can only be as 'healthy' as its surrounding waters because of very high levels of 'connectivity' in the marine environment and the biological interdependency upon neighbouring communities. An extremely well managed part of a marine ecosystem can be to little avail if the surrounding or adjacent waters are over-used, polluted or are themselves inadequately managed.

2. The *three-dimensional aspects* of what marine managers are expected to manage. Most marine ecosystems are not well known (refer to David Suzuki quote below), nor easily viewed, nor can areas be easily delineated for management purposes.
3. The *temporal dimension* as natural systems and any associated marine managed areas are never static.
4. The *logistical difficulties of sampling* marine systems make it much more difficult and expensive than sampling terrestrial environments.
5. The *ownership issues*—most marine areas world-wide remain subject to the 'tragedy of the commons'; no one owns them, yet they are widely used, frequently leading to over-use.
6. The *lack of knowledge and information* about marine systems.

There is a global trend for increasing requirements for *evaluation* of all marine management programs, including those dealing with Marine Spatial Planning (MSP). Evaluations are needed to demonstrate the effectiveness of management through evidence of results, rather than on the basis of educated guesses (Day 2008). However, in the context of marine spatial management, calls for accountability and evaluation need to recognise the wide variety of marine managed areas set up to achieve differing purposes and objectives, for instance, sustainable use of living marine resources, availability of space for aquaculture, wind farms and other industires tourist activities, as well as nature conservations, e.g. thorough Marine Protected Areas.

Adaptive management is a key aspect of managing any marine area. Parma et al. (1998) define adaptive management as "…managing according to a plan by which decisions are made and modified as a function of what is known and learned about the system, including information about the effect of previous management actions". According to Day (2008), key components of an adaptive management approach include various *policies* specifying locally appropriate actions based on a sound understanding of the system's status and behaviour); *management systems* that implement those policies, including *partnerships* with other stakeholders where management responsibility is shared; *monitoring* to determine the system responses; *evaluation* of the monitoring results, and the consequent *adjustment of management* if the evaluation shows it is necessary. Adaptive management enables managers to be flexible and to expect, and deal with unexpected change (for instance: climate change was not even considered an important marine issue a decade ago). It is also important to recognise that some management actions need to be in place for a reasonable period of time to be effective or to enable a reasonable assessment of their effectiveness (Day 2008). Furthermore, due to the interdependency that exists between the ecosystem resources and its users, successful implementation of the ecosystem-based management depends on the identification and understanding of different stakeholders, their practices, expectations and interests (Pomeroy and Douvere 2008). For instance, in a policy perspective, in order to obtain successful development of MSP, Plasman (2008) states that one should:

i. use all available authorities (of federal, regional, provincial and local governments)
ii. use science and scientists efficiently,
iii. recognize the importance of short-term accomplishments in policy
iv. communicate issues and accomplishments transparently
v. build trust and public support

Most likely, successful MSP cannot be achieved without a certain level of conflict, and without iterative adaptations in management actions. MSP is viewed an essential part of advancing ecosystem-based management as it is demanded of the Marine Strategy Directive (Crowder and Norse 2008, Douvere 2008, Gilliand and Laffoley 2008). The biological interconnectedness of fisheries and aquaculture is strong, with factors such as competition for space, disease transmission, genetic impact from escapees, availability of fish for fish food, and organic and inorganic waste management. Increased aquaculture production could hardly be reached without at least some effects on fisheries and other use of the coastal zone. The public perception of aquaculture is in most European regions influenced by the view of aquaculture being a "new" and "unnatural" activity, whereas fisheries are viewed as "traditional" and "natural" (Bergh 2007). However, in an ecosystem-based management, the management of aquaculture and fisheries, as well as other uses of the coastal zone, should be considered integral parts with local variations in their respective importance, which need to be reflected in successful Marine Spatial Planning.

Socioeconomics and governance

COEXIST will work according to the guidelines of the "Framework for Monitoring and Assessing Socioeconomics and Governance of Large Marine Ecosystems" by NOAA (National Oceanic and Atmospheric Administration) (NOAA, 2000). The steps in this framework are listed below, with a reference to the relevant Work packages (**WP**s):

Step 1: Identify principal uses of Large Marine Ecosystem (LME) resources **(WP1)**
Step 2: Identify governance mechanisms influencing LME resource use **(WP2)**
Step 3: Identify LME resource users and their activities **(WP2)**
Step 4: Assess the level of LME-related activities **(WP1)**
Step 5: Assess the interactions between LME-related activities and LME resources **(WP1)**
Step 6: Assess the impacts of LME-related activities on other users **(WP4, 5)**
Step 7: Assess the interactions between governance mechanisms and resource use **(WP4, 5)**
Step 8: Assess the socioeconomic importance of LME-related activities and economic and socio-cultural value of key uses and LME resources **(WP4, 5)**
Step 9: Identify the public's priorities and willingness to make tradeoffs to protect and restore key natural resources **(WP2)**
Step 10: Assess the cost of options to protect or restore key resources **(WP4)**
Step 11: Compare the benefits with the costs of protection and restoration options **(WP4)**
The last, Step 12: Identify financing alternatives for the preferred options for protecting/restoring key LME Resources, will not be addressed in COEXIST as this is a political/ societal choice. COEXIST will help to make informed decisions.

In addition to these steps, the existing biological, geochemical and socio-economic models will be integrated in order to be able to produce a framework for improvement of management tools and strategies, thus integrating models and processes in **WP3**, providing data for **WP4**.

Modelling

Dynamic models are important instruments for addressing the challenges of the current EU water legislation and the emerging guidance on common aquaculture policy on water ecological quality and conservation (2000/60/EC: Water Framework Directive (WFD) and 2008/56/EC: Marine Strategy Directive, Borja et al., 2008). Models are the most appropriate tools for addressing both, the natural and human environment and the interaction between fisheries, aquaculture and other uses of the coastal zone as they can integrate the different elements. Moreover, they can also be used by managers to explore potential development scenarios without the social costs of experimental execution (Ferreira et al., 2008a), and to define reference conditions by hind-casting to a period when a system or type (*sensu* WFD typology) was in better state.

Models covering aquaculture, fisheries, and other activities run at specific scales (temporal/spatial) according to the aspect studied of a distinct activity (e.g. physical, production, ecological, economic or social aspects; Inglis et al. 2000). For instance, several ecological models consider a small local scale (farm scale e,g. fish – the MOM model (Hansen et al., 2001; Stigebrandt et al., 2004); bivalves – FARM model (Ferreira et al, 2007); shrimp (Franco et al., 2006)) or an ecosystem-scale (bay, estuary; NORWECOM, EcoWin2000 (Ferreira et al., 2008a)). Fisheries models target wild harvestable populations and the spatio-temporal distribution of fleets and landings (Fock, 2008), while models of both natural and human impact of other activities (e.g. shipping, tourism, gas and oil, offshore wind turbine farms) are often part of integrated models for all activities at system-scale (e.g. WadBOS, CUMULEO). Some models at system-scale (e.g. EcoWin2000), integrate models running at various scales of time and space by operating at a coarser scale. Such integrated and spatially explicit models, which combine models of different activities or trophic levels, e.g. multi-trophic aquaculture,, are missing tools in marine spatial management in European coastal seas (Neori et al., 2004; Ferreira et al., 2008b).

A second category of models, screening models, are designed to give a simplified overview of a system based on a few diagnostic variables and can be more easily used by managers e.g. ASSETS eutrophication assessment (Bricker et al., 2003), DEPOMOD for fish farm capacity modelling (Cromey et al., 2002) etc. See also **WP3** for more elaborate descriptions.

More complete and appropriate spatial management tools for the sustainable use of seas and oceans must include the interactions - conflicts as well as mutual benefits - between the different users in the coastal zone by choice of the appropriate modelling toolset (integrating research models, screening models), the resolution of important scaling issues, and the balanced use of models and detailed process studies.

1.3 S/T methodology and associated work plan

1.3.i - Overall strategy

In COEXIST, individual processes as well as their interaction, will be investigated in case studies, representing the specific conditions and combinations of activities of European coastal areas of particular importance for aquaculture and coastal fisheries. The six case studies, which are described in Annex 1 will use input from research conducted in national projects as sources of data for further modelling and evaluation in **WP3** and **WP4**, as well as for a best practice guide to be developed in conjunction with stakeholders in **WP5**, in which a synthesis of results will be carried out.

WP 1 will set the baseline of COEXIST, providing reference description of fisheries aquaculture and other activities in the coastal zone, both at the generic level, and at an ecosystem specific level. A detailed strategy for involvement of stakeholders is integrated in these WPs. Furthermore, a separate **WP 6** for Dissemination, Communication and Knowledge Transfer will provide focus on external communication to and from the project. **WP 7** Knowledge management – supporting systems, processes and methodologies will ensure internal communication and data management is carried out in a transparent and efficient way. WP C project management involves the Scientific and administrative management, and the communication with the EU.

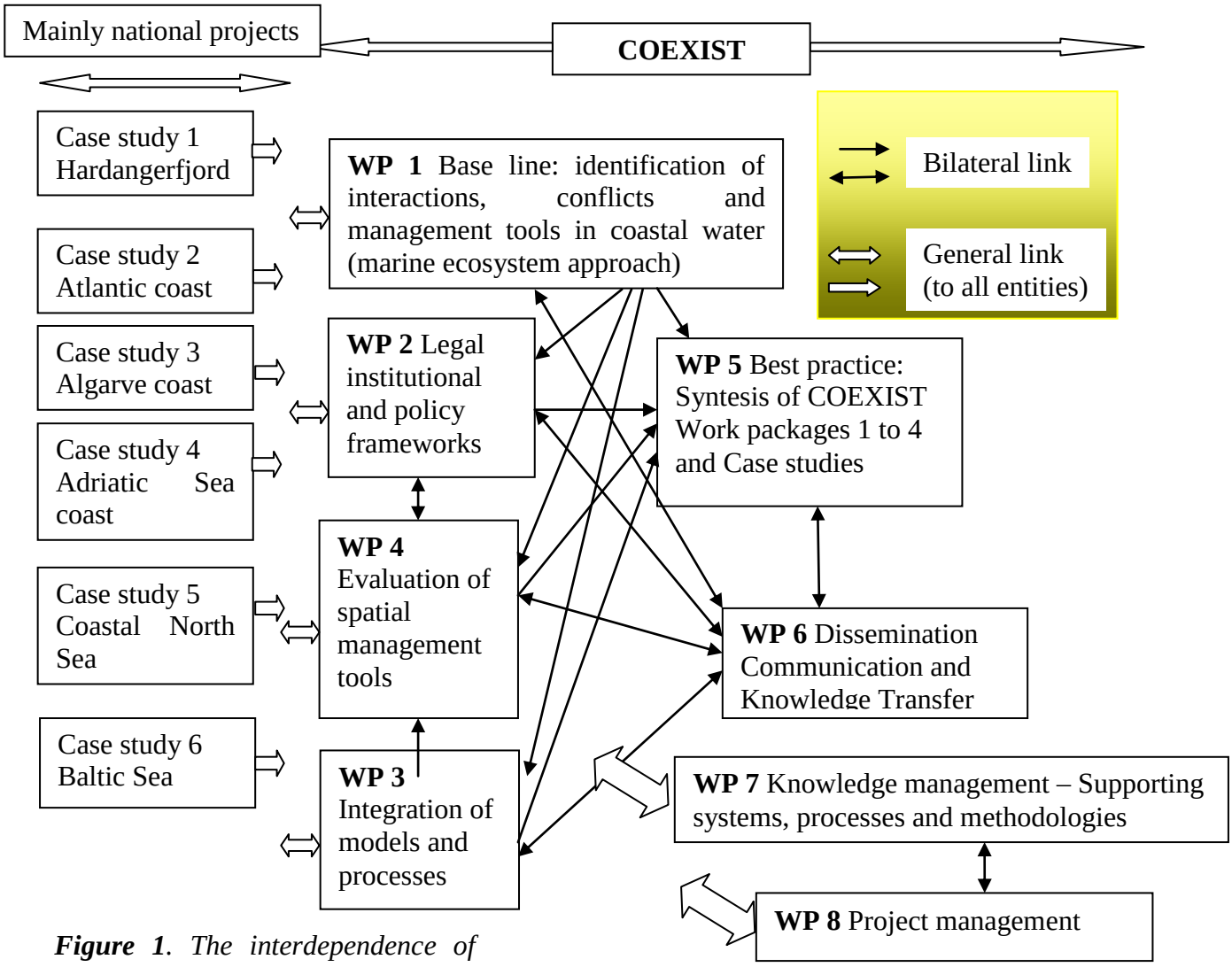

***Figure 1**. The interdependence of the components of COEXIST, and the information flow*

1.3ii - COEXIST Gantt diagram. Timing of tasks.
Please see Work package desctiptions for full name and description of the tasks

Task No.	Name	Year 1				Year 2				Year 3			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1.1	Definitions and characterisation of marine ecosystems	X	X	X									
1.2	Matrices of interactions	X	X	X									
1.3	Inventory of possible combinations…	X	X	X									
1.4	Glossary of different spatial management tools	X	X	X									
1.5	Future scenarios	X	X	X									
2.1	Review of legal frameworks		X	X	X	X	X						
2.2	Review of current policy frameworks		X	X	X	X	X						
2.3	Review of current management regimes and plans				X	X	X	X	X	X			
2.4	Conduct stakeholder analysis		X	X	X	X	X	X	X				
2.5	Conduct institutional analysis		X	X	X	X	X	X	X				
2.6	Review of best governance practice using marine Spatial planning						X	X	X	X	X		
2.7	Review of the potential use and best practice of GIS and…					X	X	X	X	X			
3.1	Data and information..	X	X	X									
3.2	Natural and human components of fisheries	X	X	X	X	X	X	X					
3.3	Natural and human components of aquaculture	X	X	X	X	X	X	X	X				
3.4	Assessment of the effect of fisheries and aquaculture at different scales		X	X	X	X	X	X	X	X	X		
3.5	Natural and human components of other activities	X	X	X	X	X	X	X					
3.6	Adaption, improvement and integration of models			X	X	X	X	X	X	X	X	X	
3.7	Development of screening models	X	X	X	X	X	X	X	X	X	X	X	

4.1	Develop a framework for evaluation of marine spatial management in coastal zones	X	X	X	X	X							
4.2	Identify spatial management objectives and assess the degree to which they are currently being achieved		X	X	X	X	X						
4.3	Development of indicators			X	X	X	X	X	X				
4.4	Measurement of impacts			X	X	X	X	X	X				
4.5	Determine how individual spatial management tools influence key activities				X	X	X	X	X	X	X	X	
4.6	Evaluate effectiveness and efficiency of spatial management tasks				X	X	X	X	X	X	X	X	
4.7	Evaluate adaptations to spatial management tools and propose adaptations				X	X	X	X	X	X	X	X	X
5.1	Compilation of case study results									X	X	X	X
5.2	Evaluation of conclusions from case studies and modelled management scenarios									X	X	X	X
5.3	Compilation of a working document based on 5.1 and 5.2											X	X
5.4	Syntesis workshop										X		
6.1	Identification and segmentation of stakeholders and target end users	X	X	X	X								
6.2	General dissemination	X	X	X	X	X	X	X	X	X	X	X	X
6.3	Targeted dissemination	X	X	X	X	X	X	X	X	X	X	X	X
6.4	Communication and Feedback	X	X	X	X	X	X	X	X	X	X	X	X
6.5	Compilation of all kowledge generated from the project and					X	X	X	X	X	X	X	X

	translation for end users												
6.6	Scientific publication		X	X	X	X	X	X	X	X	X	X	X
7.1	Assist in the development of the methology and processes for communicationg wth stakeholders in the case studies across the WP's	X	X	X	X	X	X	X	X	X	X	X	X
7.2	Centralise data management, a meta database of results	X	X	X	X	X	X	X	X	X	X	X	X
7.3	Assist in the organisation of any external events	X	X	X	X	X	X	X	X	X	X	X	X
8.1	Design and manage a project management system	X	X										
8.2	Internal project communication	X	X	X	X	X	X	X	X	X	X	X	X
8.3	Scientific Project Management	X	X	X	X	X	X	X	X	X	X	X	X
8.4	Administrative Project Management	X	X	X	X	X	X	X	X	X	X	X	X

1.3.ii Detailed work description – broken down to Work packages

Table 1.3.a Work package list

Work package No[1]	Work package title	Type of activity[2]	Lead beneficiary No[3]	Person-months[4]	Start month[5]	End month[6]
1	Base line: identification of interactions, conflicts and management tools in coastal waters (marine ecosystem approach)	RTD	11	57,1	1	9
2	Legal institutional and policy frameworks	RTD	3	30.5	1	33
3	Integration of models and processes	RTD	6	123.8	1	34
4	Evaluation of spatial management tools	RTD	10	101,4	1	34
5	Synthesis of Coexist	RTD	2	48,9	25	36
6	Communication and dissemination	OTHER	13	17	1	36
7	Knowledge management	OTHER	13	12,5	1	36
8	Project management	MGT	1	39,1	1	36
	TOTAL			430.3		

1

OTHER = Other activities (including management) applicable for collaborative projects, NoEs, and CSA
MGT = Management of the consortium - applicable for all funding schemes
COORD = Coordination activities – applicable only for CAs
SUPP = Support activities – applicable only for SAs

1 Number of the beneficiary leading the work in this work package.

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1 Workpackage number: WP 1 – WP 8.

2 Insert one of the following 'types of activities' per WP (only if applicable for the chosen funding scheme – must correspond to the GPF Forms):
RTD = Research and technological development including scientific coordination applicable for collaborative projects and NoEs
DEM = Demonstration - applicable for collaborative projects
OTHER = Other activities (including management) applicable for collaborative projects, NoEs, and CSA
MGT = Management of the consortium - applicable for all funding schemes
COORD = Coordination activities – applicable only for CAs
SUPP = Support activities – applicable only for SAs

3 Number of the beneficiary leading the work in this work package.

4 The total number of person-months allocated to each work package.

5 Relative start date for the work in the specific work packages, month 1 marking the start date of the project, and all other start dates being relative to this start date.

6 Relative end date, month 1 marking the start date of the project, and all end dates being relative to this start date.

Table 1.3b Deliverables list

Del. no. [7]	**Deliverable name**	**WP no.**	**Lead bene-ficiary**	***Estimated indicative person-months***	**Nature**[8]	**Dissemi-nation level** [9]	**Deliv. date**[10] **(project month)**
D1.1	Map(s) of Europe showing which coastal areal (marine ecosystems) have which specific characteristics based on physical characteristics and suitability for different activities	1	11	10	R	PU	6
D1.2	Matrice of interactions aquaculture versus fisheries	1	11	10	R	PU	8
D1.3	Matrice of interactions of aquaculture and fisheries versus other activities in the coastal zone	1	11	10	R	PU	8
D1.4	Working document WP 1, including DPSI elements to be described for each case study and contributing matrices to infer the most relevant interactions (benefits and conflicts) between activities	1	11	27,1	R	PU	9
D2.1	A stakeholder map and database for each case study area (Legal, institutional and policy frameworks)	2	3	5	R	PU	9
D2.2	Report on the potential use of GIS and other scenario-based simulation and visualisation tools	2	3	5	R	PU	18
D2.3	Development of indicators of best practice (Legal, institutional and policy frameworks)	2	3	5	R	PU	18

7 Deliverable numbers in order of delivery dates: D1 – Dn

8 Please indicate the nature of the deliverable using one of the following codes:
R = Report, **P** = Prototype, **D** = Demonstrator, **O** = Other

9 Please indicate the dissemination level using one of the following codes:
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)

10

D2.4	A comprehensive review of the legal, policy and institutional frameworks that cover the current approaches to interactions between aquaculture, fisheries and other sectors and identifying barriers to and opportunities for more efficient management	2	3	16.4	R	PU	33
D3.1	Parameterized and validated population models for appropriate species of wild finfish , bivalves and crustaceans	3	6	10	O	PU	18
D3.2	Report on economic analysis in coastal fisheries on the basis of revenue for individual profession and fishing trips	3	6	12	R	PU	24
D3.3	Coastal fisheries fleet models	3	6	18	O	PU	24
D3.4	Validated farm-scale models for aquaculture	3	6	15	O	PU	24
D3.5	Report on assessment of aquaculture and fisheries production scale effect on environment	3	6	10	R	PU	24
D3.6	Report on pathogens impact on farmed and wild fish, with salmon lice in a fjord system as a model (farm-fishery interactions)	3	1	10	R	PU	26
D3.7	Combined local-scale and system-scale models (Production/disease/GIS	3	6	22,5	O	PU	30
D3.8	Screening models for decision support on aquaculture siting and risk analysis	3	6	25	O	PU	33
D4.1	An internal working document containing the developed framework for multi-objective quantitative and qualitative evaluation of marine spatial management in coastal zones	4	10	20	R	PP	12
D4.2	For each case study a final	4	10	60	R	PU	33

	report containing measured cumulative impacts of the aggregate coastal activities, evaluation of the effectiveness and efficiency of currently applied spatial management tools, and results of scenario studies, that incorporate the best practices and proposed improvements to existing spatial management toos, on the effects of aquaculture, fisheries and other activities in coastal zones						
D4.3	Submission of a peer-reviewed paper on the development of a framework for multi-objective quantitative and qualitative evaluation of marine spatial management in coastal zones	4	10	21.4	R	PU	33
D5.1	Working document describing general conclusions from the overall comparison of realized management methods and modelled alternative scenarios in spatial planning	5	2	20	R	PU	36
D5.2	Document: Guideline for best practice in spatial planning to integrate fisheries aquaculture and further demands in the coastal zone. Potential end users will be EU commission and national level decision makers as the synthesis aims at supporting European maritime policy	5	2	28,9	R	PU	36
D6.1	Databases of stakeholders and target-end users	6	13	2	O	PP	6
D6.2	Project Brochure	6	13	1	R	PU	3
D6.3	Project website	6	13	1	R	PU	3
D6.4	<6 article/press releases per year on COEXIST	6		2			
D6.5	Annual report on attendance and	6	13	1	R	PU	12,24,36

	dissemination at aquaculture events						
D6.6	Presentations at producers events	6	13	1	O	PU	Ongoing
D6.7	Report on all targeted dissemination efforts and analysis of impact	6	13	1	R	PU	12,24,36
D6.8	Presentations at producers events	6	13	1	O	PU	Ongoing
D6.9	Report on all targeted dissemination efforts and analysis of impact	6	13	1	R	PU	12,24,36
D6.10	Years 1+2 each, annual report on knowledge generated within the project, analysis of potential and recommended plans of action for the following year	6	1	1	R	PU	12,24
D6.11	Year 3 final WP 6 report on overall and deliverables generated by COEXIST	6	1	1	R	PU	36
D6.12	Scientific publications	6	1	2	R	PU	Ongoing
D6.13	Presentations at scientific conferences	6	1	2	O	PU	Ongoing
D7.1	Design support collateral for stakeholder surveying	7	13	2	O	PP	Ongoing
D7.2	Design stakeholder surveys	7	13	2	O		Ongoing
D7.3	A protocol for carrying out stakeholder surveying	7	13	1	O	PP	Ongoing
D7.4	A protocol for case study leaders to compile and submit surveying data/results to WP's	7	13	2	O	PP	Ongoing
D7.5	A meta database to host the data collection i the project	7	13	2	O	PP	Ongoing
D7.6	Event structure template per external event	7	13	1	O	PP	Ongoing
D7.8	Feedback survey to measure participant satisfaction	7	13	1	O	PP	Ongoing
D7.9	Results of participant feedback surveys per event	7	13	1,5	O	PP	Ongoing
D 8.1	The Consortium agreement signed by all partners	8	1	4	O	PP	2
D 8.2	The internal project management system has	8	13	6	O	PP	2

	been set up						
D8.3	The communication plan has been developed and communicated to all partners	8	1	10	O	PP	12
D8.4	Information on the content of the scientific workshops, participation in workshops and distribution of grants aiming at supporting exchange activities will be included in the yearly report to the EC	8	13		R	PU	
D 8.5	Yearly progress report to the European Commission and final report.	8	1	19,1	R	PU	12,24,36
			TOTAL	**430.3**			

Table 1.3.c List of Milestones

Milestone number	Milestone name	Work package(s) involved	Expected date (month)	Means of verification
M 1.1	Project started	1,2,3,4,6,7,8	1	Start of activities
M 1.2	Working Document WP 1 finished	1	9	Document published
M 2.1	Review of law and policy framework started	2	2	Draft on internal website
M 2.2.	Templates for partners contributions to review on law and policy framework agreed	2,7	4	Template on internal website
M 2.3	Draft review of report on law and policy frameworks published	2	24	Draft on internal website
M 2.4	Review on law and policy framework published	2	33	Review published
M 3.1	Relational database to be distributed throughout the prtnership	3,7	12	Internal report on internal website
M 3.2	Web-based metadatabase for culture practices, production, coastal fishing activities, etc	3	18	Database operational
M 3.3	Population and fleet-scale models for coastal fisheries	3	18	Internal report on internal website
M 3.4	Economic analysis for coastal fisheries activities completed	3	18	Internal report on internal website
M 3.5	Completed conflict analyses for coastal fisheries with aquaculture and other elements of spatial planning	3	21	Report submitted
M 3.6	Farm-scale models incorporating detailed aquatic resource modules	3	24	Internal report on internal website
M 3.7	Distribution and discussion of preliminary screening models	3,7	29	Internal report on internal website
M 3.8	Tuned and improved screening models			Internal report on internal website
M 3.9	Delivery of final farm-scale and screening models			Report submitted
M4.1	An internal working document containing the developed framework for evaluation of marine spatial management in coastal zones has been drafted	1,2,4,7	6	Draft on internal website
M4.2	For each case study area the	4,6,7	6	Internal report on

	spatial management objectives have been identify; the objectives weighted; and the indicators developed.			internal website
M 4.3	Cumulative impacts of the aggregate coastal activities have been measured in every case study area.	4	12	Internal report on internal website
M 4.4	Depending on the availability of data and models a decision has been taken regarding the relative proportion of quantitative and qualitative methods of evaluation in each case study area.	4	14	Internal report on internal website
M 4.5	For each case study area the manner in which currently applied spatial management tools influence the key activities in the coastal zone has been determined.	4	16	Internal report on internal website
M 4.6	The effectiveness and efficiency of spatial management tools has been evaluated in every case study area.	4	22	Internal report on internal website
M 4.7	In each case study area the scenario studies have been completed and improvements to existing spatial management tools have been proposed in a final report.	4	27	Report submitted
M 4.8	A paper on the development of a framework for multi-objective quantitative and qualitative evaluation of marine spatial management in coastal zones has been submitted for peer review.	4	30	Peer-reviewed publication submitted
M 5.1	Workshop with case study representatives and stakeholders to discuss and further develop a draft version of a manual guiding to best practice in spatial management in the coastal zone	5,6	30	Workshop arranged
M 6.1	Comprehensive database for stakeholder consultation and targeted dissemination	6	4	Agreement from partnership and industry representatives that list is complete
M 6.2	Launch of project website	6	4	Site live on WWW

M 6.3	Website has significant visits	6	Ongoing	Google web stats on site
M 6.4	Publication of press releases in trade/scientific journals	6	Ongoing	Copies of each journal containing articles
M 6.5	Dissemination of project updates to stakeholders		6,12,18,24,30,26	Recording of stakeholders being sent updates every 6 months and feedback from dissemination
M 6.6	Presentations at producer events across Europe	6	Ongoing	Copies of presentations made at events
M 6.7	Effective targeted dissemination	6	Ongoing	Quantitative and qualitative recording of targeted dissemination activities
M 6.8	WP6 Annual reports summarising progress	6	14, 26, 36	Report on findings of analysis, measurement of adhering to recommended plan of action (part of following year report)
M 6.9	Transfer of knowledge to end users during project	6	Ongoing	Indicators will be set up and recorded to measure the amount of knowledge transfer
M 6.10	Presentations at Scientific Conferences	6	21,33	Amount of presentations at scientific conferences
M 7.1	Knowledge Management is effectively implemented across consortium	7	36	Project meets its intended objectives
M 7.2	Support material is developed per case study	7	6	Appropriate material exists (suitable format, language, medium)
M 7.3	Protocols are created per WP to carry out surveying and submit results	7	6	A protocol exists agreed upon by WP leaders
M 7.4	A meta database frame is on the project website	7	6	The database frame is live
M 7.5	Customised sections completed per WP to host data	7	12	A customised section exists per WP
M 7.6	Announcement per event	7	Ongoing	Announcements are created and distributed in WP6
M 7.7	Successful delivery of events	7	Ongoing	Analysis of the

				Feedback surveys from the events
M 8.1	Consortium agreement completed and signed by all partners	8	2	Consortium agreement forwarded to the EU
M. 8.2	Project meetings	8	1,7,13,19,25,31	Agenda and notes distributed
M 8.2	Project report and Final report submitted	8	12,24,36	Report submitted

Work package number	1	**Start date or starting event:**								Month 1				
Work package title	**Base line: identification of interactions, conflicts and management tools in coastal waters (marine ecosystem approach)**													
Activity Type	RTD													
Participant id	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Person-months per beneficiary:	2	6	6.5	2	8.4	7.4	5	4.9	0.4	3	9.1	1.2	0	1.2

Objectives

This work package (WP1) sets the baseline for COEXIST providing a reference description of fisheries, aquaculture and other activities in the coastal zone both at the generic level and at an ecosystem specific level. The baseline will be used by Work Packages 2, 3 and 4, and consist of: definitions and characterization of concepts, description of the major present and future types of interactions between aquaculture and fisheries, or between any of these two elements and other sectors/resource users, accounting for spatial use, environment and ecology, and socio-economics. An inventory of possible combinations of aquaculture and/or fisheries and other activities (existing, and future scenarios) including a management tool glossary.

Description of work

Task 1.1: Definitions and characterization of marine ecosystems A list of definitions will be given, the coastal ecosystems studied will be described with respect to pressures from aquaculture, fisheries and other activities in order to acknowledge the regionally differing characteristics of Europe. By consultation of regional authorities and site visits we will provide the required information including stakeholder involvement into the project, split up into generic and ecosystem-specific descriptions. A map of Europe showing which coastal areas are similar to each other will be produced, based on physical characteristics of the areas and on possible activities within the system

Task 1.2: Matrices of interactions Multi-layered matrices will be developed in that will describe the properties of various activities in the coastal zone and will give guidance for the activities in the other WPs.

- **Matrix 1**. Fisheries versus aquaculture with all relevant requirements and implications
- **Matrix 2**. Interactions based on Matrix 1 versus all other activities.

The matrices might be split into multiple matrices in order to improve interpretation of the matrix. Where possible, existing sources of information will be utilized, e.g., from the EU-funded project "WINDSPEED". Concerning potential interactions with Natura 2000 objectives, COEXIST will build upon the outcome of the EMPAS project (ICES/ German Federal Agency for Nature Conservation) and the ICES advice (ICES 2008).

Task 1.3: Inventory of possible combinations (both existing and new) of different forms of aquaculture and/or fisheries and other activities. Based on the matrices developed under Task 1.2, an inventory will be made of possible combinations of different activities to be used later on in WP4.

Task 1.4: Glossary of different spatial management tools currently utilised An inventory of existing spatial management tools and their objectives will be generated, primarily on the basis of existing approaches in the case study areas. Spatial management tools used in other parts of the world (e.g. USA, Canada, Australia) will also be included.

Task 1.5: Future scenarios for fisheries, aquaculture and other activities per case study Both, the current status and the expected trends in aquaculture and fisheries will be dealt with, based on current knowledge and (policy) documents about developments that are to be expected. Developments in and growth prognosis for aquaculture (FAO 2006) will be described. Factors like increasing amount of claims for space for e.g. wind farms and infrastructural works will be taken into account, as well as the impact of external ecological or economic drivers like climate change or oil prices..

Deliverables

D1.1: Map(s) of Europe showing which coastal areas (marine ecosystems) have which specific charactersitics based on physical characteristics and suitability for different activities.

D.1.2 Matrice of interactions aquaculture versus fisheries

D.1.3 Matrice of interactionsof aquaculture and fisheries versus other activities in the coastal zone

D1.4: Working Document WP1, including DPSI elements, to be describes for each case study and contributing matrices to infer the most relevant interactions (benefits and conflicts) between activities.

Work package number	2	Start date or starting event:								Month 1				
Work package title	**Legal, institutional and policy frameworks**													
Activity Type	RTD													
Participant id	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Person-months per beneficiary:	2	2	14.6	1.8	0	0	5	1.8	0	2.6	0.9	0.7	0	0

Objectives

The overall goal is to review and document the current governance regimes applicable to the management of fisheries and aquaculture. The term governance encompasses the whole decision-making process for management, how management decisions are made and enacted by government as well as other relevant mechanisms, institutions and stakeholders in an ecosystem-based management of this sector. In light of the integrated approach advocated by the European Commission, it will also be necessary to examine briefly the management of other relevant activities (e.g. tourism, management plans based on Natura 2000, recreational fishing, wind energy etc.) in the same coastal areas. This WP will examine general EU and national institutional arrangements and will utilise the case studies to support delivery of the objectives:

- To conduct a baseline analysis of legal, policy and institutional arrangements covering current approaches to interactions between aquaculture, fisheries and other sectors.
- To conduct a stakeholder analysis and mapping exercise to identify those with an important role and to clarify the societal motivations, incentives and values which govern their responses
- To assess levels of societal acceptance of activities and combinations of activities in the coastal zone.

Description of work and role of participants

Produce a review report on the law and policy framework for fisheries and aquaculture management. This will review relevant legislation at a range of operational scales, that is, international (e.g. Law of the Sea Convention, Convention on Biological Diversity), regional (e.g. OSPAR, HELCOM, Mediterranean ICZM Protocol), European (e.g. Marine Strategy Directive, Water Framework Directive, SEA and EIA Directives) and national scales (based on Partner Countries). Policies of relevance focusig on the Common Fisheries Policy (CFP) and associated Biodiversity Action Plan for Fisheries as well as international approaches (FAO) such as the FAO Code of Conduct for Responsible Fisheries will be examined, as will the various instruments for their possible contribution to more ecosystem-based management and their usefulness in implementing Marine Spatial Planning (MSP). The European Commission has recommended that MSP has a legal basis similar to terrestrial planning systems. Leading partner (3) will provide direction to the participating partners to enable them to conduct assessments of governance related issues in a manner that allows for later generalisation. The tasks are:

Task 2.1 Review of the legal frameworks at any legal scales within which overall governance is implemented. This is particularly important given the requirement on Member States to be prudent in their use of natural resources and also the requirement to protect the marine environment

Task 2.2 Review of the current policy framework – account for new/recent integrated EU policy documents, e.g. Communication on Marine Spatial Planning or Blue Book. Provide a review of global and European approaches to fisheries/aquaculture interactions integrating research from sectoral aquaculture and fisheries areas.

Task 2.3 Review of current management regimes and plans – in particular the relationship between the Common Fisheries Policy and the Habitats Directive

Task 2.4 Conduct a stakeholder analysis and mapping exercise to identify and clarify (a) who the relevant stakeholders are (b) the interrelationships between stakeholders and between stakeholders and the issues, and (c) the mechanisms, mediums and levels of stakeholder engagement in the decision making process.

Task 2.5 Conduct an institutional analysis to identify and clarify what Government departments and other regulatory agencies are involved in the management of fishery and aquaculture activities with a view to identifying potential areas of overlap, gaps or opportunities to streamline management requirements e.g. development consents, licensing, leasing etc. This task will complement the above action by identifying if, where and when the public is involved in the decision-making process with a view to identifying keys stages in the decision-making process where public participation is necessary, thereby contributing to the implementation of the Århus Convention on access to environmental information, public participation in decision-making and access to justice in environmental matters.

Task 2.6 Review of best governance practice using Marine Spatial Planning in other areas. In WP1 a

glossary of spatial management tools currently utilised is given. In this WP the lessons learned from other areas, particularly PSSAs (Particularly Sensitive Areas) Identify the potential for adapting existing decision-support systems used in natural resource management to improve the effectiveness of stakeholder engagement in fisheries aquaculture interactions.

Task 2.7 Review the potential use, and best practice, of GIS and other scenario-based simulation and visualisation software tools incorporating stakeholders' preferences and management objectives.

Examine how existing governance mechanisms can be adapted to conteribute for an ecosystems-based approach to management of marine resources in the context of the changes in the CFP in 2012

Develop indicators of governance best practice relating to interactions between aquaculture, fisheries and other sectors (Olsen 2003, Bastien-Daigle *et al* 2008). Indicators may be adapted from the comprehensive list of governance performance indicators developed for Marine Protected Areas by Pomeroy et al, 2002.

Deliverables

D 2.1 A stakeholder map and database for each case study area.

D 2.2 Report on the potential use of GIS and other scenario-based simulation and visualisation tools.

D2.3 Development of indicators of best practice.

D2.4 A comprehensive review of the legal, policy and institutional frameworks that cover the current approaches to interactions between aquaculture, fisheries and other sectors and identifying barriers to and opportunities for more efficient management.

Work package number	3	**Start date or starting event:**					Month 1						
Work package title	**Integration of models and processes**												
Activity Type	RTD												
Participant id	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Person-months per beneficiary:	4.6	14	7.7	3	24.6	42	0	4.5	2.4	14.4	6.6	0	0	0

Objectives

This work package aims at the application and integration of different types of dynamic models to examine and assess interactions between fisheries, aquaculture, and other uses of the coastal zone. These models will address both the natural and human environment and will use quantitative indicators such as production, incidence of disease, income and profit, and environmental quality. These tools will include screening models that may be used for higher-level system assessment. The WP will produce a selection of relevant models that describe and quantify major processes in fisheries aquaculture and other marine resource utilization and model interactions by combining existing models for the processes in individual components, based on spatial and temporal overlap of activities, and related interference potential.

Description of work

This work package builds on the work done in WP1 (Identification of interactions, conflicts and management tools) and extends it to include dynamic process modelling. It provides support for compliance with legislative instruments (e.g. the 2008/56/EC Marine Strategy Directive) reviewed in WP2. It also links to WP 4 (Evaluation of Spatial Management Tools) and WP5 (Syntheses). Its success hinges on the choice of an appropriate modelling toolset, the resolution of important scaling issues, and the complementary, balanced use of models, dispersed data and detailed process studies. There are seven tasks, collectively designed to meet of the WP objectives above, which (i) identify existing marine models and systems they are currently applicable to; (ii) determine systems to which they could be easily adapted; and (iii) where appropriate develop, adapt and improve existing models. Detailed analyses will be conducted using the framework of COEXIST case studies in selected coastal regions.

Task 3.1 – Data and information. The relevant biophysical and socioeconomic data required for the modelling tools under review will be identified, together with data for input for WP4. These data will be collated for the systems where models will be tested, and will be validated and archived in a dedicated retrieval platform. This relational database will be open and portable, and both spatially-oriented and other data will be stored. The system will use state-of-the-art search capabilities, and where appropriate a simple connection to GIS will be implemented.

Task 3.2 – Natural and human components of fisheries. Population models will be needed for the natural

resources on coastal fisheries. These population models are available for some species (e.g. flatfish in Wadden Sea), but might need to be adjusted (parameterised) to apply to other species and cases studies. Data available within the partnership will be used for validation. Our focus will be on traditional models of exploited populations for the key vertebrate and invertebrate species in coastal fisheries. The distribution of the resources will be obtained from regular surveys, combined with predictions based on local hydrography, meteorological data and known habitat preferences of the key species. Spatio-temporal distribution of individual fleet components (metiers) will be obtained from VMS data where available, and from logbooks. In order to describe the finely resolved effort distribution, a model combining VMS data of fishing activities and the related reported landings can be applied where data availability allows for such an approach. It may be used for down-scaling from the resolution of landings data (ICES rectangles; ~30 by 30 nm) to a finer resolution model grid. In other situations effort allocation models based on logbook data will be applied.

Task 3.3 – Natural and human components of aquaculture. We will use and extend the already extensive library of biophysical models available e.g. (i) salmon, gilthead bream, bass, rainbow trout; (ii) blue mussel, Pacific oyster, Manila clam; and (iii) Penaeid shrimp and brown shrimp. We will adapt and adjust the formulations available, with the aim of matching complexity to requirements. Optimisation will seek a minimal set of drivers and equations that allow acceptable accuracy whilst providing the key production (e.g. tissue weight, condition indices) and environmental (e.g. solid and dissolved waste production, algal removal) indicators. The criteria will be based on previous EU projects (e.g. ECASA) and current legislation (2000/60/EC: Water Framework Directive and 2008/56/EC: Marine Strategy Directive)..

In all cases, the integration of key species models will be preceded by the full testing of the model dynamics in a visual workbench, Data from WP 3, Task 3.1 and other WPs, together with existing models running at the system scale (e.g. NORWECOM, EcoWin2000 will be used to supply the drivers for the models developed at the local scale (e.g. ASSETS eutrophication assessment). This approach has been successfully tested by members of the partnership, and allows adequate spatial resolution and the incorporation of a substantial level of ecological detail (i.e. multiple state variables and processes). Appropriate socio-economic components will be modelled, e.g. economic models of blue mussel culture, generic marginal analysis approaches (e.g. FARM), energy use and employment. The explicit integration of the relevant biogeochemistry will additionally permit simulation of externalities such as waste production and eutrophication. Co-Exist's third-party collaboration with NOAA will be very important for the eutrophication component. Biophysical and socio-economic models will be coupled.

Task 3.4 – Assessment of the effect of fisheries and aquaculture at different scales (local, ecosystem) on the environment The current and projected changes in the scale of aquaculture and fisheries production are likely to produce difficult-to-predict environmental impacts. Although it is unlikely that such changes will cause a regime shift at a basin scale, there will certainly be impacts on ecosystem goods and services. The adequacy of models tested in previous tasks will be examined with respect to effects/indicators that are characteristic for the selected case studies on both, local and system scale.

Task 3.5 - Natural and human components of other activities. Models of both the natural and human impacts of other activities (e.g. tourism, shipping, gas and oil) in the coastal zone will also be identified and when necessary be adapted to fit the use of the different case studies. These models that are most often part of integrated models for all activities (e.g. WADBOS, CUMULEOS), will provide coarse estimates of the effects of spatial management on other uses and the effects on the marine environment.

Task 3.6 – Adaptation, improvement and integration of models The identification of interactions and issues previously carried out in other WPs, and the above WP3 tasks, will be combined here to adapt, improve and integrate models. The output will be a toolset that can be applied in a generic way to support spatial management of coastal resources, composed of a range of models addressing different scales and complementary issues. Elements of this toolset can be combined to address each Co-Exist case study. Models that feed into each other will be coupled as appropriate, either through communication protocols or integration. Some examples of developments already identified as key areas of research in Co-Exist are given below:

(i) Based on the conflicts and interactions matrix produced in WP1 it will become clear which interactions/conflicts need to be supported by models. Based on the already designated sites for other components of spatial planning (e.g. closed areas, windfarms), as well as known distribution of aquaculture activities, various aspects of interactions with coastal fisheries will be mapped and evaluated using GIS techniques.

(ii) Mariculture in Europe focuses almost exclusively on monospecific culture. The extensive experience of the partnership with the study and simulation of integrated multi-trophic aquaculture (IMTA) will

allow us to experiment with multi-species combinations, leveraging both the production capacity and the internalisation of environmental costs, with an emphasis on N and P emissions.

(iii) Disease and production: the incorporation of pathogens in production models is a huge challenge. There is no paradigm which will allow for quantitative forecasting using deterministic models, however there is probabilistic understanding of risk factors which will allow for qualitative incorporation of risk categories.

(iv) Spatial interactions: Epidemic/population dynamics/dispersal modelling: system-scale propagation of diseases such as salmon lice will be modelled for Hardangerfjord in Norway, to improve quantitative understanding of farm-farm and farm-fishery interactions. This model can be adapted to spreading of viral and bacterial agent from fish farms.

Outputs of such simulations can be added to GIS-based aquaculture site-selection software.

Task 3.7 - Development of screening models. This task aims to develop screening models that provide a simplified approach to system analysis for management. After the initial definition of the concepts, inputs and outputs, "assessment" screening models will be developed, accounting for spatial variability, but integrated with respect to time. These models, which will combine and extend concepts from models applied in previous WP3 tasks are highly aggregated and include natural and human components. They are simple to use and understand, and are targeted at the wider management community. It is envisaged that measured data and research model outputs may be used to drive these models, either independently or in association.

The set of tasks described in this work package will additionally contribute to the design of coordinated long-term monitoring programmes, which will support decision-making both directly, by documenting shifting baselines, and indirectly by leading to improvements in model accuracy and functionality. This WP will take into account explicitly the integrated models that have been and are being developed (e.g. WADBOS, CUMULEOS).

All tasks of this work package will be done in the framework of the different case studies defined for this project. A detailed description of the modelling activities within each case study is provided in the specific case study descriptions (Annex 1).

Deliverables

D3.1 – Parameterized and validated population models for appropriate species of wild finfish, bivalves and crustaceans

D3.2 – Report on economic analysis in coastal fisheries on the basis of revenue for individual profession and fishing trips

D3.3 – Coastal fisheries fleet models

D3.4 - Validated farm-scale models for aquaculture

D3.5 – Report on assessment of aquaculture and fisheries production scale effect on environment

D3.6 – Report on pathogens impact on production on farmed and wild fish, with Salmon lice in a fjord system as model (farm fishery interactions).

D3.7 – Combined local-scale and system-scale models (Production/disease/GIS)

D3.8 – Screening models for decision-support on aquaculture siting and risk analysis

Work package number	4	**Start date or starting event:**					Month 1						
Work package title	**Evaluation of spatial management tools**												
Activity Type	RTD												
Participant id	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Person-months per beneficiary:	2.3	12.5	7.6	0	15.8	9.9	10.7	13	4.1	15	4.3	2.1	0	4.1

Objectives

Work package 4 will assess the existing spatial management tools for each selected case study and propose improvements to those tools. For every case study area, within a context of competition for space by multiple users, work package 4 will:

- develop a framework for multi-objective quantitative and qualitative evaluation of marine spatial management in coastal zones;

- identify aquaculture and fisheries specific objectives (e.g. socioeconomic, biophysical and governance), within the framework of sustainable development of coastal zones, and assess the degree to which these objectives are currently being achieved;
- determine how spatial management tools influence the key activities in the coastal zone;
- evaluate the effectiveness and efficiency of each of the applied spatial management tools in achieving aquaculture and fisheries specific objectives, within the framework of sustainable development of coastal zones; and evaluate adaptations to existing spatial management tools and propose improvements that will benefit the aquaculture and fisheries sectors specifically, and within the framework of sustainable development of coastal zones, limit the potential impact on other users

Description of work

Work package 4 will evaluate the currently applied spatial management tools, as well as their implementation, that have been identified in work package 1. This quantitative as well as qualitative evaluation will be carried out in each case study area. The emphasis will be on outcome-based performance reporting, which includes measures of performance in achieving objectives. The purpose of the evaluation is to identify ways to adapt currently applied spatial management tools to integrate different forms of aquaculture and fisheries in the coastal zone, while taking into account other key users (e.g. tourism, wind farms, aggregate extraction, shipping) and future developments and exploiting mutual opportunities.

This work package consists of five different tasks that are each related to different objectives in the evaluation process:

Task 4.1: To develop a framework for evaluation of marine spatial management in coastal zones In this task a framework for multi-objective quantitative and qualitative evaluation of marine spatial management in coastal zones will be developed. The goal is to develop a generic framework that can be applied in each of the case study areas and will enable comparison of evaluation results.

iven the complicated nature of developing dynamic process models that also include a spatial component; the additional complications of including social and economic considerations; and the expense of collecting the required data to run these models, a balance between quantitative and qualitative methods of evaluation needs to be found. Depending on the availability of data and models for each case study this relative proportion will vary from one area to the other.

Task 4.2: To identify spatial management objectives and assess (weight) the degree to which they are currently being achieved For every case study area, identify sustainability objectives (e.g. socioeconomic, biophysical and governance) for use of the coastal zone. These boundary conditions can be derived from various legislation and policy documents from different jurisdictional levels (e.g. international, European, national). These legislation and policy documents were collected and reviewed in work package 2. Next, for each case study area, this sub-task will identify management objectives and develop objective hierarchies which distinguish between several levels of management objectives (Pascoe et al., 2008). Higher order objectives are more generic, whereas lower order objectives are refinements of the higher level objectives. The management objective hierarchies can be identified with the key managers of case study areas at different jurisdictional levels. For every spatial management tool, this task will identify aquaculture and fisheries specific objectives.

The identified spatial management objectives will be weighted in a process involving key stakeholders. An advantage of involving key stakeholders into the analysis is that differences in opinion regarding management objectives become transparent, and potential areas of disagreement can be identified. After all, successful management form one stakeholder's perspective may mean failure from another's (Pascoe et al., 2008). This will require significant interaction with local stakeholders from aquaculture / fisheries and other sectors.

Task 4.3. Development of indicators After weighting the objectives they will be articulated into clear statements of 'Key Desired Outcomes' that define the tangible results that would be expected if the objectives were fully realized. If the present state of knowledge does not allow objectives to be articulated into statements of desired outcomes, there is a need to establish surrogates (Day, 2008). In addition, as well as considering what outcomes are desired, what outcomes would not be expected if the objectives were fully realized will also be considered.

The next step will be to develop realistic and measurable performance indicators that can be used to practically measure the impacts (e.g. natural, economic and social) of the aggregate activities in the case study areas. As it is not practical to measure directly all the attributes that relate to a case study area, a limited number of representative indicators need to be selected.

Task 4.4 Measurement of impacts This task aims to measure the cumulative impacts of the aggregate coastal activities in the case study areas. This includes taking into account the impact of transboundary effects that are a result of activities carried out outside of the case study area (e.g. marine or land based activities). It is important to note that task 4.2 does not try to isolate the impact of individual spatial management tools and whether they enhance or detract from the spatial management objectives. This will be done in task 4.4.

Task 4.5: To determine how individual spatial management tools influence key activities In order to quantitatively evaluate the effectiveness and efficiency of the currently applied spatial management tools, the dynamic process models that include a spatial element (i.e. bio-economic and ecosystem models) need to be linked to these spatial management tools. The dynamic process models that are mentioned above were identified and selected in work package 3. For every case study area task 4.3 will determine how each of the currently applied spatial management tools influences the key coastal activities in that particular case study area. This will enable a selective use of various dynamic process models in order to quantitatively evaluate the effectiveness and efficiency of spatial management tools in task 4.6 and the scenarios (task 4.7).

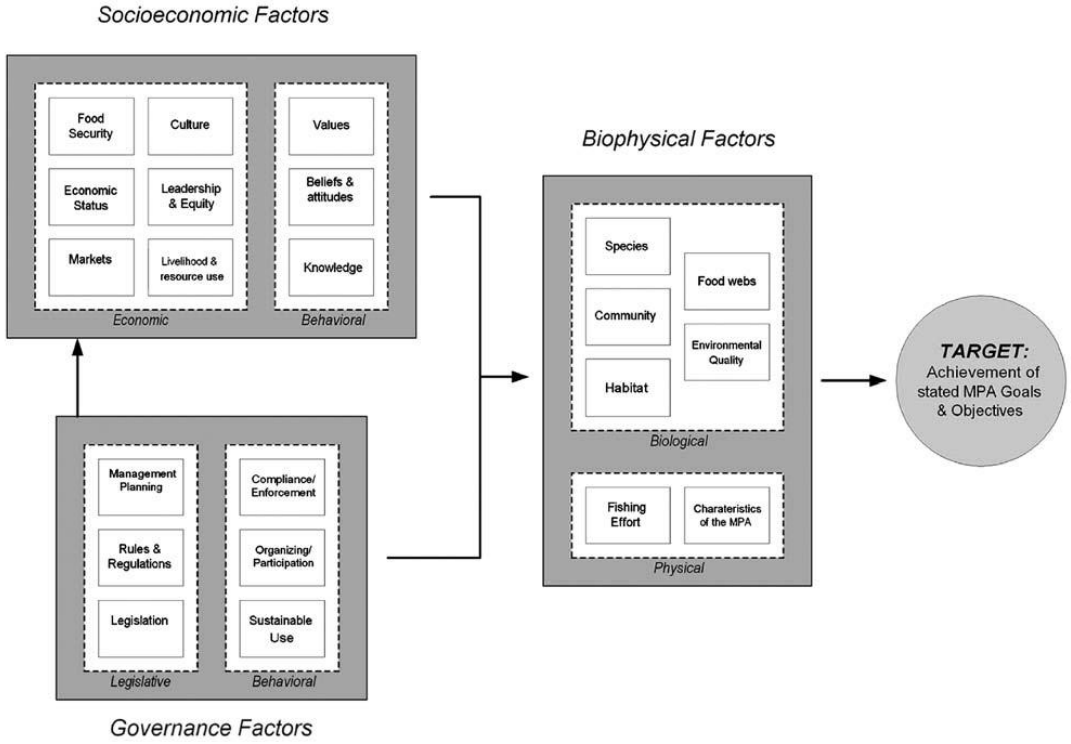

Figure 2: A conceptual framework of the operating conditions within and around selected case studies. Source: Pomeroy, R. (2005)

Task 4.6 To evaluate the effectiveness and efficiency of spatial management tools

In this task the effectiveness and efficiency of all of the currently applied spatial management tools will be evaluated in every case study area. This task will attempt to isolate the impact of individual tools. The evaluation in task 4.4 will constitute a baseline for the evaluation of adaptations to spatial management tools in task 4.5. Effectiveness is the degree to which the objectives are achieved. Unlike effectiveness, efficiency is determined with reference to costs (e.g. expenditure, time, effort).

Each case study area is expected to operate under different biophysical, socio-economic and institutional (governance) conditions. Fig. 4.1 presents a simplified representation of such complex relationships and how they influence the degree to which the objectives of the considered spatial management tools can be achieved. As the objectives of spatial management tools as well as the indicators to measure the outcomes fall into these three primary categories, the framework in Fig. 4.1 will provide the conceptual basis for the evaluation of the effectiveness and efficiency of the currently applied spatial management tools. To support

this process, appropriated indicators have been identified in task 4.2 and work package 2 (governance - best practice). Furthermore, work package 3 has identified the data for the selected indicators and aspects of efficiency, together with dynamic process models necessary for evaluation of spatial management effectiveness. Socio-economic and biophysical indicators will predominantly be assessed on the basis of the dynamic process models. The indicators of governance factors will be assessed in a qualitative manner involving stakeholder consultation. The evaluation of effectiveness of spatial management tools will focus on the degree to which each of the following objectives are being achieved: the sustainability objectives for use of the coastal zone; the management objectives for case study areas; and the aquaculture and fisheries specific objectives for spatial management tools. This includes the evaluation of the effectiveness of those spatial management tools that have been applied in another sector, but have an impact on aquaculture and/or fisheries.

Task 4.7: To evaluate adaptations to spatial management tools and propose adaptations

For each case study area this task evaluates adaptations to individual spatial management tools that are currently applied at different jurisdictional levels (e.g. international, European, national) in order to identify specific improvements and to more efficiently promote:

- different forms of aquaculture and fisheries in appropriate sites, under different biophysical, socio-economic and institutional conditions, and with exploitation of mutual opportunities;
- acceptance of aquaculture and fisheries activities by society; and
- integration of aquaculture and fisheries activities with other coastal users / sectors.

Adaptations to currently applied spatial management tools will be made on the basis of the review of best practices in work packages 1 and 2 and the result of the baseline evaluation in task 4.4. The dynamic process models that were identified and selected in work package 3 will be used to assess the consequences of the adaptations as compared to their original state. Each case study will apply model scenarios to evaluate present conditions and future options for the evolvement of different patterns of human activity, including aquaculture and fisheries. These scenarios will be described in work package 1 and the necessary data will be made available in work package 3. Model scenarios will also include the potential impact of external developments like climate change. Possible improvements of particular spatial management tools will be identified. The resulting information will be used as an input for work package 5, where generic alternatives will be proposed.

Deliverables

D 4.1 An internal working document containing the developed framework for multi-objective quantitative and qualitative evaluation of marine spatial management in coastal zones.

D4.2 – For each case study area a final report containing:

- measured cumulative impacts of the aggregate coastal activities;
- evaluation of the effectiveness and efficiency of currently applied spatial management tools; and
- results of scenario studies, that incorporate best practices and proposed improvements to existing spatial management tools, on the effects on aquaculture, fisheries and other activities in coastal zones.

D4.3 – Submission of a peer-reviewed paper on the development of a framework for multi-objective quantitative and qualitative evaluation of marine spatial management in coastal zones.

Work package number	5	**Start date or starting event:**				Month 25							
Work package title	**Best Practice: Synthesis of COEXIST Work Packages 1 to 4 and Case Studies**												
Activity Type	RTD												
Participant id	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Person-months per beneficiary:	1.8	19	3.5	0	0.6	2.1	8.1	4.4	2.2	2.9	2.4	1	0	0.9

Objectives

WP5 will synthesise at a higher level in order to look beyond the scale of individual case studies for common patterns of interactions between activities and general rules to derive best management practices and

guidelines that can be applied in coastal zone management in Europe. The main objectives are:

A) Evaluation of benefits and possible bottlenecks for concomitant development of fisheries, aquaculture and other major present and future activities in the coastal zone.
B) Extrapolation of generic conclusions from work packages 1 – 4 to areas that have not been targeted by the case studies in relation to patterns of interactions between activities and management scenarios.
C) Communicate and discuss research results from WPs 1 – 4 to stakeholders.
D) Identification of best practices for integration of fisheries and aquaculture in coastal zone management with respect to legislation and policy issues and if needed proposal of suitable spatial management tools.

Description of work

WP5 will build upon the outcomes of WP1 (identification of existing interactions and conflicts of aquaculture and fisheries) and WP2 (description of governance). It will synthesise the modelling results and interpretations produced in WPs 3 and 4. Based on regionally restricted scenarios modelled within WP 4, the general usefulness of existing legislation will be evaluated and best practices will be derived from the comparison of country-specific regulations. This overall synthesis will provide guidance to managers in order to optimize the allocation of coastal areas by balancing the different demands of various stakeholders for exploitation and conservation.

Task 5.1: A compilation of case study results in order to identify benefits and bottlenecks for concomitant development: The results of the case studies from work packages 1–4 will be analysed to derive region-specific conclusions about options for mutual benefits to be reached through effective management of activities requiring space in the coastal zone. Bottlenecks will be described and investigated with respect to possible solutions.

Task 5.2: Evaluation of conclusions from the individual case study analyses and modelled management scenarios for generic applicability. A broad comparative analysis will lead to an overall evaluation of current applications of spatial management tools and of possible mutual opportunities with combined uses. Results will be assessed for possible extrapolation to derive generic recommendations for spatial management in European seas. This will also identify gaps in the transferability of overall conclusions from the individual case study areas to other European areas.

Task 5.3: Compilation of a working document based on tasks 5.1 and 5.2, and by consultation of stakeholders, including representatives from fishing and aquaculture industries, national management agencies, the EU-Commission, research institutes and other relevant institutions. A synthesis workshop will be prepared by concerned

Task 5.4: A synthesis workshop will be held in order to draft a best practice manual for marine coastal zone management starting from the working document compiled through task 5.3. The manual will be a tool for decision support and communication to stakeholders. Special attention will be given to the aspects: Conflicts through consideration of the most effective temporal and special placement of each activity; differences in acceptance of decisions on priorities between multiple users by the society; economic consequences of various political options in spatial planning. The Best Practice Guide will be finalised in communication with workshop participants and external reviewers.

Deliverables

D 5.1 - Working document describing general conclusions from the overall comparison of realized management methods and modelled alternative scenarios in spatial planning.

D 5.2 - Document: Guideline for Best Practice in Spatial Planning to integrate Fisheries, Aquaculture and further Demands in the Coastal Zone. Potential end users will be EU Commission and national level decision makers as the synthesis aims at supporting the European Maritime Policy.

Work package number	6	Start date or starting event:								Month 1				
Work package title	**Dissemination, communication and Knowledge Transfer**													
Activity Type	OTHER													
Participant id	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Person-months per beneficiary:	3	0	0	0	0	0	0	0	0	0	0	0	14	0

Objectives

- Identify and segment stakeholders and end users of the COEXIST project
- Raise public and sector specific awareness of the project, its objectives and activities
- Set up effective dissemination tools and services for the project for transfer of knowledge during the project
- Ensure effective communication and feedback with end users and other stakeholders
- Effectively compile, customise (language, terminology, format) and transfer to end-users the new knowledge generated from project activities in a format and medium that allows uptake and exploitation

Description of work

Task 6.1 Identification and segmentation of the stakeholders and target end users of COEXIST In order to be able to effectively disseminate information it is necessary to identify the target recipients of knowledge from COEXIST. This task is dedicated to building a database of stakeholders and end-users. In WP1-4, stakeholder consultations will take place and stakeholder mapping will be carried out in WP2. The WP and case study leaders will be able to provide WP6 with the necessary input for a database of stakeholders. Database fields are likely to include type of stakeholder, contact info, and preferred communication language. The database will be applied, e.g. to select recipients of interim results and final outcomes of the project. WP6 will identify other key end users of the knowledge, which are not addressed as stakeholders through the case studies (e.g. other national policy makers, EC representatives, regional bodies, NGO's etc.). The database will be created in the first quarter of year 1 and thereafter updated on a regular basis throughout the project.

Task 6.2 General Dissemination The design of the COEXIST project makes it necessary to disseminate information to a range of stakeholders and end users. To do this the project will use two methods. General dissemination will take place using AquaTT's existing services and networks (i.e. the sharepoint intranet facility already installed and used by the consortium during the preparation of the COEXIST proposal, e-newsletters, thematic networks, technology platforms) which will ensure a broad awareness of the project across the spectrum of European stakeholders. In addition, specific customised dissemination will take place where there is a need to communicate to sub-groups of end-users as identified in the task 6.1

Task 6.3 Targeted Dissemination requires an understanding of the end user needs so that any dissemination activities can be customised to meet these needs. This task has already been informed by task 6.1 which has identified clusters of target end-users. For further description of targeted end users, see Section 3.1

Task 6.4 Communication and Feedback COEXIST engages with stakeholders and target end users across Europe, representing different opinions and priorities. It is a multidisciplinary project, which requires face to face surveying, modelling and the integration of many factors. It is therefore necessary to ensure that the project carries out an open and transparent process and has mechanisms which allow interested parties to provide feedback.

Task 6.5 Compilation of all knowledge generated from the project and translation (level, terminology, language) for end users. Research outcomes and knowledge generated in each WP needs to be identified, recorded, and assessed with respect to its use to individual groups of end users. A suitable presentation method is to be identified, taking applicable Intellectual Property Rights (IPR, See section 3.2) into considerations.

Task 6.6 Scientific publications of research and presentations at scientific conferences and industry events Peer-reviewed publications must be produced, since a large element of the decision making with

regards to spatial management is informed by scientific data and processes and thus state of the art developed by the project needs to be in the public domain and peer reviewed. In particular, the COEXIST consortium will propose a theme session on Integrated Coastal Zone Management – Fisheries and Aquaculture at the Annual Science Conference of the ICES (International Council for the Exploration of the Sea). ICES, as one of the major bodies producing scientific advice for the European Marine Policy, is targeted as a particularly relevant institution for COEXIST scientific outcomes.

Deliverables

D6.1 Database of stakeholders and target end users
D6.2 Project Brochure
D6.3 Project website
D6.4 >6 article/press releases per year on COEXIST
D6.5 Annual Report on attendance and dissemination at aquaculture events
D.6.6 Project updates for stakeholders D6.7
D6.8 Presentations at producers events
D6.9 Report on all targeted dissemination efforts and analysis of impact
D6.10 Years 1+2, each: Annual Report on knowledge generated within the project, analysis of potential and recommended plans of action for the following year
D 6.11 Year 3, Final WP6 report on overall and deliverables generated by COEXIST
D 6.12 Scientific publications
D 6.13 Presentations at Scientific Conferences

Work package number	7	**Start date or starting event:**										Month 1	
Work package title	**Knowledge management – Supporting systems, processes and methodologies**												
Activity Type	OTHER												
Participant id	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Person-months per beneficiary:	0	0	0	0	0	0	0	0	0	0	0	0	12.5	0

Objectives

WP7 will ensure that the gathering, analysing, storing and sharing of knowledge and information within the COEXIST partnership is effective and efficient. External knowledge management will be covered by WP6. WP7 will be cross-cutting and support all other work packages as required. Since some of the WP's are progressive (i.e. with later WP's relying on earlier WP's), it is essential that the flow of information in the project is efficient, to ensure that WP6 can disseminate and communicate new knowledge over the course of the project rather than waiting until the end. Specific objectives are:

1) To implement a project management system for internal partnership communication and exchange
2) To assist WP's in the development of their methodology and processes for communicating with stakeholders in the case studies across the WP's (i.e. stakeholder consultations)
3) To centralise the data management in the project to ensure consistency and compatibility between WP's, a meta database of results across WP's allowing easier analysis and to prevent any potential overlap
4) To assist in the organisation of any external events in the project (stakeholder workshops, final workshop).

Description of work

Task 7.1 To assist in the development of the methodology and processes for communicating with stakeholders in the case studies across the WP's (i.e. stakeholder consultations) Across the WP's there will be stakeholder consultations. A consistent approach is needed and protocols must be set between WP's and within WP's. This WP will support all other WP's by designing collateral material to introduce the objectives of the project and it's surveying activities to stakeholders in order to secure participation. It will

assist the WP's in designing the surveys and ensure that there is no overlap between surveying activities. It will design a protocol for carrying out surveying to ensure that there is consistency in measuring responses. It will provide a protocol for Case Studies to compile and submit results to the WP coordinators in a consistent format which can be compiled for analysis. It will work closely with WP5 in synthesising results for joint analysis.

Task 7.2 To centralise the data management in the project to ensure consistency and compatibility between WP's, a meta database of results across WP's allowing easier analysis and prevent any potential overlap A significant amount of data collection will have taken place over the course of the project based on Case Studies and the analysis of the wider European situation. This task involves working closely with the WP's to develop a suitable database system that allows partners to query the data and extract the information required to carry out their analyses. The data management needs of the different WP's will be discussed with WP coordinators and Case Study leaders. A meta-database system will be developed based on identified WP needs, allowing easy access to the database of stakeholders and target end-users developed in WP6. It will contain a tool to facilitate the submission of surveying results by case study, to perform basic statistical analyses for a preliminary evaluation of surveying results. It will not contain data related to modelling which will be addressed in WP3. Later in the project the database could be converted into a public deliverable by creating a public interface to allow users to access certain results (respecting the IPR agreement and stakeholder confidentiality agreements developed by the consortium).

Task 7.3 To assist in the organisation of any external events in the project (Stakeholder Workshops, Synthesis Workshop There will be stakeholder events across the case studies. This task will assist the organisers of those events by developing a template structure (in consultation with the WP leaders and case study leaders) to ensure that the events are well run, have the intended impact, and feedback gathered is in a consistent format that can be analysed. Innovative techniques or tools will be identified to help the workshops meet their intended outcomes. The WP will assist in event preparation, announcements, design promotion materials, reviewing presentations, and assist in the online registration of participants. Provide a feedback survey to measure participant satisfaction. It is envisaged that the Case Study organisers and WP leaders will be responsible for the local delivery of the events.

Deliverables

D 7.1 Design support collateral for stakeholder surveying
D7.2 Design stakeholder surveys
D7.3 A protocol for carrying out stakeholder surveying
D7.4 A protocol for case study leaders to compile and submit surveying data/results to WP's
D7.5 A meta database to host the data collection in the project
D7.6 Event Structure Template per External event
D7.8 Feedback survey to measure participant satisfaction
D7.9 Results of participant feedback surveys per event

Work package number	8	**Start date or starting event:**								Month 1				
Work package title	**Project management**													
Activity Type	MGT													
Participant id	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Person-months per beneficiary:	15.6	0	0	0	0	0	0	0	0	0	0	0	23.5	0

Objectives

Work package 8 combines activities for the internal management of the project among the partners in the COEXIST consortium. Its specific objectives are:

- Develop a Consortium Agreement ensuring effective management of the consortium and fair and

reasonable conditions for the partners.

- Maximize the efficiency and effectiveness of the work performed within the project and form an efficient Executive Board and relevant WP groups, thus optimising communication within the consortium.
- Develop a Communication and Dissemination Plan describing how the project is to achieve its goals and specify the target groups for the communication work.
- Organise workshops for presentation of results and exchange of ideas.
- Ensure and maintain good contact between the project and the European Commission.

Description of work

Task 8.1 Design and manage a project management system for the partnerships COEXIST will use an online project management system to facilitate the interaction within the consortium.

Task 8.2 Internal Project Communication. Design and maintanence of communication plan, intranet/partner section of project website, project management system, intellectual property agreements for partnership.

Task 8.3 Scientific Project Management. Consortium Meetings, working meetings, scientific monitoring of the project as a whole

Task 8.4 Administrative Project Management. Financial management, contractual management, correspondence with EU contact points.

Deliverables (brief description and month of delivery)

DL.8.1 The Consortium Agreement has been signed by all partners.

DL 8.2. The internal project management system has been set up

DL.8.3 The Project Assistant (PA), the Financial Assistant (FA) and the other members of the Management Support Team have been appointed and all partners have been informed about who they are.

DL 8.4 The Communication plan has been developed and communicated to all partners.

DL.8.4 Information on the content of the scientific workshops, participation in workshops and distribution of grants aiming at supporting exchange activities will be included in the yearly report to the EC.

DL.8.5 Yearly progress reports to the European Commission and final report.

Table 1.3e-Summary of staff effort (person-months)
Work package leader in bold cases

Participant No. short name	**WP1**	**WP2**	**WP3**	**WP4**	**WP5**	**WP6**	**WP7**	**WP8**	**Total Person-months**
1 IMR	2	2	4.6	2.3	1.8	3	0	**15.6**	**31.3**
2 vTI-SF	6	2	14	12.5	**19**	0	0	0	**53.5**
3 UCC	6.5	**14.6**	7.7	7.6	3.5	0	0	0	**39.9**
4. IFREMER	2	1.8	3	0	0	0	0	0	**6.8**
5 IPIMAR	8.4	0	24.6	15.8	0.6	0	0	0	**49.4**
6 IMAR	7.4	0	**42**	9.9	2.1	0	0	0	**61.4**
7 FGFRI	5	5	0	10.7	8.1	0	0	0	**28.8**
8 CNR-ISMAR	4.9	1.8	4.5	13	4.4	0	0	0	**28.6**
9 CEFAS	0.4	0	2.4	4.1	2.2	0	0	0	**9.1**
10 LEI	3	2.6	14.4	**15**	2.9	0	0	0	**37.9**
11 IMARES	**9.1**	0.9	6.6	4.3	2.4	0	0	0	**22.4**
12 DTU-Aqua	1.2	0.7	0	2.1	1	0	0	0	**5**
13 AquaTT	0	0	0	0	0	**14**	**12,5**	23.5	**50**
14 SYKE	1.2	0	0	4.1	0.9	0	0	0	**6.2**

1.3.iv Interdependence of COEXIST Work packages – please see 1.3.i – Overall strategy. Note that the Work Packages are generally highly interdependent. The internal Kowledge management strategy imposed through Work package 7 will ensure a swift and uniform data treatment which si transparent throughout the project.

1.3.v Risks. No significant risk are foreseen, apart from individual partners not meeting the requirements. The management structures are robust and will be able to meet delay of tasks with adequate actions.

It is foreseen that the highly transparent data treatment policy of COEXIST will enable Coordinator and the other leaders of Work packages and Case studies to become aware of partners not delivering the sufficient data at the earliest possible stage, enabling the Consortium to take appropriate actions.

2. Implementation

Each participant in the project undertakes to take part in the efficient implementation of the Project, and to cooperate, perform and fulfil, promptly and on time, all of its obligations under the Grant Agreement and the Consortium Agreement (based on "The Simplified FP7 Model Consortium Agreement" developed by DESCA to be used in small projects (http://www.desca-fp7.eu/DESCA/descahome.htm) as may be reasonably required from it and in a manner of good faith as prescribed by Belgian law.

2.1 Management structure and procedures

The General Assembly is the decision-making body of the Consortium

The Coordinator is the legal entity acting as the intermediary between the Parties and the European Commission. The Coordinator shall, in addition to its responsibilities as a Party, perform the tasks assigned to it as described in the Grant Agreement and this Consortium Agreement.

The Management Support Team assists the General Assembly and the Coordinator.

General Assembly

The General Assembly shall consist of one representative of each Partner.
Each Member shall be deemed to be duly authorised to deliberate, negotiate and decide on all matters that will be listed in the Consortium Agreement.

The Coordinator shall chair all meetings of the General Assembly, unless decided otherwise by the General Assembly. The General Assembly can be facilitated through web-based

The Partners agree to abide by all decisions of the General Assembly.
This does not prevent the Partners to submit a dispute to resolution in accordance with the provisions of settlement of disputes that will be agreed on in the Consortium Agreement.

Operational procedures for the General Assembly

Any Member of General Assembly:

- should be present or represented at any meeting;
- may appoint a substitute or a proxy to attend and vote at any meeting;
- and shall participate in a cooperative manner in the meetings.

The Coordinator shall convene ordinary meetings of the General Assembly at least once every six months and shall also convene extraordinary meetings at any time upon written request of any Member.

Decisions of the General Assembly

The following decisions shall be taken by the General Assembly:

Content, finances and intellectual property rights

- Proposals for changes to Annex I of the Grant Agreement to be agreed by the European Commission
- Changes to the Consortium Plan (including the Consortium Budget)
- Withdrawals from Background included
- Additions to Background excluded
- Additions to Listed Affiliated Entities
- Additions to List of Third Parties

Evolution of the Consortium

- Entry of a new Partner to the Consortium and approval of the settlement on the modalities and conditions of the accession of such a new Partner

- Withdrawal of a Partner from the Consortium and the approval of the settlement on the modalities and conditions of the withdrawal
- Declaration of a Partner to be a Defaulting Partner
- Corrective measures to be required from a Defaulting Partner
- Termination of a Defaulting Partner's participation in the Consortium and measures relating thereto
- Proposal to the European Commission for a change of the Coordinator
- Suspension of all or part of the Project
- Termination of the Project and/or the Consortium Agreement

In the case of abolished tasks as a result of a decision of the General Assembly, Members shall rearrange the tasks of the Partners concerned. Such rearrangement shall take into consideration the legitimate commitments taken prior to the decisions, which cannot be cancelled.

Management Support Team
The Management Support Team shall be proposed by the Coordinator. It shall be appointed by the General Assembly and shall assist and facilitate the work of the General Assembly.

The Management Support Team shall provide assistance to the Coordinator for executing the decisions of the General Assembly. It shall be responsible for the day-to-day management of the Project.One partner, AquaTT will perform specific tasks under the supervision of the Coordinator, on the behalf of the Coordinator in WP 7 (Knowledge management) and WP 8 (Project management) It is the intention to employ a dedicated Project Officer located at AquaTT to ensure that these tasks are carried out.

Coordinator
The Coordinator shall be the intermediary between the Partners and the European Commission and shall perform all tasks assigned to it as described in the Grant Agreement and in this Consortium Agreement.

In particular, the Coordinator shall be responsible for:
- monitoring compliance by the Partners with their obligations
- keeping the address list of members and other contact persons updated and available
- collecting, reviewing and submitting information on the progress of the Project and reports and other deliverables (including financial statements and related certifications) to the European Commission
- preparing the meetings, proposing decisions and preparing the agenda of General Assembly meetings, chairing the meetings, preparing the Minutes of the meetings and monitoring the implementation of decisions taken at meetings
- transmitting documents and information connected with the Project, including copies of Accession documents and changes of contact information to the Partners
- administering the Community financial contribution and fulfilling the financial tasks
- providing, upon request, the Partners with official copies or originals of documents which are in the sole possession of the Coordinator when such copies or originals are necessary for the Partners to present claims.

The Management support Team, particularly the dedicated Project Officer, will be utilised in order to fullfill these tasks.

If the Coordinator fails in its coordination tasks, the General Assembly may propose to the European Commission to change the Coordinator. The Coordinator shall not be entitled to act or to make legally binding declarations on behalf of any other Partner. The Coordinator shall not enlarge its role beyond the tasks specified in this Consortium Agreement and in the Grant Agreement.

2.2 Individual participants

Table: List of Participants

Participant Number	**Participant name**	**Participant short name**	**Country**	**Date enter project**	**Date exit project**
1 coordinator	Institute of Marine Research	IMR	Norway	1	36
2	Johann Heinrich von Thünen Institute; Federal Research Institute for Rural Areas, Forestry and Fisheries - Institute of Sea Fisheries	vTI-SF	Germany	1	36
3	University College Cork	UCC	Ireland	1	36
4	Institut Francais de recherché pour L'exploitation de la mer	IFREMER	France	1	27
5	National Institute of Biological Resources	IPIMAR-INRB	Portugal	1	36
6	The Institute of Marine Research	IMAR	Portugal	1	36
7	The Game and Fisheries Research Institute	FGFRI	Finland	1	36
8	Consiglio Nazionale Delle Richerche – Istituto Di Scienze Marine	CNR-ISMAR	Italy	1	36
9	Centre for Environment, Fisheries and Aquaculture Science	CEFAS	U.K	1	36
10	LEI	LEI	The Netherlands	*1*	*36*
11	Institute for Marine Resources and Ecosystem Studies	IMARES	The Netherlands	*1*	*36*
12	Danmarks tekniske universitet	DTU-Aqua	Denmark	*1*	*36*
13	Aqua TT UETP Ltd	Aqua TT	Ireland	*1*	*36*
14	Finnish Environment Institute	SYKE	Finland	*1*	*36*

Note: As several participants are represented by several individual research groups and/or departments, the description of the partners exceeds one page per partner.

Participant no. 1: Institute of Marine Research (IMR), Norway (Departments *Health, Ocanography, Fisheries Dynamics and Population genetics*)
(http://www.imr.no) IMR has about 700 employees and is Norway's largest centre in marine science, and the second largest marine research institute in Europe. The main task is to provide science-based advice to Norwegian authorities on aquaculture and the ecosystems of the Barents Sea, the Norwegian Sea, the North Sea and the Norwegian coastal zone. For this reason, about fifty percent of the activity is financed by the Ministry of Fisheries and Coastal Affairs. IMR's headquarters are in Bergen, but important activities are also carried out at the departments in Tromsø, at the research stations in Austevoll, Matre and Flødevigen, and the research vessels. The institute is also heavily engaged in development and activities in the Third World. The overall aim of research and advice provided by IMR is to ensure that Norway's marine resources are harvested and managed in a sustainable way. Focused on aquaculture, fisheries and marine environmental studies, the present area of priority is interactions in the coastal zone, emphasizing aquaculture-fisheries interactions, implementation of the Marine Strategy Framework Directive, and general coastal zone ecology. Of particular regional importance to Norway and Northern Europe is fjord ecology.

IMR has modern laboratories with facilities for rearing of marine fish. The facilities and personnel holds relevant certificates for Animal Experiments according to Norwegian and European legislation.Adjacent to the biological laboratories are modern laboratories for molecular biology, microbiology and fish pathology. IMR's contribution to the present project will be carried out by personell in several of IMR's presently 18 research groups: Oceanography, Fish health, Population Genetics, Fisheries Dynamics and Benthic habitats and Shellfish. The national project EPIGRAPH, focusing on fjord ecology will be highly iintegrated with the present project.

IMR's research on aquaculture is focused on sustainability, including

- *transfer and spreading of of diseases and pathogenic organisms,*
- *fish welfare*
- *ecological impact of aquaculture, including organic waste*
- *genetic impact of aquaculture on wild populations*
- *fisheries –aquaculture dynamics*

Similarly, IMR's activities in the coastal zone is focused on sustainable use and development of the zone, including

- *Fisheries management*
- *Recreational fisheries*
- *Pollution, particularly impact of the oil industry*
- *Oceanography of fjords and coastal waters*
- *Marine Protected Areas*

Key personnel:
Dr. Øivind Bergh (*http://www.imr.no/research/bergh*) (b. 1962), Principal Scientist, Coordinator of the present proposal. Dr. scient in General Microbiology 1996. *Ecological relations between bacteria and early life stages of fish, with emphasis on the Atlantic halibut, Hippoglossus hippoglossus in aquiaculture*. Employed by IMR since 1994, Programme manager 1998-2003, Head of IMR's Fish Health group 2004-2008. Adjunct Professor in Fish Bacteriology at the University of Bergen since 2005. About 75 peer-reviewed publications, mainly on bacterial diseases and microbial ecology of marine fish and shellfish.
Dr. Øystein Skaala (*http://www.imr.no/research/skaala*) Principal Scientist Dr,. scient in Population genetics of Salmonid fishes, 1992. *Genetic variation in brown trout Salmo trutta L. and application of genetic markers in studies on gene flow from cultured populations.* Emploied by IMR since 1985. Currently project manager for the strategic institute programme EPIGRAPH-Hardangerfjord and for the project Genetic and ecological impact of escaped salmonids.
Jon Helge Vølstad, (*http://www.imr.no/om_hi/forskere/view_scientists?cid=6&pid=1580*) Principal Scientist, Dr. scient, Quantitative Fisheries Biology (Biometrics), 1990. Vølstad has over 20 years of international research and consulting experience in quantitative fisheries biology and ecological statistics, specializing in statistical survey sampling methods and experimental design, environmental statistics, and

quantitative methods for fisheries assessment. Vølstad is currently the Principal Investigator and manager of a project supported by the Norwegian Research Council (NRC) to develop methods to estimate catch and effort by tourists in Norwegian coastal waters. He recently joined the IMR team involved in an EU project on Science and Policy Integration for Coastal Systems Assessment (SPICOSA) — an integrated project under the EU´s 6th Framework Program for Research of the European Commission

Merete Nilsen MSc in Integrated Coastal Zone Management" University of Bergen. 2005, BSc in Aquaculture" College of Sogn og Fjordane, 1999. Education: From 2007: Engineer at the Tourist fisheries project at Institute for Marine Research. 2002-2007: Research assistant and Fishroom Manager at Sars International Centre for Marine Molecular Biology. 2001-2002: Technician and Aquaculture assistant at The Live Gene pool Facility for Wild Salmon in Eidfjord.

Dr. Lars Asplin Principal Scientist, Dr. Scient in physical oceanography, 1994. *The influence of the Earth's Rotation on Flows in Fjords and Coastal Oceans.* Employed by IMR since 1997. Involved in a number of projects associated with the influence of aquaculture on the fjord environment and fjord ecology, including observations and numerical modeling of the environment and planktonic salmon lice abundance.

Merete Tødenes Project economist. Senior economist, employed by IMR since 2007, fifteen years experience in finance and insurance business, of which seven years as controller in a major insurance company.

Helene Pedersen Project economist, Senior economist employed by IMR since 1988.

Relevant IMR publications

- **Bergh, Ø**. 2007. The dual myths of the healthy wild fish and the unhealthy farmed fish. *Diseases of Aquatic Organisms*, 75:169-16
- **Bergh Ø**. 2008. Bacterial diseases of fish. Pp. 239-278 in: Eiras J, Segner H, Wahli T and Kapoor B (editors) Fish Diseases. Science Publishers Inc New Hampshire USA.
- **Bergh Ø**., **Nerland AH.** 2008. Improving disease immunity to reduce antibiotic use in farmed fish. In Lie Ø. (ed) Improving farmed fish quality and safety. Pp. 183-198. Woodhead publishing, Cambridge UK.
- Llansó, R. J., D.M. Dauer, **J.H. Vølstad**, and L.C. Scott. 2003. Application of the benthic index of biotic integrity to environmental monitoring in Chesapeake Bay. Environmental Monitoring and Assessment 81:163-174.
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- **Samuelsen, O.B., Nerland, A., Svåsand, T**., Jørgensen, T., Schrøder M., and **Bergh, Ø**., 2006. Viral and bacterial diseases of Atlantic cod *Gadus morhua*, their prophylaxis and treatment: a review. *Diseases of Aquatic Organisms*, 71:239-254.
- **Skaala, Ø., Wennevik, V., Glover, K.A**. 2006. Evidence of temporal genetic change in wild Atlantic salmon populations affected by farm escapees. ICES Journal of Marine Science, 63: 1224-1233.
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Participant no. 2. Johann Heinrich von Thünen Institute; Federal Research Institute for Rural Areas, Forestry and Fisheries - Institute of Sea Fisheries (vTI-SF), Germany

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vTI-SF provides the scientific basis and evaluates the economic conditions to guide the sustainable use of natural marine resources. This institute prepares decision support for the German Federal Ministry of Food, Agriculture and Consumer Protection (BMELV) with respect to the Common Fisheries Policy of the EU (CFP) and international marine conventions (i.a. NEAFC, NAFO, CCAMLR, OSPAR, IWC, ASCOBANS) of which Germany is a member. Through its scientific monitoring programs and research activities, the institute contributes to a general increase in knowledge about marine systems for the benefit of the international community.

Based on its research, the institute enunciates advice to the Federal Ministry (Departments 621 and 622) and the European Commission (STECF, other EU advisory boards). The institute's scientific outcome also forms an important part of the German contribution to the annual advice for fisheries and marine ecosystems provided in collaboration with other European fisheries research institutions (ERA-NET) under the auspices of the International Council for the Exploration of the Sea (ICES). The institute takes part in international research projects funded by EU and other agencies in order to evaluate and resolve specific questions regarding the management of marine living resources and to further improve the scientific basis of its advice. Research is carried out in a variety of different fields, of which fisheries economy, effects of different users of the German EEZ on marine resources and fisheries, as well as fisheries effort management are particularly relevant to this project.

Key Personnel

Dr. Gerd Kraus is the director of the Institute of Sea Fisheries. He has a profound experience in marine ecology and fisheries research. His scientific experience covers the fields of early life history and recruitment in exploited marine fish, population dynamics of marine fish stocks as well as modelling and evaluation of marine protected areas for fishery management purposes. Dr. Kraus will be the leading scientist at vTI-SF for the COEXIST project.

Dr. Anne Sell has been cruise leader for fisheries research surveys in the North Sea and is responsible for analysing survey data from the German EEZ and the Wadden Sea. Her research interests and expertise to be contributed to this project cover the analysis of ecological processes in bottom fish communities, ecosystem effects of fishing activities, and costal zone management. Dr. Sell is currently involved in exploring and evaluating possible fisheries management measures for the designated Natura 2000 sites.

Dr. Matthias Kloppmann has a long experience in larval fish ecology and ichthyoplankton surveys. In recent years he also worked with analysing fish communities in the German EEZ, in particular with respect to proposed wind farms as well as marine protected areas. He will be responsible for fishery and closed areas interaction.

Dr. Jörg Berkenhagen is a research scientist in the field of fisheries economics. He is currently involved in the EU data collection program and he analyzes the economic situation of the German fishing fleet. Dr Berkenhagen accounts for expertise in collecting, processing and analysing relevant economic data and optimizing the combination of production factors. He will be responsible for economic analysis within the case study and will contribute to work packages 1, 2 and 5 with respect to any economical analysis.

Dr. Volker Siegel works with vTI-SF for almost 30 years. His main interests are biology and fisheries on krill and other marine invertebrate species in the southern oceans and Antarctic. He is a member of the ICES WG CRANGON and has a long working experience with brown shrimp population dynamics and fisheries

ecology in the North Sea. Volker Siegel will be responsible for coordinating the analyses of data from research surveys for *Crangon*.
Dr. Ulrich Damm's expertise lies in mathematical modelling related to populations and stock assessment, including population dynamics of *Crangon*. Within this project, he will guide the PostDoc into modelling proxies for the development and distribution of shrimp populations, and modelling of fishing fleet behaviour. He will also contribute to analysing the interactions between blue mussels and oysters in the Wadden Sea.

Recent relevant vTI-SF publications

- Fock, H.O. (2008) Fisheries in the context of marine spatial planning: Defining principal areas for fisheries in the German EEZ. Marine Policy 32 (4): 728-739.
- **Kraus, G.,** Pelletier, D., Dubreuil, J., Möllmann, C., Hinrichsen, H.H., Bastardie, F., Vermad, Y., and Mahevas, S. (2008). A model-based evaluation of the performance of Marine Protected Areas as a fishery management measure for a stock facing strong environmental variability - the example of Eastern Baltic cod (*Gadus morhua callarias* L.). ICES J. Mar. Sci. (in press).
- Morgan, M.J., Murua, H., **Kraus, G.**, Lambert, Y., Martinsdottir, G., Marshall, C.T., O'Brian, L., and Tomkiewicz, J. (2007). The evaluation of reference points and stock productivity in the context of alternative indices of reproductive potential. Can. J. Fish. Aquat: Sci. (in press).
- Ehrich, S., Adlerstein, S., Brockmann, U., Floeter, J., Garthe, S., Hinz, H., Kröncke, I., Neumann, H., Reiss, H., **Sell, A.F.**, Stein, M., Stelzenmüller, V., Stransky, C., Temming, A., Wegner, G., Zauke, G.-P. 2007. 20 years of the German Small-Scale Bottom Trawl Survey (GSBTS): A review. Senckenbergiana maritima. 37(1): 13-82.
- Ehrich, S.; **Kloppmann, M.H.F**.; **Sell, A.F**.; Böttcher, U. (2006): Distribution and assemblages of fish species in the German North Sea and Baltic EEZ's and potential impact of wind parks. Pp. 149-180. In: Offshore Wind Energy. Research on Environmental Impacts. Julia Köller, Johann Köppel, Wolfgang Peters (Eds.). Springer, Berlin.
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- Pedersen, S.A., Fock, H., Krause, J., Pusch, C., **Sell, A.F.**, Böttcher, U., Rogers, S. I., Sköld, M., Skov, H., Podolska, M., Piet, G.J., and Rice, J.C. 2009. Natura 2000 sites and fisheries in German offshore waters. ICES Journal of Marine Science 66: 1-15.

Participant 3. University College Cork, (UCC) Ireland (3 thematic areas)
(http://cmrc.ucc.ie & http://www.ucc.ie/zeps/)
The expertise within the college, relevant to the sustainable use of seas and oceans and integration of aquaculture and fisheries in the coastal zone can best be described according to three key thematic areas: *Applied Fisheries Ecology & Management, Governance, and Data Management /Geomatics for effective marine resource management.*

Applied Fisheries Ecology & Management
The AFDC/CMRC research group has a broad, collective expertise in fish and shellfisheries. The group have led and been involved in a number of fisheries projects in collaboration that have addressed fundamental aspects of fish and shellfish biology and ecology (e.g. Hake and Orange Roughy, mussels and scallops); the research has an applied component through the quantification of discards and incorporation of these into stock assessments, identification of spawning grounds and assisting in management through closed areas/seasons. Research initiatives led by the group focusing on reducing by-catch have had a direct bearing on management decisions e.g. the research group demonstrated that acoustic devices (pingers) reduce the by-catch of harbour porpoises by 90%. The shellfish work has concentrated on management issues such as definition of the resource, control of fishing effort and modelling of recruitment. The AFDCs experience with the variability of relatively small scale shellfish populations ideally complements the large scale work of the pelagic fisheries experts in UCC.

A unique strength of the group is in marine mammal ecology, which compliments the other strengths in the consortium and is a particular focus for projects described later in the document. Given the need for spatially explicit management of fish stocks, spatially explicit population distribution data of top marine predators such as cetaceans, pinnipeds and seabirds, is valuable to resource managers and policy makers. The group have studied the abundance and distribution of cetaceans in Irish and European waters on a number of different temporal and spatial scales, including the inter-relationship with physical and biological oceanographic factors.

- Extensive experience in applied fisheries biology and ecology research
- Contributing valuable data to fisheries resource management
- National experts in top marine predator ecology and conservation including seal fishery interactions
- Experience in modelling the interactions between top predators and fisheries and determining spatial-temporal overlaps.

Governance

Research activities of the group cover participatory governance, stakeholder engagement, socio-economic impact of management decisions on stakeholders, systems theory, Integrated Coastal Zone Management (ICZM), Marine Spatial Planning (MSP), adaptive management, social learning, sustainability science, resilience theory, dealing with non-linear processes/complexity and capacity building.

The group have collaborated on numerous national and international initiatives aimed at improving understanding of the inter-relationships between government, market and civil society at a range of scales. A particular strength involves combining academic theory with practice. For example, work is currently underway to apply a Systems Approach Framework from the FP6 SPICOSA project to the management of Cork Harbour, which is a complex, multiple use zone. The INTERREG funded Coastal Research & Policy Integration (COREPOINT) project, completed in April 2008, was led by the CMRC and fostered the development creation of 'expert couplet nodes' to strengthen the links between scholars and practitioners in an innovative working model. This approach is being further tested under a new Interreg project, Innovative Management for Europe's Changing Coastal Resource (IMCORE).

Facilitating the link between the science and policy interface is also a focus of the current FP6 Conscience project.

The group have experience in liaising between stakeholder groups and legislators and managers, assessing impacts of fisheries management decisions on stakeholders, broadening the economic base of affected stakeholder groups, the development of "bottom-up" fisheries conservation approaches such as the Celtic Sea spawning box closure for Cod fishing and the establishment of fisheries RAC's. This relationship with fishing industry practitioners is invaluable given that the progressive implementation of an ecosystems approach will impact on stakeholder communities. The ICoNet (Irish Coastal Network) forum which facilitates debate on the management of coastal communities is run by the UCC team.

At an international level, the group are involved in a LOICZ initiative to undertake a global assessment of coastal governance arrangements. At a national level the group are leading a large-scale long-term (7 year) study looking at an Ecosystem Approach to Fisheries Management and advising regional bodies on marine policies for rural coastal communities,

Relevance to targeted research area

- Extensive knowledge of policy, legislative and institutional capacity for marine science and management through previous & existing research projects
- Track record of applying theory into practice by working with stakeholders on a wide range of issues including the development of coastal management plans and conservation measures required for the restoration of sustainable fish stocks.

- Insight into and direct experience of the building blocks required to engage with stakeholders for ecosystems approach to fisheries management
- Close working relationships with scientists, industry, policy makers and practitioners concerned with the fishing industry nationally and internationally

Data Management/Geomatics for effective marine resource management
Sound data handling is required to develop an integrated management solution; from the development of tools for data integration for scientific analysis, to decision support systems for policy makers, to communication technology for engaging with stakeholders including fishermen. Geomatics research acknowledges the spatial dimension of fisheries data. It covers the development of Geographic Information Systems (GIS) management and geo-spatial analysis; remote sensing; web services; data integration; semantic interoperability; open source standards and software (e.g. OGC and ISO standards); data mining, visualisation and quality; metadata; and data modelling (e.g. ArcMarine Data Model).

The success of the UCC team in delivering solutions for the marine community is evidenced by the lead role in contributing research expertise to marine FP6 projects (ECOOP, InterRisk, Monruk, LIMES, MARIS) and several national marine research projects [desktop study on data mining for marine data, BIDI (Biological Data Integration), GEODI (Geological Data Integration]. It also has three dedicated post-docs working on a nationally significant 5 year "Geomatics for Geosciences" project.
The application of GIS to a scallop stock enhancement project off the south east coast as part of the inshore fisheries strategic research programme serves as an excellent example of the experience of the group in developing applied tools to support an economically strategic fishery.

The team has the unique ability to understand the data chain from collection through to analysis and dissemination. For example, this team have significant expertise applying multibeam ecosounders, side-scan sonar, ROV and benthic sampling to collect data for processing into habitat maps. Seabed habitat mapping has been applied through various projects (in brackets) to the Scallop fisheries (*Scallops 3, AdFish*), cold-water coral reefs (*ACES, ECOMOUND*), SAC designation and in a regional context (*Habmap*).

Relevance to targeted research area:
- Application of GIS for fisheries management and stock assessment
- Integration of data from multiple sensors and surveys, including physical, social and economic sources
- Optimisation and application of integrated geostatistical techniques within a GIS framework as tools to facilitate ecosystem management

Key personnel*:*
Prof Gavin Burnell, director, AFDC
Interest & experience: Molluscan aquaculture and fisheries, including interactions between aquaculture/fisheries and the environment. 55 refereed papers and 70 technical articles translating research results to industry in an accessible format. Recent projects have been concerned with the management and restoration of shellfish stocks and the control of biofouling in aquaculture.
Jeremy Gault, Deputy Director, CMRC
Interest & experience: Utilisation of scientific data, derived directly from the field and from modeling of coastal dynamics, as a tool for effective integrated coastal zone management. He is concerned with both the quality and relevance of the data collected and the ability of the scientific community to effectively communicate results to those with high levels of responsibility but limited scientific background. Experienced project manager and currently manages, IMCORE, a large scale INTERREG project.
Dr **Anne Marie O'Hagan,** Senior Researcher, CMRC.
Interest & experience: Since completing her Phd (The legal and administrative framework for ICZM in Ireland) Anne Marie has worked on a number of European and nationally funded projects including the PROTECT (Marine Protected Areas as a tool for ecosystem conservation and fisheries management) and HERMES (Hotspot Ecosystem Research on the Margins of European Seas). She has completed a law degree and currently works on the CONSCIENCE, SPICOSA and IMCORE projects.
Fitzpatrick, M., associate researcher, CMRC.

Interest & experience: Marine biologist with 12 years professional experience in fisheries, including six years working for fishermen's organisation in South of Ireland setting up and managing projects aimed at development of stakeholder led conservation measures and strategies for resolution of long-term fishing industry problems. Contributed to number of Irish Fishery Reviews including recent Cawley Seafood Strategy Review, Irish Common Fisheries Policy Review Group, 2006 Salmon Fisheries Review.

Relevant publications:

- Ballinger, R., **Cummins**, V., Dodds, W., C. O Mahony, C. & Smith, H. (2004). Community Based Approaches to Coastal Management – the CoCoNet Initiative. Proceedings of Littoral 2004: Delivering Sustainable Coasts: Connecting Science and Policy, Volume 1. Cambridge Publications. ISBN: 0-9540081-0-4.
- **Burnell**, G.M. (1996). The environmental impact of marine bivalve mollusc exploitation: a brief review of the disturbance caused by mariculture and fishing. In: Disturbance and recovery of ecological ecosystems (Eds: A. Myers and P.G. Giller). Proceedings of the Royal Irish Academy, 95B (3): 217 - 223.
- **Burnell**, G.M. and Davenport, JL. (2004). A review of the use of TBT in marine transport and its impact on coastal environments. In John Davenport and Julia L. Davenport (eds.) The Effects of Human Transport on Ecosystems: Cars and planes, Boats and Trains, 267-276. Dublin: Royal Irish Academy.
- **Burnell**, G.M. (ed.). (2001). Coastal shellfish - a sustainable resource. Kluwer Academic Publishing, pp. 224.
- Cross, T.F**., Burnell**, G., Coughlan, J., Culloty, S., Dillane, E., McGinnity, P., and Rogan, E. (2008). Detrimental effects of interactions between reared strains and wild populations of marine and andromous fish and invertebrate species. In: (Eds) Holmer, M., Black, K., Duarte, C.M., and Karakassis, I. Aquaculture in the Ecosystem, 117 - 154, SpringerDavenport, J., Black, K., **Burnell**, G. Cross, T., Culloty, S., Ekaratne, S., Furness, R., Mulcahy, M., and Thetmayer, H. (2003). Aquaculture: the ecological issues. Published by Blackwells/British Ecological Society.
- COREPOINT (2008). (Eds.) Cummins, V., Griffin, P., **Gault, J**., O'Mahony, C. & O'Suilleabhain D. Cork Harbour Integrated Management Strategy: 2008. Corepoint: Coastal Research and Policy Integration, EU Interreg IIIB project.
- Long, R. & **O'Hagan, A.M.** *In Press.* Ireland's Maritime Limits to be published by Clarus Press.
- Mc Kenna, J., Cooper, J.A.G., and **O'Hagan, A.M.** 2008. Managing by principle: a critical analysis of the European principles of ICZM. *Marine Policy.*, 32 pp.941–955
- Mc Kenna, J., **O'Hagan, A.M.**, Power, J., MacLeod, M., and Cooper, A. 2007. Coastal dune conservation on an Irish commonage: community-based management or Tragedy of the Commons? *Geographical Journal* [published article online, paper issue Oct./Nov. 2007]
- Long, R. & **O'Hagan, A.M.** 2005. Ocean and Coastal Governance: the European Approach to Integrated Management – Are there lessons for the China Seas Region? *In: Recent Developments in the Law of the Sea and China; Nordquist, Norton Moore & Fu (Eds.), Nijhoff, 85-142.*
- McKenna, J. MacLeod, M., Cooper, J.A.G., **O'Hagan, A.M.** and Power, J. 2005. Land tenure type as an underrated legal constraint on the conservation management of coastal dunes: examples from Ireland. *Area*, 2005, Volume 37(3), pp.312-323.

Participant 4. IFREMER, France

Partner IFREMER French research institute for exploitation of the sea

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The French research institute for exploitation of the sea, Ifremer contributes, through studies and expert assessments, to knowledge about the ocean and its resources, monitoring of marine and coastal zones and the sustainable development of maritime activities.
To these ends, it designs and operates observational, experimental and monitoring tools and facilities. Ifremer manages the ocean research fleet for the French scientific community.

Created by decree of 5 June 1984, modified on 1998 and 2002, Ifremer is a public institute of industrial and commercial nature. It is placed under the joint supervision of four ministries: Research; Agriculture and Fisheries ; Transport and Housing ; Ecology and sustainable development. Ifremer develops basic and applied research, expertise activities and industrial and technological development actions, aiming at:
- the identification, evaluation, forecasting and sustainable exploitation of marine resources
- the development of more efficient methods for the monitoring, behavioural forecasting, protection and enhancement of the marine and coastal environments
- the encouragement of the economic development of maritime activity.

Priorities are:
• Monitoring, use and enhancement of coastal seas
• Monitoring and optimising aquaculture yields
• Promoting scientific advices on fisheries resources for a sustainable fishing
• Exploring the seafloor and the ocean biodiversity
• Forcasting ocean circulation and marine ecosystems evolution
• Managing facilities and vessels for oceanography

Ifremer takes an active part in European Union studies (the European Science Foundation's Marine Board, the DG Research and DG Fisheries programmes. Ifremer is also a member of international organisations in its field of competence (General commission for Mediterranean fishing, intergovernmental ocean research commission, the OSPAR convention, International Council for the Exploration of the Sea). Ifremer contributes to international research programmes (studies on climate, environment and biodiversity). Ifremer coordinates bilateral partnership agreements (Japan, USA, Canada, Australia, European countries).

Contribution to the project.
IFREMER will contribute to WP1, 2, 3 through its implication in the Seaweed and bivalve fisheries of the Iroise Sea.

Key Personnel
Partner personnel (to be engaged on the study, including short description)

Dr **Olivier Guyader** from UMR AMURE

Olivier Guyader works as a research fellow in fisheries economics at the French Institute for the Sustainable exploitation of the Sea (IFREMER). He has been involved in several European Research projects dealing with fleet behaviour, bio-economics and fisheries regulation and is currently involved in economic data collection projects for economic assessment of commercial and recreational fisheries. In 2007, he coordinated a DGMARE study on small-scale fisheries (FISH/2005/10) in Europe. Other EC projects: "Technological Developments and Tactical Adaptation of important EU fleets" QLK5-2001-01291 / "Economic assessment of European Fisheries" European concerted action Q5CA-2001-01502 / "Measuring Capacity in Fishing Industries using the Data Envelopment Analysis (DEA) approach" DGFISH99/005 / "The significance of Economic incentives in Fisheries Management under the Common Fisheries Policy" FAIR CT97 3936
Dr **Martial Laurans** has been actively involved since 1998 in a number of projects relating to fish biology, fish stock assessment and fisheries management. He has been actively involved in EU-funded research projects (SIAP, POORFISH) around the analysis and modelling of the linkages between management, stock assessment and fishing mortality. He is also a member ICES Working Group of crab. He is currently implied in two major projects from Ifremer, the RECOPESCA Project and the analysis of VMS data.

Recent relevant IFREMER publications

Guyader, O., Berthou, P., Alban, F., Arzel, P. Reynal, L., Koutsikopoulos, C., Etzanos, E., Eschbaum E., Gaspar, P., Fahy E., Tully O. 2007. Small-Scale Coastal Fisheries in Europe, Final report of the contract No FISH/2005/10, 447 p. http://ec.europa.eu/fisheries/publications/studies_reports_en.htm

Guyader, O., Daurès, F. 2005. Capacity and Scale Efficiency: Application of Data Envelopment Analysis in the Case of the French Seaweed Fleet, Marine Resource Economics, 20(4), 347-365.

Guyader, O., Berthou, P., and F. Daurès 2004. Decommissioning Schemes and Capacity Adjustment: A Preliminary Analysis of the French Experience, Communication the NMFS buyback workshop en cours de publication, in Squires (Ed) Fisheries Buyback, Blackwell.

Guyader, O., Daurès, F. and S. Fifas 2004. A Bioeconomic Analysis of the Impact of Decommissioning Programs: Application to a Limited-entry French Scallop Fishery, Marine Resource Economics, 19(2), 225-242.

Boncoeur J., Alban F., **Guyader O.,** Thébaud O., 2002. Fish, fishers, seals and tourists: economic consequences of creating a marine reserve in a multi-species, multi-activity context, Natural Resource Modelling, 15 (3), 387-411.

Frésard, M., Fifas, S., and **O. Guyader** 2006. Biological Invasion Control in a Coastal Fishery : A bioeconomic Analysis of the Saint Brieuc Scallop Fishery, In Proceedings of the 13th Biennal IIFET Conference : Rebuilding Fisheries in an Uncertain Environment. Portsmouth 11-14 July 2006.

Guyader, O, Berthou P., and F. Daurès. 2007 Decommisioning schemes and capacity adjustement : A preliminary analysis if the French experience, in R. Curtis and D. Squires (Ed.) Fisheries Buybacks, Blackwell Publishing, 7: 105-132

Taquet, M., Reynal, L., **Laurans, M.** and A. Lagin. 2000. Blackfin tuna (Thunnus atlanticus) fishing around FADs in Martinique (French West Indies) Aquat. Living Resour. 13 259−262

Participant 5: National Institute of Biological Resources, (IPIMAR-INRB) Portugal

IPIMAR is the governmental research organisation in Portugal in the area of fisheries and marine resources, integrated in the National Institute for Biological resources (INRB) of the Ministry of Agriculture, Rural Development and Fisheries. IPIMAR aims to promote and support a sustainable and competitive fishing industry and aquaculture, to manage fish stocks to maintain maximum sustainable exploitation, to contribute for the protection of marine environment, and to monitor and upgrade the quality of fishery and aquaculture products.

IPIMAR has about 200 researchers and technicians with permanent positions distributed by four Research Units: Marine Resources and Sustainability, Aquatic Environment and Biodiversity, Aquaculture, and Fish Products. The institute hosts also graduated students, PhD and post-doc (about 60). It is responsible for providing scientific recommendations for the assessment of the commercial marine stocks to the European Community. IPIMAR is the national delegate institution at ICES. The institute has three research vessels aimed at providing information on the state of the living marine resources and marine studies. IPIMAR undertakes a wide range of research projects and monitoring activities financed by the Ministry of Agriculture, National Research Council, European Community and Public and Private Companies.

Key researchers:

Carlos Vale is the Head of the Research Unit Marine Environment and Biodiversity of IPIMAR. He and his research team have been involved in 13 research projects in the last 10 years with national and European funding and in tens of contracts with public and private companies. His field of work is marine chemistry, pollution and Water Framework Directive. He has published 150 peer review research papers in international journals.

Miguel Caetano, PhD, is a senior researcher specialised in marine science and chemical oceanography. He has been involved in several projects and governmental contracts concerning the environmental impact of structures in the coastal area. He devolved his research in biogeochemical processes in the water column, interactions of pollutants between sediments and aquatic organisms and diagenetic processes in sediments.

Miguel Neves dos Santos, PhD, is a senior researcher scientist from IPIMAR specialized in fisheries and impacts in marine communities. In the last five years has participated in ten research projects with national

and European funding. He is specialized in the ecology of fish assemblages at artificial structures, fisheries ecology, stock assessment, population dynamic.
Pedro Pousão, equivalent to PhD, is a senior researcher scientist from IPIMAR specialized in coastal aquaculture. In the last five years has participated in various research projects with national and European funds. He is specialized in hatchery, on growing and offshore aquaculture, aquaculture system management.
Miguel Gaspar, PhD, is a senior researcher scientist from IPIMAR specialized in fisheries and marine benthic ecology. He is heading the research group of invertebrate artisanal fisheries. In the last five years has participated in fourteen research projects with national and European funding. He is specialized in the ecological effects of fishing and aquaculture practices on marine ecosystems, small-scale fisheries management and population dynamics.
Dalida Serpa, PhD student at IPIMAR specialized in nutrient biogeochemistry in sediments and aquaculture systems. She has working experience in nutrient dynamics in water column and in sediment-water interface. Recently developed work on the role of artificial reefs in the ecology of the adjoining area.

Relevant Publications

- Carvalho S, Falcão M, Cúrdia J, Moura A, Serpa D, Gaspar MB, Dinis MT, Pousão-Ferreira P, Cancela da Fonseca L., 2008. Benthic dynamics within a land-based semi-intensive aquaculture fish farm: the importance of settlement ponds. Aquaculture International, *in press*, DOI: 10.1007/s10499-008-9227-1
- Joaquim, S., Gaspar, M.B., Matias, D., Ben-Hamadou, R., Arnold, W.S., 2008. Rebuilding viable spawner patched of the overfished Spisula solida (Mollusca: Bivalvia): A preliminary contribution to fishery sustainability. ICES Journal of Marine Science, 65: 60-64.
- Vicente M, Falcão M, Santos MN, Caetano M, Serpa D, Vale C, Monteiro C., 2008. Environmental assessment of two artificial reef systems off southern Portugal (Faro and Olhão): a question of location. Continental Shelf Research 28, 839-847
- Vicente, M., M. Falcão, M. Santos, M. Caetano, D. Serpa, C. Vale e C. Monteiro, 2008. Environmental assessment of two artificial reef systems off southern Portugal (Faro and Olhão): nutrient cycling and seabed organic enrichment. Continental Shelf Research 28:839-847.
- Whitmarsh, D., Ramos, J., Santos, M.N., Monteiro, C.C. 2008. Marine habitat modification off the Algarve (southern Portugal): An economic analysis of the fisheries and the prospects for management. Ocean and Coastal Management 51: 463-468
- Duarte P, Azevedo B, Guerreiro M, Ribeiro C, Bandeira R, Pereira A, Falcão M, Serpa D, Reia J., 2008. Biogeochemical modelling of Ria Formosa (South Portugal). Hydrobiologia 611, 115–132
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Participant 6: The Institute of Marine Research - IMAR, Portugal

The Institute of Marine Research - IMAR (www.imar.pt) was created in 1991, with the general objective of development of Marine Science and Technology. The IMAR Centre for Ecological Modelling CEM) at the New University of Lisbon (UNL) has been carrying out research in Coastal Management and Modelling for about 15 years, and has worked extensively in ecological modelling of coastal systems, data management, GIS and remote sensing. It has a permanent staff of 20 (Ph.D. level, the majority of whom are lecturers at UNL) and a total staff of about 3 times that number.

IMAR has a proven track-record in environmental databases, GIS, remote sensing and ecosystem modelling, as well as in innovative approaches to information technologies, such as the ASSETS web-based eutrophication screening model (http://www.eutro.org/register). Additionally, IMAR has been actively involved in supporting regulatory activity, e.g. by participating in the EU COAST group as part of the

Common Implementation Strategy of the EU Water Framework Directive, and in working groups set up by NOAA to address eutrophication issues in the US.

The IMAR-CEM has excellent credentials in M.Sc., Ph.D. and post-doctoral training of scientists, with over 150 students successfully completing post-graduate training since 1992. This institution is internationally recognized, hosting students from all over the world, including many northern European countries, the U.S., S.E. Asia and S. America over this 15 year period. Training has taken place in the scope of many international programmes, including the European Masters' in marine modelling, Socrates and Erasmus Mundus, bilateral Ph.D. collaborations, and post-doctoral grants. Training has been provided across a range of topics, including ecosystem modelling, benthic ecology, toxicology, hydrology, systems analysis and environmental impact assessment. Laboratory and field facilities are used, and computational products for data processing, GIS, remote sensing and simulation are provided. These are both commercially available products and tools developed within the CEM group.

IMAR covers the majority of research areas on Marine Science and Technology, these include:

- Coastal Management
- aquaculture
- Ecological Modelling
- Environmental Impact
- Fisheries (including Technology)
- Hydrodynamic Modelling
- Instrumentation
- Marine Biology
- Pollution
- Sediment Transport
- Toxicology
- *Key personnel:*

Joao Gomes Ferreira (http://www.fojo.org), principal Scientist. Professor in Environmental Engineering at the Faculty of Sciences and Technology of the New University of Lisbon (UNL), Portugal, and currently on the Board of Directors of IMAR – Institute of Marine Research. B.Sc. in Biology with Oceanography from U. Southampton, Ph.D. in Environmental Sciences from UNL. Coordinator of the modelling component of 12 European research projects over the last 15 years. Over 40 papers in peer-reviewed international journals, and author of the EcoWin2000 ecological modelling package, and co-author of the FARM and ASSETS models.

Camille Saurel, Scientist. Ph.D in Marine Biology 2008 (Bangor University UWB, UK). *Mussel Production Carrying Capacity, The need for an in situ and multidisciplinary approach*. M.Sc. Marine Environmental Protection (UWB, UK).
Research assistant at UWB 2003-2006. Experience in bivalve ecophysiology, growth and aquaculture.

Relevant publications

- Borja, A., Bricker, S.B., Dauer, D.M., Demetriades, N.T., **Ferreira, J.G**., Forbes, A.T., Hutchings, P., Jia, X., Kenchington, R., Marques, J.C., Zhu, C.B. 2008. Overview of integrative tools and methods in assessing ecological integrity in estuarine and coastal systems worldwide. *Marine Pollution Bulletin*, 56, 1519–1537.
- **J.G. Ferreira,** A.J.S. Hawkins, P. Monteiro, H. Moore, M. Service, P.L. Pascoe, L. Ramos, A. Sequeira, 2008. Integrated Assessment of Ecosystem-Scale Carrying Capacity in Shellfish Growing Areas. *Aquaculture*, 275, 138-151.
- Sequeira**, J.G. Ferreira**, A.J. Hawkins, A. Nobre, P. Lourenço, X.L. Zhang, X. Yan, T. Nickell, 2008. Trade-offs between shellfish aquaculture and benthic biodiversity: A modelling approach for sustainable management. *Aquaculture*, 274, 313-328.
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- **Saurel C.,** Gascoigne J., Palmer M. and Kaiser M. J. 2007. *In situ* mussel feeding behaviour in relation to multiple environmental factors: regulation through food concentration and tidal conditions. *Limnology and Oceanography*, 52, 1919-1929.

Partner 7: The Game and Fisheries Research Institute (FGFRI), Finland

(http://www.rktl.fi) Finnish Game and Fisheries Research Institute is an expert organisation with approximately 300 staff members. The institute is in the administrative sector of the Ministry of Agriculture and Forestry. FGFRI is the main governmental research organisation and the principal research centre on fisheries and game research in Finland. The total funding in 2007 was EUR 24.6 million.

FGFRI basic research profile include production of background information for policy making, especially to promote sustainable use, maintenance and management of natural animal resources, to promote fisheries and fish stocks, game management, reindeer husbandry as a business and recreational activities. FGFRI research impacts are seen in comprehensive ecological, social and economic research information supply for sound decision-making and successful business, in improved information-application processes, in improved networking skills and increased networking locally, nationally and internationally. FGFRI research activities are based on societal demand and scientific information needs. Our customers are government, business, non-governmental organizations, corporations, private entrepreneurs and individual citizens. The institute has a long tradition in performing interdisciplinary research projects in many fields in game and fisheries science.

FGFRI has scientific expertise in all major fields of fisheries research and fish biology. FGFRI assess the major stocks, studies the impact of fishery and environmental changes on them, and develops fisheries' management methods and harvesting technology. The fishery management research is focusing on the impact of different fishing gears and fishing methods on the state of the exploitable stocks and especially interactions between marine mammals and fish stocks/fishery. Fisheries research covers catch composition, the regional and temporal distribution of the catch and the effects of regulation on the fishery and fishermen. In fishing technology main research topics are to develop more economical and effective fishing methods taking into account stock interactions e.g. seal-salmon-herring - interactions. Our basic fish stock assessments are used for regulation and for the development of fisheries at regional and international levels. The research in statistics and economy is directed at causal relationships in the fisheries, the major aim being to clarify the role of social, economic and biological factors in determining the development of the fisheries. The environmental research monitors the projected climate change and its impact on fish stocks and fisheries. In particular changes due to anthropogenic forcing are considered. FGFRI has a long-period data-base on catches, stocks, distributions, growth, spawning, nursery grounds, migration patterns, selectivity and discarding. FGFRI promotes fish farming industry through product development and expert work both in national and international projects. FGFRI investigates the consumers needs, product quality requirements, sustainable production and competitiveness of business and studies the effects of social changes as well as the impacts of this on the various actors in the sector. FGFRI has studied the social and economic aspects and the governance of commercial and recreational fisheries and fish farming in EU and national projects.

International cooperation is maintained with the International Council for the Exploration of the Sea (ICES), North Atlantic Salmon Conservation Organization (NASCO) and Scientific, Technical and Economical Committee for Fisheries (STECF), and its working groups in European Commission. FGFRI also contributes to the work of the European Inland Fisheries Advisory Commission (EIFAC, FAO) and participates in a number of research programmes coordinated by the Nordic Council of Ministers (NCM). FGFRI participates in many research projects under the European Union research framework programmes.

Key personnel:

Timo Mäkinen, Ph.D., Senior research scientist (http://www.rktl.fi/yhteystiedot/henkilosto/henkiloesittelyt/timo_makinen.html) has been the coordinator of the Finnish national team in EU funded AQCESS project (Q5RS-2000-31151). He was leading a national study of net loading system for fish farming in 2007 and is participating in the "Natural resources and the society – Research Programme" of the FGFRI.

Jouni Vielma, Ph.D., Senior research scientist, has a background in fish nutrition and has mainly been involved in projects developing sustainable diets for aquaculture. As an example, a project investigated possibilities to incorporate fresh Baltic herring in low-polluting farm-made diets to provide income for Baltic herring fisheries. Lately, Vielma has collaborated with economists to develope bioeconomic models to assess economical aspects of e.g., pollution abatement and fish wellfare actions of aquaculture.

Pekka Salmi, M.Soc.Sc., is working as a researcher at the Finnish Game and Fisheries Research Institute. He has studied the social and economic aspects and the governance of commercial and recreational fisheries and fish farming. His research has focused also on water ownership, hunting, fisheries-cormorant and fisheries-seal conflicts and on the role of negotiation forums for balancing the controversies between humans and large carnivores.

Jari Setälä, M.Sc. Economics, has been the coordinator of the Finnish research team in the EU-funded SALMAR project in 2000-2003 as well as the coordinator of Nordic Fish Market project 2004-2006. His main research field is the economics of corporate analysis. He has developed profitability analysis programs for fishermen and fish farmers and has for instance been responsible for economic analyses in the national study of net loading system for fish farming.

Markus Kankainen (M.Sc. Economics, http://www.rktl.fi/yhteystiedot/henkilosto/henkiloesittelyt/markus_kankainen.html) has specialized in production planning. He has developed bioeconomical models in Finnish Game and Fisheries Research for several aquaculture production systems with different species. Kankainen´s other faculty is value chain analysis. He has evaluated different qualitative and fish productivity traits' economic values as well as total economic value with the approach of the value chain.

Relevant publications:

- **Grönroos**, Juha; **Seppälä**, Jyri; Silvenius, Frans; **Mäkinen**, Timo. 2006. Life cycle assessment of Finnish cultivated rainbow trout. Boreal Environment Research 11(5):401-414.
- Heikkinen J., **Vielma** J, Kemiläinen O, Tiirola M, Eskelinen P, Kiuru T, Navia-Paldanius D, von Wright A. 2006. Effects of soybean meal based diet on growth performance, gut histopathology and intestinal microbiota of juvenile rainbow trout (Oncorhynchus mykiss). Aquaculture, 261: 259-268.
- **Mäkinen**, T., **Salmi**, P., Salmi, J. & Kettunen, J. 2008. Institutional sustainability of aquaculture and fishing – A case of the Archipelago Sea Region, Finland. In J. L. Nielsen, J. J. Dodson, K. Friedland, T. R. Hamon, J. Musick and E. Verspoor (eds) Reconciling fisheries with conservation: proceedings of the Fourth World Fisheries Congress. American Fisheries Society, Symposium 49, Bethesda, Maryland, USA, pp. 81-94.
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- **Salmi**, P. 2005. Rural Pluriactivity as a Coping Strategy in Small-Scale Fisheries. Sociologia Ruralis 45(1/2): 22-36.
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- Varjopuro R., Sahivirta E., **Mäkinen** T. & Helminen H. 2000. Regulation and monitoring of marine aquaculture in Finland. Journal of Applied Ichtyology, 16: 148-156.

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- **Vielma**, J., Ruohonen, K., Gabaudan, J., Vogel, K., 2004. Top-spraying soybean meal-based diets with phytase improves protein and mineral digestibilities but not lysine utilization in rainbow trout, Oncorhynchus mykiss (Walbaum). Aquaculture Research, 35: 955-964.
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- Saarni, K., **Setälä**, J., Honkanen, A. and J. Virtanen. 2003. An overview of salmon trout aquaculture in Finland. Aquacultuture Economics & Management, 7 (5 & 6), 335-343.

Participant 8 Consiglio Nazionale Delle Richerche – Istituto Di Scienze Marine, (CNR-ISMAR) Italy

The National Research Council (CNR) is a governmental research organization which carries out, promotes, spreads, transfers and improves research activities in the main sectors of knowledge and its applications for the scientific, technological, economic and social development of the Country. To this end, the activities of the organization are divided into macro areas of interdisciplinary scientific and technological research, concerning several sectors. CNR is distributed all over Italy through a network of institutes.

Since early seventies CNR - Institute of Marine Sciences (ISMAR) Ancona is carrying out scientific research related to management issues, focusing on the assessment of fishery resources, fishing technology, mariculture, artificial reefs, integrated management of coastal areas and changes induces on the marine environment by human activities and natural events (e.g. mucilage, anoxia. eutrophication). The main working area of ISMAR Ancona is the Adriatic Sea. ISMAR scientists act as scientific experts in many advisory bodies at local, national and international level (e.g. FAO-GFCM, UE-STECF). Stock assessment and scientific advices have been produced up to now by ISMAR Ancona for the Italian Ministry of Fisheries, European Commission and in many international meetings such as GFCM-Technical Consultations (1980s), GFCM-Scientific Advisory Committees (since 2000), and FAO-ADRIAMED working groups.

Gianna Fabi - Senior researcher. Chief of the Marine Environment Management Unit at CNR-ISMAR Ancona since 1996. Fishery biologist with more than 20-ys of experience mainly related to fishery management, open-sea mariculture and evaluation of the impacts of human activities on the marine environment and its resources. Scientific Responsible and/or Coordinator of research projects funded by EU (DG 14), Italian Government and private companies. Expert at STECF- and EU-Working Groups and other international and national committees on fisheries and aquaculture.

Fabio Grati - Researcher at ISMAR Ancona since 1997. More than 15-ys experience on ecology of artificial structures (artificial reefs and gas platforms), small scale fisheries in coastal waters, set gears selectivity and GIS mapping.

Giuseppe Scarcella - Contracted researcher at ISMAR Ancona since 2008. Experience on the ecology of fish assemblages at artificial structures, fisheries ecology, stock assessment, population dynamic.

Mauro Marini - Researcher at ISMAR Ancona since 2001. More than 10-ys experience on the biogeochemical processes in the sea-water column and sediment interface, interactions of pollutants and xenobiotics in marine sediments and fish in the Adriatic.

Federica Grilli - Contracted researcher at ISMAR Ancona since 2007. Experinece on the analysis of oceanographic data (data processing, visualization and programming), particularly for Adriatic Sea and Antarctic Sea dynamics.

Relevant publications

- Bombace G., Fabi G., Fiorentini L., Speranza S. 1994. Analysis of the efficacy of artificial reefs

located in five different areas of the Adriatic Sea. *Bull. Mar. Sci.*, 55(2-3): 559-580.
- Fabi G., Sala A. 2002. Assessment of biomass and diel activity of fish at an artificial reef (Adriatic sea) using stationary hydroacoustic technique. *ICES J. Mar. Sci.*, 59: 411-420.
- Grilli F., M. Marini, D. Degobbis, C. Ferrari, P. Fornasiero, A. Russo, M. Gismondi, T. Djakovac, R. Precali, R. Simonetti. 2005. Circulation and horizontal fluxes in the Northern Adriatic Sea in the period June 1999-July 2002. Part II: nutrient transport. *Science of the Total Enviroment*, 353:115-125.
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Participant 9 : Centre for Environment, Fisheries and Aquaculture Science, (Cefas) U.K.

Cefas, an Executive Agency of the UK's Department for Environment, Farming and Rural affairs, is a multidisciplinary scientific research and consultancy centre delivering solutions to meet the diverse needs of public and private sector businesses and organisations active in marine, coastal, estuarine and freshwater environments. We provide a comprehensive portfolio of research, consultancy and training services in fisheries science and management, environmental monitoring and assessment, fish and shellfish health, hygiene and cultivation, to clients around the world and maintain extensive collaborative links with research institutes, technical development companies and universities on a global basis.

Cefas currently employs over 520 staff at two well-equipped specialist laboratories. Our well-trained scientists possess the up-to-date, multidisciplinary skills that are needed to tackle current problems in the environment.

Cefas is divided into three multidisciplinary Divisions; Environment & Ecosystems, Fisheries and Aquatic Animal Health specialising in aquaculture.

For this project staff will be drawn from all three Divisions. The professional specialisms within this group are very wide-ranging and include **many internationally recognised specialists**. In this instance, of particular note are our capabilities in:

- Expertise in fish and shellfish health, with the Cefas Weymouth Laboratory housing the Fish Health Inspectorate for England and Wales, as well as more then 40 other scientists with fish health expertise, many internationally recognised as leaders in their particular specialist fields
- Scientific advice to government departments on coastal and offshore environmental impacts.
- Assessment of the impact of human activity on the marine and coastal environment.
- Provision of policy and technical advice to government departments and external clients on the potential risks and impacts to the marine environment of a wide range of human activities, including; fishing aggregate extraction, construction, capital and maintenance dredge disposal, offshore wind farms.
- In particular we are currently working with the UK government in preparing a Marine Bill that will create a strategic marine spatial planning system to clarify our sustainable development priorities for the future. It will also direct decision-makers and users towards more efficient, sustainable use and protection of our marine resources. The Bill will be supported by a marine policy statement that describes short and long-term national objectives, and will be followed by a series of marine plans, which will implement the policy statement in specific areas, using information about spatial uses and needs in those areas. Cefas is currently working with UK government to develop practical tools, methods and approaches to allow marine spatial plans to be developed and implemented by the new Marine Management Organisation.

Key personnel:

Dr David Verner – Jeffreys. Senior microbiologist. PhD Infection and Immunity, University of Glasgow. Senior microbiologist and aquaculture health specialist. Employed by Cefas since 2003, leading research into emerging diseases of farmed and wild fish and shellfish and developing and testing aquaculture health and hygiene products.

Dr Nick Taylor. Epidemiologist. PhD Parasitology, University of Stirling. Over eight years experience in epidemiology and population ecology. Key research interest is the interaction between environment and

disease and the impacts of such interactions on host and pathogen populations. Track record of working with industry, academia and government in fisheries and aquaculture based research.

Dr Michaela Schratzberger.Senior Benthic Ecologist. PhD Marine Biology, University of Hamburg (Germany). Senior benthic ecologist. Employed by Cefas since 1999, leading research into changes in benthic community structure in response to environmental change, including anthropogenic perturbation. Chair of the ICES Study Group on Biodiversity Science.

Dr Chris Vivyan Senior Regulatory Advisor. Thirty two years experience in the assessment of pollution and other man-induced effects on the marine environment from a regulatory perspective, particularly with respect to waste disposal at sea, marine constructions and the dredging of marine sand and gravel deposits. The last 21 years of this experience has involved the provision of advice to the UK Government on licence applications, and national and international matters

Andrew Birchenough - Senior Marine Advisor. PhD Marine Science University of Newcastle. Manager of Cefas Regulatory Assessment Team. In his current position, he is responsible for leading the team providing scientific advice to the UK government department Defra on the potential risks and impacts to the marine environment of a wide range of human activities, including; capital and maintenance dredge disposal, aggregate extraction and marine constructions.

Key publications

- Verner-Jeffreys DW, Pond MJ, Peeler EJ, Rimmer G, Oidtmann B, Way K, Mewett J, Jeffrey K, Bateman K, Reese RA, Feist SW (2008) Emergence of coldwater strawberry disease of rainbow trout, Oncorynchus mykiss Walbaum in England and Wales: outbreak investigations and transmission studies. Diseases of Aquatic Organisms 79: 207-218
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- Bignell, J P, Dodge, MJ, Feist, SW, Lyons B, Martin PD, Taylor NGH, Stone D, Travalent L, Stentiford GD, (2008) Mussel histopathology: effects of season, disease and species. Aquatic biology 2: 1-15.
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- Stelzenmüller V*, Maynou F, Guillaume B, Cadiou G, Camilleri M, et al. (2008) Spatial assessment of fishing effort around European marine reserves: Implications for successful fisheries management. Marine Pollution Bulletin 56: 2018–2026
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Participant 10: Agricultural Economics Research Institute (LEI Wageningen UR), The Netherlands

(http://www.lei.wur.nl/UK/) LEI is the main institute for socio-economic research in agriculture, horticulture, fisheries and forestry in the Netherlands, having a staff of over 300 people and being part of Wageningen University and Research (WUR). The research programs of the various divisions of the Institute are particularly directed to the provision of relevant quantitative and qualitative information on micro and

macro level in the fields of economics and social sciences. The Fisheries Unit employs 13 persons in total, of whom ten are professional research workers and three support staff for the extraction of financial statistics of the sector and administrative tasks. Since 1948 the Division has built up solid experience in all fields of fisheries economics and social sciences, such as financial analysis, market research, techno- and bio-economics, management policies, aquaculture and fisheries development and governance. Part of the research program of the Division is regular activities of extraction, processing and publication of the economic results of Dutch fisheries and aquaculture. A panel of skipper-owners covering about one quarter of the sea fishing fleet is annually making these data available on a voluntary basis. Another part consists of specific research projects requested by the Dutch fishing industry or the Fisheries Directorate of the Ministry of Agriculture, Nature Management and Food Quality. Finally, the Division carries out studies contracted by the European Union, Government institutions in developed and developing countries or private firms.

The most important qualities of the LEI Wageningen UR's Fisheries section are:

a. Long term involvement in economic analysis of fisheries;
b. National responsibility for the collection of economic data under the EU data collection regulation Reg. (EC) 1639/2001;
c. Involved in several EU project for bio-economic modeling (EFIMAS, COMMIT), fishing tactics (TECTAC) and economic and technical efficiency (CAFÉ, DEGREE)
d. Closely involved in several national and EU projects on governance such as the transition to a sustainable fishery in the Netherlands
e. Availability of staff experienced in execution of EU wide research

The list of projects demonstrates the capacity of LEI to carry out successfully the economical and governance tasks in the present project. The proposed staff members of LEI B.V. are Hans van Oostenbrugge, who will act as project manager for LEI, Arie van Duijn, Erik Buisman and Ellen Hoefnagel.

Principal scientific personnel:

Hans van Oostenbrugge (b. 1971, PhD in fisheries Science) is a biologist by origin and has been working at the fisheries group from 2001. In this period and in his finished PhD study on uncertainty in catch rates, he worked extensively with bio-economic and statistical modeling. Recently, he has been concerned with the set up of the Dutch National program for economic data collection for the EU and with projects on bio-economic indicators, valuation of fishing grounds and prediction of economic effects of quota measures, seaday restrictions and fleet reductions on the Dutch fleet. He is also involved in the EU project EFIMAS and COMMIT on modeling effects of management measures.

Arie van Duijn (b. 1973, MSc in Integrated Tropical Coastal Zone Management and MA in Human Geography) joined LEI in 2008. From 2005-2008 he has been working with FAO in Vietnam as a Fisheries – Socio-Economist on Integrated Lagoon Management. From 2002-2005 he has been working for the Faculty of Geosciences of Utrecht University carrying out geospatial research.

Erik Buisman (b. 1959, MA in General Economics) is a senior researcher at LEI. He has been working for the Fisheries Unit of LEI since 1995 and has twelve years of experience in fisheries economic research. He participated in several national and EU projects concerning fisheries economics, analysis of fisheries management and relation economy - ecology.

Ellen Hoefnagel (b. 1954, MA in Social Anthropology and Sociology of Non Western Peoples) is a senior researcher at LEI. She has been working for the Fisheries of LEI since 1995. She has carried out field and desk research on anthropological and socio-economic issues and transformations in fisheries in the Netherlands, Portugal and Europe. She specially studies the process of institutionalization, property rights, co-management, the knowledge used in fisheries management, gender issues and fishermen's reactions to policy. She also has experience in the ex ante and ex post evaluations of fisheries policy.

- Buisman, F.C., and B.I. de Vos, 2008, Social Cost-Benefit Analysis for fisheries, (in Dutch) Dutch title: Maatschappelijke kosten-batenanalyse voor de visserij, Rapport 2008-005, LEI, Den Haag, 2008.
- Oostenbrugge, Hans J.A.E. van, Jeff P. Powell, Jos P.G. Smit, Jan-Jaap Poos, Sarah B.M. Kraak and Erik F.C. Buisman, 2008, Linking catchability and fisher behaviour under effort management, Aquatic Living Resources Vol. 21 N°3, 2008.

- Kraak, S.B. M., F.C. Buisman, M. Dickey-Collas, J.J. Poos, M.A. Pastoors, J.G.P. Smit, J.A.E. van Oostenbrugge, and N. Daan, 2008, The effect of management choices on the sustainability and economic performance of a mixed fishery: a simulation study. – ICES Journal of Marine Science, 65: 697–712.
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- Hoefnagel, E. Transitions in European Fisheries Social Science Contributions 1960-2005. Paper presented at the MARE conference People and the Sean IV. Amsterdam, 2007.
- Hoefnagel, E.W.J., A.Burnett and D.Wilson, 2006, 'The knowledge base of co management', Ch. 4 in: The Knowledge Base for Fisheries Management, Elsevier 2006
- Del Valle, I., E.W.J. Hoefnagel, K. Astorkiza, I. and Astorkiza, 2006, 'The knowledge base of rights based fisheries management'. Ch. 3 in: The Knowledge Base for Fisheries Management, Elsevier 2006
- Duijn, A.P. van, 2004, "The rich eat fish the poor eat pork" The decline of the livelihoods of handpickers of aquatic organisms in North Vietnam. In: Visser, Leontine E. (Ed.) Challenging Coasts: Transdisciplinary Excursions into Coastal Zone Development pp. 211-237. Amsterdam University Press
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Participant 11 Institute for Marine Resources and Ecosystem Studies (IMARES), The Netherlands

Wageningen IMARES (IMARES) is a non-profit privatised research organisation and part of Wageningen University and Research Centre (WUR) and is one of the premier nature and fisheries research institutes in Europe. Wageningen IMARES is the result of a merger between the Netherlands Institute for Fisheries Research (RIVO), the Marine Research department of Alterra and the water quality department of TNO. IMARES has a staff of approximately 170 employees and an average turn over of €15 million per year. Research is carried out through 6 departments or clusters, of which 'Fisheries Biology and Management' and 'Ecology' are the two clusters which will be engaged in this project. The institute is able to draw on a wide experience in the fields of fish biology and ecology, empirical trends in the North Sea system, fish stock assessment and the provision of management advice.

Wageningen IMARES provides knowledge that is essential for the sustainable use and management of the sea and saline coastal areas. The focus is on strategic and applied ecological research relating to economic developments that respect the sea's ecology and environmental values. The field of work comprises a wide variety of issues, e.g.: sustainable fisheries, development of new forms of aquaculture, effects of windmill parks, oil and gas production, sand extraction, intrusion of saline water in land areas used for agriculture or the production of drinking water, restoration of brackish transition areas, coastal defence, large-scale land reclamation for harbour industries, development of Marine Protected Areas in response to the Bird and Habitat Directives, implementation of EU marine strategy and the Water Framework Directive and environmental risk assessment. The research is focused on changes introduced by human intervention as well as to natural changes, and their effects on ecosystem dynamics, assessment of (profitable) functionality and multifunctional use from an ecological perspective, protection of marine ecosystems, and the development of management systems, and provision of advice based on policy scenario's for the marine environment, particularly fisheries (modelling).

Ir. Floor Quirijns has been working as a fisheries scientist for six years. At IMARES she works on collaborative research projects with the fishing industry (self sampling program of discards, F-project); communication with stakeholders; and analyses of data on landings and effort (including VMS). She has participated in several EU projects on fisheries data (e.g. TecTac, CEDER) and she has been actively involved in ICES study groups and workshops on cooperative research and better use of commercial catch and effort data (SGFI, WKUFS, WKSC). She has a lot of experience in management of national and international projects. In this project she would be the leader of WP1.

Martin Pastoors. Organized the ICES advisory process and chaired the advisory meetings on fisheries management. Communicated the advice to management authorities, stakeholder organizations and media. Organized the transition between three separate advisory committees into one integrated committee dealing with fisheries, ecological and environmental advice. Vice-chair of Advisory Committee. Chair of Advisory Committee on Fishery Management Advised national government on fisheries management. Participated in the ICES advisory process. Chaired the ICES Working Group on Fisheries Systems and the ICES Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak. Organized and participated in several EU funded research projects dealing with the interface between science and policy (PKFM), the development of tools for management strategy evaluations (EFIMAS, COMMIT) and the links between biological and economic sciences (EFFORT-F, TECTAC).

Dr. **Norbert Dankers** has been working in the Wadden Sea since 1976. He has been involved in Integrated Coastal Zone Management in Europe and Asia. His main research interests have been related to impacts of shellfish fisheries on coastal marine systems, and general ecology of shellfish. In the Waddensea he is still trying to get stakeholders involved in management issues and accepting multifunctional use of the area.

Participant 12 The Technical University of Denmark (DTU-Aqua)

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The Technical University of Denmark (DTU) is a modern self-governed university that operates at a high international level in a wide array of research area within science and technology, i.e. biotechnology, microbiology, chemical engineering, information and communications technology, material science, food science, fisheries research, transport and traffic research, micro- and nanotechnology, energy research (both conventional and sustainable energy), medico technology, and space technology. The University's research and teaching is provided by 22 departments and research centres. DTU have a very wide range of advanced research infrastructures and laboratories, and acts in a number of areas as national and international reference laboratory. The University embraces most of the engineering disciplines, and educates engineers to Bachelor, Masters and PhD level. In addition, the University offers a comprehensive continuing education programme, with a number of courses taught in English. The University has a staff of approx. 2000 scientists, 690 PhD students, 6000 Bachelor and Masters Students, 400 foreign students a year on English-taught courses and Master programmes, and an annual budget of 425 million euro

The National Institute for Aquatic Resources (DTU AQUA) performs fisheries research in order to advice the Ministry of Food, Agriculture and Fisheries, EU-Commission, public authorities, international organisations, the industry and trade of fisheries and other organisations. DTU Aqua works with all aspects of sustainable and innovative use of fish and shellfish resources. In the area of commercial fisheries, DTU AQUA are researching fisheries management methods, catch technologies, determination of stock sizes, and how fish stocks are influenced by changes in the marine ecosystem. The institute has long experience in collecting and compiling data into large scale databases, analysing, and modelling fleet and fisheries based biological and economical data, as well as spatial management, including use of Marine Protected Areas. The institute has participated in and coordinated large-scale EU Projects (most recently the FP6 EFIMAS and FP6 PROTECT Projects, and participated in several others e.g. the FP6 CEVIS, AFRAME, IN EX FISH, SPICOSA and IMAGE Projects, and EU Interreg III3A BALANCE), as well as national projects. It is representing leading player in European research on Marine Protected Areas as tools for fisheries management.In the area of aquaculture, DTU AQUA is researching new farming systems and their effect on the environment. DTU AQUA is researching nutrition, genetics and physiology, prevention and limitation of fish diseases, and the significance of optimal fish welfare in aquaculture. The purpose of aquaculture research is to further sustainable development of the aquaculture industry, which is growing globally, and which is contributing increasingly to the overall value creation in commercial fisheries.

Per Dolmer, Senior Advisor, head of Section for Shellfish Mussel ecology, impact of fishery, mussel fishery and culture. Scientist at DIFRES at 1994-2002. Senior advisor 2002-precent. Member of several ICES study groups as well as national scientific fishery committees. PD runs several nationally and EU-funded research projects on impact of mussel dredging on benthos and the structure of the seabed and also on aquaculture of mussels including development of bottom cultures, longline systems and integrated management of mussel production. The projects are conducted with participation of several research institutes from different scientific disciplines, managers employed within the counties responsible for the sustainable development of the fjord, and several stakeholders. Publications: 18 peer reviewed papers and 60 reports and popular publications. 5 graduated master students and 1 Phd student.

Dr. Josianne G. Støttrup, **Senior Research Scientist, Head of Section for Coastal Ecology**. JGS has been responsible for the Coastal Fisheries Management Programme for around 15 years. JGS has many years of experience with coastal ecosystems and ecosystem effects of anthropogenic activities in the coastal zone. JGS have co-ordinated or participated in several national and international projects within the field. JGS is Node 3 leader within the EU SPICOSA project (Science and Policy Integration for Coastal Systems Assessment). JGS was chair of the scientific committee for the International symposium on Integrated Coastal Zone Management held in Arendal, June 2007, and co-editor on the book of the peer-reviewed proceedings presently in press. Publications: 22 peer reviewed papers, 1 book and 65 reports and popular publications. 20 graduated master students and 5 graduated PhD students.

Dr. Claus Stenberg, Scientist. Fish ecology, feeding ecology, restoration of hard bottom ecosystems. 1996-2005 Research assistant at Greenland inst. of National Resources. 2006- today. Scientist at DTU Aqua. CS is projectleader in two national habitat restoration projects and participates in an Interreg project on restoration of boulder reefs. 6 peer reviewed papers and 30 reports and popular publications.

Thomas Kirk Sørensen is a marine biologist and has worked with policy issues as well as marine spatial planning and the development and management of marine protected areas for ecosystem conservation and an ecosystem based approach to fisheries management. TKS has dealt in detail with Natura 2000 and has actively worked with synthesis and dissemination within the EU FP6-project "PROTECT" and with management issues within the Interreg IIIb project "BALANCE". TKS has also been involved in coordination of the Nordic Council-financed project "Nordic Forum on Marine Protected Areas in Marine Spatial Planning".

Ole Vestergaard is a marine ecologist with extensive international working experience in marine ecosystem management, incl. research and tool development for integrated spatial marine and coastal ecosystem conservation and fisheries management, use of Marine Protected Areas and ecosystem-approaches to fisheries, habitat mapping and marine spatial planning. OV currently serves as Deputy Coordinator and Project Manager for EU FP6 research project 'PROTECT' (Marine Protected Areas as a tool for ecosystem conservation and ecosystem management) and 'EFIMAS' (Operational evaluation tools for fisheries management options); Cocoordinator of EU Interreg project BALANCE (marine habitat mapping and spatial planning of Baltic Sea); Coordinator of Nordic MPA Expert. Group (Nordic Council). In COEXIST, OV will be involved in development of generic spatial management tools, including governance issues.

Grete E. Dinesen is a marine ecologist with more than 12 years of experience in research and monitoring of coastal ecosystems and implementation of EU directives (HD, BD, WFD) in the planning and management of anthropogenic activities in the sea. GD has been appointed a project coordinator and manager of several national and international projects (e.g. EU FP5 DELOS, the Øresund-Link, NorGIS, EU Interreg IIIB BALANCE). GD has co organized several workshops (e.g. 1st Nordic Workshop on Marine Spatial Planning) and is a member of the ICES working groups on ICZM and MHM. GD is a coordinator of the national project on regime shift in the Limfjorden and a manager of the Danish Study Site Team, developing decision support systems in the Limfjorden, for the EU FP6 research project SPICOSA (Science and Policy Integration for Coastal Systems Assessment). Publications: 9 peer reviews papers and 40 reports and popular publications.

Rasmus Nielsen, Senior Scientist, Head of Section & Research Co-ordinator, Management System Section. Author of 25+ journal papers (and overall 110 publications). Research areas cover fish population and fisheries dynamics / assessments, fisheries management research and bio-economic management evaluation tools, fisheries hydro-acoustics, and research survey design. Coordinated several large national / international

research projects (e.g. EU-FP6-EFIMAS; EU-ISDBITS; EU-FP5-EASE (co-coordinator)). Responsible for ICES Norway pout assessment (North Sea). Scientific advisor in Vietnam (DANIDA) for a year, and conducting university teaching and student supervision.

Francois Bastardie is a Research Scientist at DTU-Aqua developing bioeconomic management evaluation models. He is Ph.D in ecological sciences in 2004. He has developed advanced modelling skills during his post-doctoral position at IFREMER (France), in particular in fishery modelling, R-programming incl. the FLR framework, and statistical analysis of fishery data. He has participated in the EFIMAS, PROTECT, CEVIS and IMAGE EU-FP6 projects developing fisheries Management Strategy Evaluation tools. He is a member of the ICES WGBFAS.

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Vestergaard, O.; Sørensen, T.K. & Hoffmann, E. (2006): Marine Protected Areas as a tool for Ecosystem Conservation and Fisheries Management - Overview and initial findings of the research project PROTECT. Extended abstract in Proceedings of European Symposium on Marine Conservation 2006, 8-12 May, Stralsund, Germany.

Participant 13 Aqua TT

Expertise:

AquaTT is an international foundation which provides project management and training services to support the sustainable development of Europe's aquatic resources. AquaTT's mission is to bridge the knowledge gap between the dynamic R&D environments and the progressive commercial sector. AquaTT supports its target audiences through the provision of support services and through participation in, and coordination of EU projects and initiatives in the area of knowledge management including customised dissemination, education, training and technology transfer.

AquaTT is a non-profit making organisation, founded in 1992 under the EU COMETT programme as the University Enterprise Training Partnership (UETP) for the European Aquaculture Industry. The initial proposal arose from the identification of a clear need to systematise, coordinate and develop the knowledge requirements of the industry through a single body.

Company operations are controlled by a management team, who are supported in their actions by a Board of Directors and an international network. The Board is comprised of four Irish members and four European Directors. There includes a nominee from the Federation of European Aquaculture Producers (FEAP) highlighting their strong links with industry.

AquaTT responds to the needs of industry in Europe and provides a variety of services & products customised to target end users:

- coordination of Europe wide thematic networks;
- facilitation in Technology Platforms
- dissemination of information and results from EU research and technological development (RTD) programmes;
- E-newsletters on latest EU developments in education and training;
- development of vocational training methodology and resources;
- sector-specific surveys;
- end user training courses & workshops;
- needs analysis;
- glossaries and multilingual teaching materials;
- online training materials and courses;

AquaTT has fifteen years of experience specialising in EU project management, and has the ability to provide a range of services in Research projects including; project management, communication, dissemination and knowledge transfer to target end users. AquaTT continues to seek out and embrace

opportunities for collaboration and key initiative development with the aim of helping effectively transfer knowledge generated from Research to end-users for uptake and exploitation.

AquaTT has excellent connections with the main stakeholders in the aquaculture sector including industry players, educators, trainers and researchers having participated in, and led several initiatives under the following EU Programmes: COMETT, LINGUA, FORCE, TEMPUS, FAIR, LEONARDO DA VINCI, SOCRATES, PESCA, TEMPUS, INTERREG, ASIA PRO ECO, DG FISHERIES INNOVATIVE ACTIONS & FP6.

AquaTT develops and participates in initiatives of benefit to key stakeholders. This includes networking of students, promotion of student activities, development and provision of training courses and workshops. For academics, needs analysis, bridging gaps between working groups, advising in project concept, design and co-ordination. For industry, transfer of knowledge, provision of up-to-date information, needs analysis, training workshops, materials and tools.

Tasks attributed:
AquaTT will be the leader of WP6 - *Dissemination, Communication and Knowledge Transfer* and WP 7 - *Knowledge Management – Supporting Systems, Processes and Methodologies*
AquaTT will ensure effective dissemination and communication systems are set up and implemented to facilitate stakeholder interaction and discussion. They will also implement best practice in event management and ensure that the workshops envisaged within the project are structured so as to meet their intended objectives and meet the expectations of all participants.

Key persons:
David Murphy is the Managing Director of AquaTT and has 8 years of experience working in EC projects in the field of Education, Training and RTD, having coordinated 8 and participated in over 20. Amongst others he was the coordinator of the biggest educational Thematic network in Aquaculture, Fisheries and Aquatic Resources, AQUA-TNET, between 2000-2005 and helped expand the network in 2005 into a larger network encompassing both vocational and academic learning in order to meet the challenges of the Bologna and Copenhagen Processes and Reforms. David Murphy is also facilitator of the Knowledge Management Thematic Area of the EATIP, the European Aquaculture Technology and Innovation Platform, that brings together private and public stakeholders in order to promote and coordinate research and development that will improve the competitiveness of the European aquaculture industry. His experience will ensure that the project communication and dissemination activities are best practice ensuring a measurable impact on target end users.

Partner 14: Finnish Environment Institute (SYKE), Finland

The Finnish Environment Institute (SYKE) (http://www.environment.fi/syke) is a national research and development centre under the Ministry of the Environment, Finland. The institute provides environmental information, publishes assessments on the state of the environment, conducts research on the environment and environmental effects of activities and analyses approaches and methods for the prevention and mitigation of harmful effects. SYKE evaluates alternative scenarios and measures to influence future development. In addition to research and development, SYKE promotes sustainable development by assessing its implementation.

With a staff of about 600 the institute spans a broad range of research and development activities and it is part of an extensive international network. The Research Department has seven broad research programmes: Production and Consumption, Global Change, Contaminants and Risks, Protection of the Baltic Sea, Biodiversity, Environmental Policy, Integrated River Basin Management.

The Research Department works in close co-operation with Expert Services Department, which is responsible for various expert, authority and development functions within nature conservation, water resources management, hydrology, environmental protection and management, control of chemicals, and environmental damage mitigation. SYKE's combination of research and expert services provides a firm

background for analysing environmental policies and providing policy advice. In this capacity SYKE has also been responsible for producing e.g. general state of the environment reports, compiling indicators of sustainable development and for carrying out evaluations and the environmental assessments of policies such as the national forestry programme, the national climate strategy and the national biodiversity programme.

Principal scientific personnel:
Professor **Jyri Seppälä** (b. 1959) is a Research Manager of the Production and Consumption Programme at the Finnish Environment Institute. He has been in charge of several extensive R&D projects and his main area of specialization has been to perform complete environmental impact assessments of different products, services and sectors (industry, municipalities etc.) in order to mitigate climate change and to increase eco-efficiency .

Senior Research Scientist *Juha Grönroos* (b. 1968). M.Sc. Environmental Sciences. The key areas of expertise are 1) Life Cycle Assessment (LCA) of foodstuffs, bio-waste management systems and bio-energy alternatives, and 2) agri-environmental issues in general, such as assessing the environmental performance of the Finnish Agri-Environmental Support System and integrated modeling of the gaseous agricultural nitrogen emissions.

Key relevant publications:

- **Grönroos**, J., **Seppälä**, J., Voutilainen, P., Seuri, P. & Koikkalainen, K. 2006. Energy use in conventional and organic milk and rye bread production in Finland. Agriculture, Ecosystems and Environment 117: 109-118.
- **Grönroos**, J., **Seppälä**, J., Silvenius, F. & **Mäkinen**, T. 2006. Life cycle assessment of Finnish cultivated rainbow trout. Boreal Environment Research 11: 401-414.
- **Grönroos**, J., **Seppälä**, J., Silvenius, F. & **Mäkinen** 2008. Environmental impacts of Finnish fish products – an LCA study. Submitted to Boreal Environment Research.
- Nissinen, A., **Grönroos**, J., Heiskanen, E., Honkanen, A., Katajajuuri, J.-M., Kurppa, S., **Mäkinen**, T., Mäenpää, I., **Seppälä**, J., Timonen, P., Usva, K., Virtanen, Y., Voutilainen, P. 2006. Developing benchmarks for consumer-oriented LCA-based environmental information on products, services and consumption patterns. Journal of Cleaner Production 15(6): 538-549.
- **Seppälä**, J. 1999. Decision analysis as a tool for life cycle impact assessment. In: Klöpffer, W. and Hutzinger, O. (eds.), LCA Documents, Vol. 4. Eco-Informa Press, Bayreuth. 174 p.
- Potting, J., Klöpffer, W., **Seppälä**, J., Norris, G. & Goedkoop, M. 2002. Best available practice in life cycle impact assessment of climate change, stratospheric ozone depletion, photo-oxidant formation, acidification, and eutrophication. In: Udo de Haes, H.A., Jolliet, O., Finnveden, G., Goedkoop, M., Hauschild, M., Hertwich, E., Hofstetter, P., Klöpffer, W., Krewitt, W., Lindeijer, E., Mueller-Wenk, R., Olson, S.I., Pennington, D.W., Potting, J. & Steen, B. (eds.) Life-Cycle Impact Assessment: Striving towards Best Practice, 65-100. Pensacola, Society of Environmental Toxicology and Chemistry.
- **Seppälä**, J., Knuuttila, S. & Silvo, K. 2004. Eutrophication of Aquatic Ecosystems: A New Method for Calculating the Potential Contributions of Nitrogen and Phosphorus. Journal of Life Cycle Assessment 9(2): 90-100.

2.3 Consortium as a whole

The Coexist Consortium consists of a range of research institutes geographically well distributed around the European coastline. They have expertise on different of the selected case study areas, which together are representative of the variety of biogeographical zones that exist along the coastline of the continent. Furthermore, the partners have gained their core experience and scientific

traditions from working along coasts which may be highly different in a socio-economic terms, with respect to population density, level of conflict among different stakeholders, relative importance of aquaculture versus fisheries, and the relative importance of aquaculture and fisheries versus other use/activities, such as tourism, wind farms, environmental protection etc.

The majority of the institutes are governmental or private non-profit research institutes with strong links as advisory agencies to public policymakers of their respective countries. This reflects that the project is to a large extent policy-oriented, however dialogue with stakeholders in the private sector is considered equally important. The universities DTU-Aqua, UCC and IMAR (at the New University of Lisbon) also perform advisory work to governmental bodies. IMARES and LEI are also parts of the University of Wageningen.

The competence of the partners is diverse, matching the highly interdisciplinary focus of the call. Several institutes, (IMR, IPIMAR, IFREMER, vTI-SF, CNR-ISMAR, Cefas) are marine research institutes, most with long tradition and strong competence in fisheries and marine environmental issues, and in most cases also aquaculture. These institutes generally work in in broad ecosystem-oriented contexts. IMARES lead WP 1 and vTI-SF lead WP 5. CNR-ISMAR IPIMAR, IFREMER, UCC, vTI-SF, FGFRI and IMR also lead case studies in their respective regions.

LEI has focus on economic, socio-economic and bio-economic analysis, carrying out economical and governance tasks, and will lead WP 4. Other partners will contribute to the WP 4 and are allocated to tasks according to their competence. The partnership of UCC also comprises a strong group in governance aspects, and will lead WP 2. Other partners with competence in governance aspects of the fisheries and aquaculture sector will contribute to the WP with input on governance in the different respective regions.

IMAR has a strong track record in biological modelling, leading WP 3, with support from several partners, including LEI (socio-economy), IMR and Cefas (modelling of pathogen spreading), and partners involved i case studies. FGFRI and SYKE form a joint interdisciplinary group with competence ranging from biology and ecology to socio-economics and governance.

One partner, AquaTT is entirely focused on dissemination and communication within the area of Europe's aquatic resources, thereby providing extra strength on these issues. AquaTT will lead WP6, emphasizing the focus of the Coexist Consortium to bridge the gap between the R&D environments in this sector and the progressive commercial sector, as well as the governmental agencies at national and EU levels. AquaTT will also lead WP 7 Knowledge management and participate with a Project Officer employed in WP7 and WP 8, in order to facilitate the management and administration of the project, both in general project management (WP 8) and knowledge management (WP 7). The joint efforts by AquaTT and the coordinator IMR will enable the Coordinator to focus his time on a clear role as the scientific coordinator and leader of the project.

1) *Subcontracting*. The participants of the consortium are full partners, thus sub-contracting will not be used in the present project
2) *Other countries.* No finance will be allocated to partners outside the EU and Associated Countries. However, two important collaborators from the US, Dr. Suzanne Bricker and Dr. Robert Pomeroy will be closely involved through the partnerships of IMAR and LEI, to whom they are closely affiliated through national projects, respectively. Their contributions will be described in the following:
3) *Additional partners* – (Third parties) See below.

Brief description of the contributions by Dr. Bricker

The Center for Coastal Monitoring and Assessment (CCMA), part of NOAA's National Centers for Coastal Ocean Science in Silver Spring, Maryland, provides long-term measurements of contaminants on local, regional and national scales (http://ccma.nos.noaa.gov/). CCMA's mission is to assess and forecast coastal and marine ecosystem conditions through research and monitoring and provides the best available scientific information, technical advice, and data to resource managers and researchers. CCMA's science addresses five major environmental stressors: Pollution, Land and Resource Use, Invasive Species, Climate Change, and Extreme Natural Events and builds on two key programs; the Mussel Watch Program and the National Status and Trends Program. The National Status and Trends program, begun in 1984, is the only nationwide source of long-term data on toxic contaminants and samples more than 350 sites in U.S. coastal waters and estuaries The Mussel Watch Program, begun in 1986, monitors the status and trends of chemical contamination of coastal waters, including the Great Lakes and is one of the longest running, continuous national coastal monitoring programs in the U.S. Both programs use data to characterize environmental impacts of new and emerging contaminants, extreme events (e.g. hurricanes and oil spills), and to evaluate effectiveness of legislative and management decisions. CCMA develops thematic, watershed, regional and national assessments of contaminants, such as the National Estuarine Eutrophication Assessment (http://www.eutro.us). This effort, like most projects in CCMA, is cooperative among local, state and federal agencies, NGOs, and various educational institutions.

Suzanne Boyd Bricker is a senior scientist at CCMA and manager, since 1991, of the National Estuarine Eutrophication Assessment (NEEA; **http://www.eutro.us**). Her research is focused on development of screening models for assessment of coastal eutrophication, including socioeconomic aspects, for use in development of successful management measures. B.A. in Biology from Northwestern University, PhD from Graduate School of Oceanography, University of Rhode Island. Member of the National **Science and Technology** Council, Joint Subcommittee on Ocean Science and Technology Interagency Working Group on Harmful Algal Blooms, Hypoxia, and Human Health. Co-author of the ASSETS and FARM models (**http://www.eutro.org**; **http://www.eutro.org/register**, **http://www.farmscale.org**).

CCMA (Dr. Bricker) will participate in particular through IMAR and WP 3, but her expertise will be available to all partners through project meetings and communication channels.This external partner will not be funded through COEXIST.

Key Publications

Ferreira, J.G. , et al. 2008. Sustainable Options for People, Catchment and Aquatic Resources: The SPEAR Project, an International Collaboration on Integrated Coastal Zone Management. Institute of Marine Research. IMAR http://www.biaoqiang.org

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Brief description of the contributions and competence of Dr. Pomeroy

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Sea Grant is a national network comprised of 30 Sea Grant programs based at flagship universities in coastal and Great Lake states throughout the U.S. and Puerto Rico. The National Sea Grant College Program encourages the wise stewardship of our marine resources through research, education, outreach and technology transfer. The Program is focused on making the United States the world leader in marine research and the sustainable development of marine resources. Connecticut Sea Grant is a member of this national network. The mission of Connecticut Sea Grant is to work towards achieving healthy coastal and marine ecosystems and consequent public benefits by supporting integrated locally and nationally relevant research, outreach and education programs in partnership with stakeholders.

Robert Pomeroy is currently a Professor in the Department of Agricultural and Resource Economics and Connecticut Sea Grant College Fisheries Extension Specialist at the University of Connecticut – Avery Point in Groton. He is also a Principle Scientist in the Policy, Economics and Social Science program at the WorldFish Center headquartered in Penang, Malaysia. Before starting at UConn in August 2002, Dr. Pomeroy worked at the World Resources Institute in Washington DC from September 1999 to December 2001 where he helped develop a marine program. Prior to that, he worked at the International Center for Living Aquatic Resources Management (ICLARM) in Manila, Philippines from 1991 to 1999. Dr. Pomeroy has his PhD in Resource Economics from Cornell University. His areas of professional interest are marine resource economics and policy, specifically small-scale fisheries management and development, coastal zone management, aquaculture economics, international development, policy analysis, and seafood marketing. Dr. Pomeroy has worked on research and development projects in over 40 countries in Asia, Africa, the Caribbean and Latin America.

Key publications:

Pomeroy, R.S. and F. Douvere. 2008. The Engagement of Stakeholders in a Marine Spatial Planning Process. Marine Policy. Volume 32, Issue 5, Pages 816-822

Sissenwine, M., R. Pomeroy and J. Sanders. 2009. Technical Guidelines for Marine Protected Areas as a Fishery Management Tool. FAO Technical Guidelines for Responsible Fisheries. UN Food and Agriculture Organization, Rome.

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CCMA (Dr. Pomeroy) will participate in particular through LEI and WP 4, but his expertise will be available to all partners through project meetings and communication channels. This external partner will not be funded through COEXIST.

Third parties
One partner, LEI, has requested that Part of CoExist's work is foreseen to be carried out by LEI-WUR through resources provided by Stichting Dienst Landbouwkundig Onderzoek (Stichting DLO), established in Costerweg 50, 6701 BH Wageningen, The Netherlands. LEI-WUR reimburses the costs of third party Stichting DLO.

The financial contribution involved is as detailed in the table below.

WP No	Workpackage title	Labour costs involved	Overheads	EU requested contribution
1	Baseline: identification of interactions, conflicts and management tools in coastal waters (marine ecosystem approach)	€ 20,393	€ 10,197	€ 22,943
2	Legal, institutional and policy frameworks	€ 16,847	€ 8,423	€ 18,953
3	Integration of models and processes	€ 61,446	€ 30,723	€ 69,127
4	Evaluation of spatial management tools	€ 101,080	€ 50,540	€ 113,715
5	Best Practice: Synthesis of COEXIST Work Packages 1 to 4 and Case Studies	€ 20,393	€ 10,197	€ 22,943
	Total	€ 220,159	€ 110,080	€ 247,679

2.4 Resources to be committed

Table – Resources to be committed. All sums in Euro, distributed per partner per Workpackage. Work package leader in bold cases

Workpackage	**WP1**	**WP2**	**WP3**	**WP4**	**WP5**
1 IMR	38 276	38 276	88 034	44 017	34 448
2 vTI-SF	39 959	13 320	93 779	83 247	**126 536**
3 UCC	59 738	**134 181**	70 766	69 847	32 167
4 IFREMER	31 672	28 505	47 508	0	0
5 IPIMAR	44 574	0	130 537	83 841	3 184
6 IMAR	33 893	0	**192 367**	45 344	9 618
7FGFRI	31 158	31 158	0	66 678	50 476
8 CNR-ISMAR	45 161	16 590	41 475	119 815	40 553
9 CEFAS	5 172	0	31 031	53 012	28 446
10 LEI	32 671	28 315	156 823	**163 357**	31 582
11 IMARES	**95 413**	9 436	69 201	45 085	25 164
12 DTU	25 243	14 725	0	44 175	21 036
13 Aqua TT	0	0	0	0	0
14 SYKE	18 064	0	0	61 720	13 548
Total	500 994	314 505	879 022	880 139	416 758

Workpackage	**WP6**	**WP7**	**WP8**	Total per. Beneficiary	Requested EC Contribution
1 IMR	57 414	0	**293 100**	588 078	535 652
2 vTI-SF	0	0	0	358 370	269 528
3 UCC	0	0	0	366 699	275 024
4 IFREMER	0	0	0	107 684	80 763
5 IPIMAR	0	0	0	262 135	196 601
6 IMAR	0	0	0	281 222	210 916
7FGFRI	0	0	0	179 470	134 602
8 CNR-ISMAR	0	0	0	263 594	197 696
9 CEFAS	0	0	0	117 661	88 246
10 LEI	0	0	0	412 749	309 561
11 IMARES	0	0	0	244 300	183 225
12 DTU	0	0	0	105 178	76 686
13 Aqua TT	**102 760**	**91 750**	172 490	367 000	367 000
14 SYKE	0	0	0	93 333	70 000
Total	160 174	91 750	471 041	3 747 473	**2 995 500**

The above table give a financial overview of the resources that will be mobilized per partner, and the requested EU contribution. Note that the resources are distributed with respect to

- Leadership and participation of work packages (see work package description)
- Leadership and responsibilities of Case studies that will feed data into the Work packages. Note that all activity in Case studies is integrated into the respective Work packages (1-5). There is no separate budget for the Case studies.

3. Impact

3.1 Expected impacts listed in the work programme

This project will contribute towards a **knowledge-based economy** through transnational cooperation between relevant disciplines, one of the key objectives of the work programme. This will include scientists, those involved in the fisheries and aquaculture industry and other stakeholders while simultaneously addressing the social, environmental and economic challenges relevant to those maritime sectors.

The project will also generate **new knowledge** which is **transferrable** across the European region. This in turn will aid the implementation of the European Union's Integrated Maritime Policy. While that emphasises a regional seas approach to the management of maritime activities and resources, it is anticipated that the lessons learned and recommendations made through the course of this project may be readily applied to other maritime regions with similar biophysical characteristics managing similar coastal and maritime activities.

Increased production of food from fisheries and aquaculture is necessary to meet the need projected global demand for seafood. However, this goal cannot be achieved without improved management tools to ensure that it is based on a true ecosystem approach. Better management of fisheries and aquaculture sectors will help deliver **sustainable development** at the local and regional levels. Inherent in this is a contribution towards the growth of both industries while simultaneously ensuring the **protection of the marine and coastal environments**, key objectives of the Work Programme. It is recognised that the fisheries sector and its associated jobs have come under increasing pressure in recent years. An examination and analysis of the

governance structure and institutions involved in the current management regime will highlight areas where this can be improved thereby contributing to relevant EU policy and legislation.

In addition an examination of current **Marine Spatial Planning** frameworks across Europe will identify methods with which this approach has been utilised in addressing conflicts surrounding the management of coastal and maritime activities, including the management of nature conservation sites such as those included in the nationally designated coastal Natura 2000 sites. Marine Spatial Planning is a key component of the EU's Integrated Maritime Policy. An integrated Marine Spatial Planning approach will also address the need for sustainable use and production of renewable bio-resources.

It is recognised that FP7 is working to develop **better relationships** between scientists and European citizens. Within the COEXIST project there will be close working relationships between those currently involved in the fisheries and aquaculture industries and the researchers working on the project. This is particularly true in relation to the case study areas where the input of those involved in the industry will be essential in order to carry out the tasks in relevant work packages. The Work Package on Synthesis will **strengthen the links between scientists, policy makers and people employed in fisheries and aquaculture,** as well as the general public. The products of the Synthesis work package: a generic road map, decision support tools and best practice examples, will provide a response to the ever-changing needs of the industry and will complement and implement central aspects of the EU's Maritime Policy as well as relevant legislation.

The COEXIST project will carry out work on the basis of a number of work packages. These work packages are **cross-thematic** as well as **multidisciplinary** in content. Work Package 1, for example, will include research on ecology, biology, socio-economics while Work Package 2 will focus on governance including law, policy and institutional aspects. This is particularly important in the context of the fisheries and aquaculture sector given that the European Commission has recommended an ecosystem-based approach to the management of these sectors. It also fully supports the need to adopt an **integrated approach** to the management of marine and coastal resources also advocated by the European Commission. In this respect, the project will **contribute to the formulation, implementation and assessment of current EU policies and legislation**.

Societal conflicts exist arising from ad hoc planning and piecemeal policy making in the area of aquaculture-fisheries interactions. From a governance perspective the COEXIST project will provide a framework to assist with the resolution of existing and future conflicts related to interactions between aquaculture, fisheries and other sectors.

Overall, the COEXIST project will contribute to the maintenance and development of both coastal fisheries and aquaculture within an environment where there is growing competition for space. This will be achieved through the development and testing of a range of different spatial tools that seek to encourage positive interactions and mutual benefits.

A European rather than national approach is required in this area as in particular fishing vessels and ships from a large number of countries may be operating in the same vicinity as aquaculture installations as well as the fragile habitats and species included in the nationally designated coastal Natura 2000 sites. In addition the majority of the policies governing sectoral operations are prescribed on a European basis and a national patchwork approach to governing multi-sectoral interactions would be counter productive.

3.2. Dissemination and/or exploitation of project results, and management of intellectual property

In Europe a high percentage of the results of intellectual production has stayed on the shelf, unused by the broader society. The EC has recognised this challenge and as such has prioritised knowledge management in FP7 Research projects. It is no longer sufficient for scientists to simply disseminate and assume that industry/policy makers will be able to immediately identify the potential knowledge and apply it to their area. The Co-Exist consortium has designated a dedicated Marine Knowledge Management company to

manage Knowledge, Communication and Transfer in the project. They are positioned as a facilitator of knowledge management in the European Aquaculture Technology and Innovation Platform (EATiP), as well as in national projects with representatives of administration and aquaculture and fisheries industry, and other stakeholders. Through this capacity, COEXIST will be able to ensure that best practice is implemented so that the appropriate end users receive information in appropriate formats that they can assimilate and use for exploitation.

For detailed description of the concepts to be applied for Dissemination, communication and Knowledge Transfer (external activities), and Knowledge management (within the consortium), see WP 6 and WP 7, respectively. Furthermore, stakeholder consultations are an essential part of WPs 1,2,4 and 5. The dissemination has both general and targeted components, the selection of targeted end users (WP 6) reflects the dissemination strategy of the overall project:

- ***Decision and Policy Makers and Advisors*** (Governments, EU, ICES): Dissemination through project update reports, attendance at ICES events with special sessions, partnership network
- ***National and Regional Planners:*** Project updates, ongoing engagement by Case Study partners.
- **Industry Associations:** This includes associations within aquaculture and fisheries as well as other coastal user groups e.g. offshore energy, tourism etc. Dissemination through project update reports (two per year) and ongoing communication with Case Study partner per region
- **Stakeholder Networks:** Co-Exist will facilitate the utilization of Co-Exist outputs by existing networks and projects related to coastal planning, e.g. Regional Advisory Councils (RACs), European Commission's Advisory Committee on Fisheries and Aquaculture (ACFA).
- **Aquaculture Producers and Fishermen:** Dissemination will take place both, directly with business owners and workers in the industry, as well as through their associations/networks. Co-Exist partners attendance and presentation of project updates at regional producer events will promote the project and at the same time engage with industry actors in order to obtain feedback
- **Scientific Community**: Dissemination through scientific publications, presentations, and conferences
- **Other Stakeholders**: E.g. NGO's, other coastal users or those with an interest in the area: project updates, consultation through case studies, access to information on the project website

A memorandum of understanding based on the model version developed by French Public Research Organizations - MoU model - Version of June 7th, 2004, available from IPR-Helpdesk (2004) wil be signed by the partner institutions before commencement of the project. This MoU secures confidentiality of any information whether of financial, commercial, scientific, or technical nature disclosed by the disclosing Party to the receiving Party in relation to the development of this research proposal.

The partners have agreed to develop a Consortium Agreement based on the "The Simplified FP7 Model Consortium Agreement" developed by DESCA (2007) to be used in small projects. The Consortium Agreement will be presented to the European Commission in due time and before the negotiations with the EC are finalised. The Consortium Agreement sets out in detail the principles for management of "Intellectual property right, ownership and Access Rights" and the principles for "Dissemination".

The General Assembly assisted by the Coordinator and the Executive Board will ensure that dissemination activities follow the principles set out in Article II.30 of the Grant Agreement.

- Each beneficiary shall ensure that the foreground of which it has ownership is disseminated as swiftly as possible
- Dissemination activities shall be compatible with the protection of intellectual property rights, confidentiality obligations and the legitimate interest of the owner(s) of the foreground.
- At least 45 days prior notice of any dissemination activity shall be given to the other beneficiaries concerned
- All publications or any other dissemination relating to foreground shall include the following statement: "**The research leading to these results has received funding from the European Community's Seventh Framework Programme (FP7/2007-2013) under grant agreement n^{o} xxxxx**".

Regarding Foreground, Grant Agreement Article II.26. - Article II.29. shall apply with the following additions.:

In case of joint ownership of Foreground each of the joint owners shall be entitled to use the joint Foreground as it sees fit, and to grant non-exclusive licenses to third parties, without any right to sub-license, subject to the following conditions:

- at least 45 days prior notice must be given to the other joint owner(s); and
- fair and reasonable compensation must be provided to the other joint owner(s).

Each Partner institution may transfer ownership of its own Foreground following the procedures of the Grant Agreement Article II 27.

- It may identify specific third parties it intends to transfer Foreground to in separate attachment to the Consortium Agreement. The other Parties will waive their right to object to a transfer to listed third parties according to the Grant Agreement Article II.27.3.
- The transferring Partner shall, however, notify the other Partners of such transfer and shall ensure that the rights of the other Parties will not be affected by such transfer.
- Any addition to separate attachment after signature of the Grant Agreement requires a decision of the General Assembly.
- The Partners recognize that in the framework of a merger or an acquisition of an important part of its assets, a Partner may be subject to confidentiality obligations which prevent it from giving the full 45 days prior notice foreseen in Grant Agreement
  Article II 27.2.
- Dissemination activities including but not restricted to publications and presentations shall be governed by Article II.30 of the Grant Agreement.
- The Partner institution objecting a publication has to show that its legitimate interests will suffer disproportionately great harm and shall include a request for necessary modifications.
- For the avoidance of doubt, a Partner may **not** publish Foreground or Background of another Partner, even if such Foreground or Background is amalgamated with the Partners' Foreground, without the other Partner's prior written approval. The internal communication means set up under WP 7 will be used for this communication.
- The Partners undertake to cooperate to allow the timely submission, examination, publication and defence of any dissertation or thesis for a degree which includes their Foreground or Background. However, confidentiality and publication clauses have to be respected.
- Nothing in the Consortium Agreement shall be construed as conferring rights to use in advertising, publicity or otherwise the name of the Partner or any of their logos or trademarks without their prior written approval.
- The Partners shall identify in a separate attachment to the Consortium Agreement the Background to which they are ready to grant Access Rights, subject to the provisions of the Consortium Agreement and the Grant Agreement. Such identification may be done by e.g.
- naming a specific department of a Partner institution and/or by subject matter.
- The owning Partner may add further Background to the attachment during the Project by written notice.
- However, only the General Assembly can permit a Partner to withdraw any of its Background from the attachment.
- The Partners agree that all Background not listed in the attachment shall be explicitly excluded from Access Rights. They agree, however, to negotiate in good faith additions to the attachment if a Partner asks them to do so and those are needed.
- For the avoidance of doubt, the owner is under no obligation to agree to additions of his Background to the attachment.
- In addition, if a Partner wishes to exclude specific Background, it shall list such Background in a separate attachment.

- The owning Partner may withdraw any of its Background from this attachment during the Project by written notice.
- However, only the General Assembly can permit a Partner to add Background to the attachment.
- Each Partner shall implement its tasks in accordance with the description of work, and shall bear sole responsibility for ensuring that its acts within the Project do not knowingly infringe third party property rights.
- As provided in the Grant Agreement Article II.32.3. Partners shall inform the Consortium as soon as possible of any limitation to the granting of Access Rights to Background or of any other restriction which might substantially affect the granting of Access Rights (e.g. the use of open source code software in the Project).
- If the General Assembly considers that the restrictions have such impact, which is not foreseen in the description of work, it may decide to update Table 1.3c accordingly.
- Any Access Rights granted expressly exclude any rights to sublicense unless expressly stated otherwise.
- Access Rights shall be free of any administrative transfer costs.
- Access Rights are granted on a non-exclusive basis, if not otherwise agreed in writing by all the Partners according to the Grant Agreement Article II.32.7.
- Foreground and Background shall be used only for the purposes for which Access Rights to it have been granted.
- All Access Rights shall be granted upon written request.
- The granting of Access Rights may be made conditional on the acceptance of specific conditions aimed at ensuring that these rights will be used only for the intended purpose and that appropriate confidentiality obligations are in place.
- The requesting Partner must show that the Access Rights are Needed.
- Access Rights to Foreground and Background Needed for the execution of the own work of a Partner under the Project shall be granted on a royalty-free basis, unless otherwise agreed in a separate attachment.
- Access Rights to Foreground if Needed for Use of a Partner's own Foreground including for third-party research shall be granted on fair and reasonable conditions.
- A third party shall not be granted direct Access to Foreground generated by other Partners unless those Partners explicitly agree to it.
- Access rights for internal research activities shall be granted on a royalty-free basis.
- Access Rights to Background if Needed for Use of a Partner's own Foreground shall be granted on fair and reasonable conditions.
- For the avoidance of doubt any grant of Access Rights not covered by the Consortium Agreement shall be at the absolute discretion of the owning Partner and subject to such terms and conditions as may be agreed between the owning and receiving Partners**.**
- Access Rights granted to a Defaulting Partner and such Partner's right to request Access Rights shall cease immediately upon receipt by the Defaulting Partner of the formal notice of the decision of the General Assembly to terminate its participation in the Consortium.
- A Partner leaving voluntarily and with the other Partner's consent shall have Access Rights to the Foreground developed until the date of the termination of its participation. The time limit for its right to request these Access Rights shall start on the same date.
- Any Partner leaving the Project shall continue to grant Access Rights pursuant to the Grant Agreement and the Consortium Agreement as if it had remained a Partner for the whole duration of the Project.
- Partner's Access Rights to Software do not include any right to receive source code or object code ported to a certain hardware platform or any right to receive respective Software documentation in any particular form or detail, but only as available from the Partner granting the Access Rights.

All information in whatever form or mode of transmission, which is disclosed by a Partner (the "Disclosing Partner") to any other Partner (the "Recipient") in connection with the Project during its implementation and which has been explicitly marked as "confidential", or when disclosed orally, has been identified as

confidential at the time of disclosure and has been confirmed and designated in writing within 15 days at the latest as confidential information by the Disclosing Partner, is "Confidential Information".

The Recipients hereby undertake in addition and without prejudice to any commitment of non-disclosure under the Grant Agreement, for a period of 5 years after the end of the Project:

- not to use Confidential Information otherwise than for the purpose for which it was disclosed;
- not to disclose Confidential Information to any third party without the prior written consent by the Disclosing Party;
- to ensure that internal distribution of Confidential Information by a Recipient shall take place on a strict need-to-know basis; and
- to return to the Disclosing Partner on demand all Confidential Information which has been supplied to or acquired by the Recipients including all copies thereof and to delete all information stored in a machine readable form. If needed for the recording of ongoing obligations, the Recipients may however request to keep a copy for archival purposes only.

The Recipients shall be responsible for the fulfilment of the above obligations on the part of their employees and shall ensure that their employees remain so obliged, as far as legally possible, during and after the end of the Project and/or after the termination of employment.

The above shall not apply for disclosure or use of Confidential Information, if and in so far as the Recipient can show that:

the Confidential Information becomes publicly available by means other than a breach of the Recipient's confidentiality obligations;

- the Disclosing Partner subsequently informs the Recipient that the Confidential Information is no longer confidential;
- the Confidential Information is communicated to the Recipient without any obligation of confidence by a third party who is in lawful possession thereof and under no obligation of confidence to the Disclosing Partner;
- the disclosure or communication of the Confidential Information is foreseen by provisions of the Grant Agreement;
- the Confidential Information, at any time, was developed by the Recipient completely independently of any such disclosure by the Disclosing Parner; or
- the Confidential Information was already known to the Recipient prior to disclosure.

The Recipient shall apply the same degree of care with regard to the Confidential Information disclosed within the scope of the Project as with its own confidential and/or proprietary information, but in no case less than reasonable care.

Each Partner shall promptly advise the other Partner in writing of any unauthorised disclosure, misappropriation or misuse by any person of Confidential Information as soon as practicable after it becomes aware of such unauthorised disclosure, misappropriation or misuse.

If any Partner becomes aware that it will be required, or is likely to be required, to disclose Confidential Information in order to comply with applicable laws or regulations or with a court or administrative order, it shall, to the extent it is lawfully able to do so, prior to any such disclosure notify the Disclosing Partner, and comply with the Disclosing Partner's reasonable instructions to protect the confidentiality of the information. The confidentiality obligations under the Consortium Agreement and the Grant Agreement shall not prevent the communication of Confidential Information to the European Commission.

4. Ethical issues

ETHICAL ISSUES TABLE

	YES	PAGE
Informed Consent		
• Does the proposal involve children?		
• Does the proposal involve patients or persons not able to give consent?		
• Does the proposal involve adult healthy volunteers?		
• Does the proposal involve Human Genetic Material?		
• Does the proposal involve Human biological samples?		
• Does the proposal involve Human data collection?		
Research on Human embryo/foetus		
• Does the proposal involve Human Embryos?		
• Does the proposal involve Human Foetal Tissue / Cells?		
• Does the proposal involve Human Embryonic Stem Cells?		
Privacy		
• Does the proposal involve processing of genetic information or personal data (eg. health, sexual lifestyle, ethnicity, political opinion, religious or philosophical conviction)		
• Does the proposal involve tracking the location or observation of people?	X	
Research on Animals		
• Does the proposal involve research on animals?		
• Are those animals transgenic small laboratory animals?		
• Are those animals transgenic farm animals?		
• Are those animals cloning farm animals?		
• Are those animals non-human primates?		
Research Involving Developing Countries		
• Use of local resources (genetic, animal, plant etc)		
• Benefit to local community (capacity building ie access to healthcare, education etc)		
Dual Use		
• Research having potential military / terrorist application		
I CONFIRM THAT NONE OF THE ABOVE ISSUES APPLY TO MY PROPOSAL		

Tracking the location or observation of people

During the course of the project fisheries effort data originating from the satellite based Vessel Monitoring System (VMS) will be utilized. However, the equipment of fishing vessels larger than 15 m with VMS is mandatory in European waters. Generally, VMS data may only be utilized in anonymised formats, not allowing the identification of individual boats, a rule that will also be applied during this project.

5. Gender aspects

Every effort will be made to establish a project staff in which both genders are as far as possible equally represented. Traditionally, women have been underrepresented in marine sciences, although the female : male-ratio tends to improve in the younger generations. In the present project, two work packages are led by women, as well as the twocase studies. Several of the younger scientists involved in the project are women.

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Annex 1 – Case studies of COEXIST

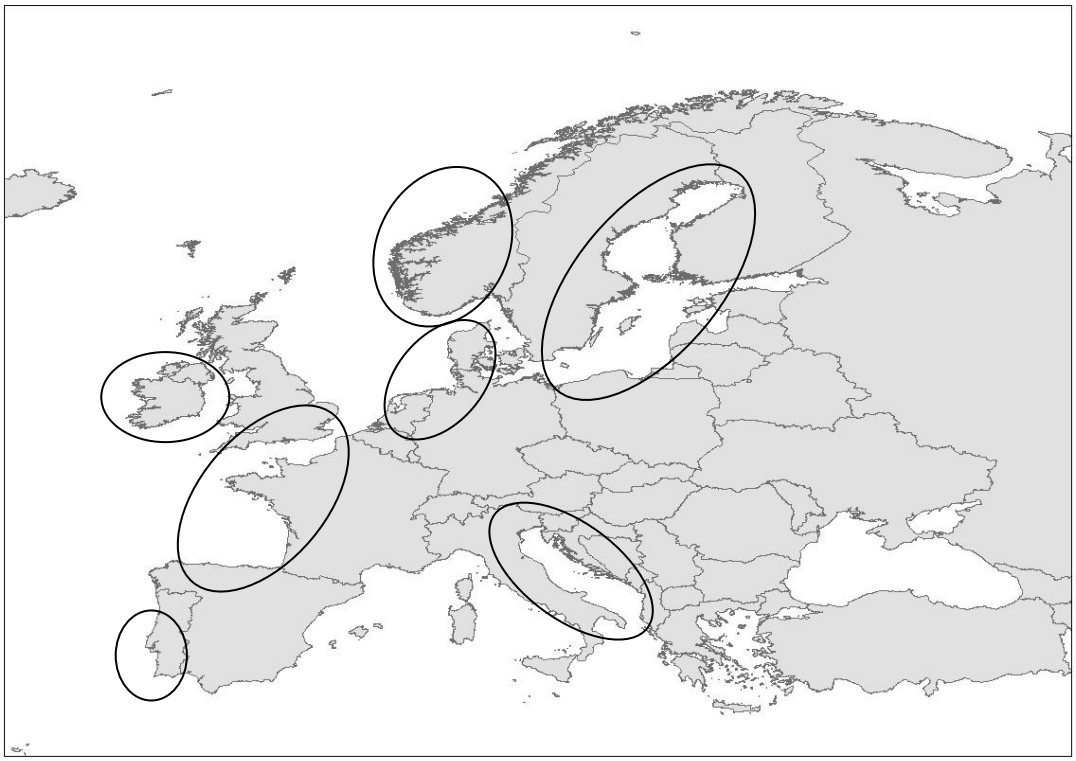

Figure 1. Case studies of COEXIST.

In COEXIST, individual processes as well as their interaction, will be investigated in case studies, representing the specific conditions and combinations of activities of European coastal areas of particular importance for aquaculture and coastal fisheries. The six case studies, which are described here, will use input from research conducted in national projects as sources of data for further modelling and evaluation in **WP3** and **WP4**, as well as for a best practice guide to be developed in conjunction with stakeholders in **WP5**, in which a synthesis of results will be carried out.Each Case study has one leading partner, but several partners will add to the analyses of data of each particular case study, adding to the European dimension of COEXIST

Table 1. Case studies of COEXIST, with leading partner

Case study		**Leading partner**
1	Hardangerfjord	1, IMR
2	Atlantic sea coast	3, UCC
3	Algarve Coast	5. IPIMAR
4	Adriatic Sea Coast	8. CNR-ISMAR
5	Coastal North Sea	2 . vTI-SFF
6	Baltic Sea	7 . FGFRI

Case study 1: Hardangerfjord

The ecosystem in the Hardangerfjord has been of high importance for man for more then 9000 years, and at present the fjord serves many functions, for fisheries and aquaculture, for recreation, tourism and cultural identity, as a climate moderator in the fruit growing districts, as a resipient and as a transportation route for people and cargo. During the past 15 years, the salmon farming industry has expanded very rapidly up to a production of about 57.000 tonnes in 2007, making the Hardangerfjord the area in Norway with highest density of salmon *(Salmo salar)* farms (Figure 2).

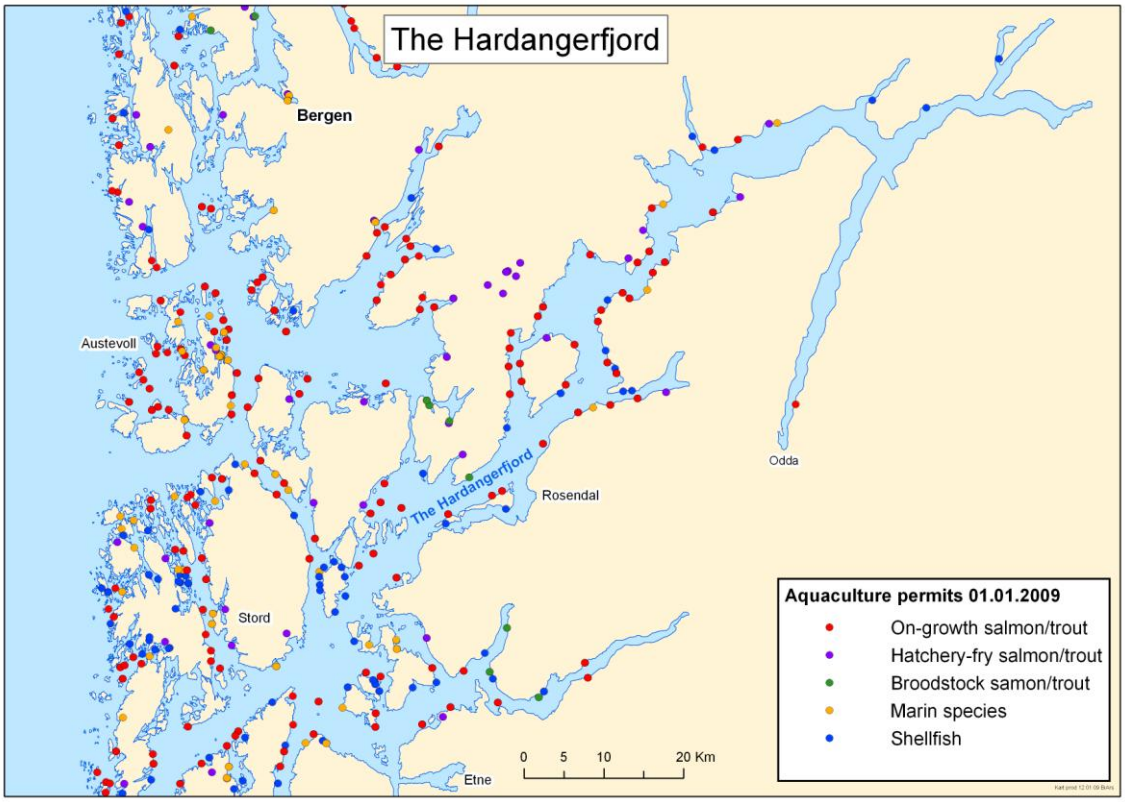

Figure 2. *The Hardangerfjord, Western Norway, with aquaculture sites marked (Norwegian Directorate of Fisheries, 2008).*

Simultanously, tourism based on marketing of the clean, pristine Norwegian fjords in general, and specificially of the Hardangerfjord, is expanding and attracting cruise traffic and other forms of tourism to the area. Sprat, a key species in the ecosystem, once a very important source of food and work, and the basis for the first industry in the region, has declined dramatically over the last decades. Sea trout which was common in most rivers draining into the fjord, and a basis for recreation in every little village, and abundant in the sea for thousands of years, is now rarely seen in any numbers. The number of wild salmon spawning is now far below the numbers required for recruitment, and angling is banned in all salmon rivers apart from one. Another important species, the cod, has also declined strongly.

Variation in temperature and salinity, nutrients, phytoplankton and zooplankton in time and space is key information to understand and interpret observed changes in macroalgae and fish species and the impact of aquaculture on the environment. Therefore, the main effort is placed on obtaining high-resolution

information on the low end of the food chain. This information is also of vital importance to interpret annual fluctuations in infection levels of salmon lice in seatrout and wild salmon, and the potential impact of nutrients from salmon farms Through the national EPIGRAPH project, http://www.imr.no/english/__data/page/6335/imr_news_3_2008.pdf COEXIST will be provided a wide set of data on the ecology of this ecosystem, its fisheries, MPA's and aquaculture production.

In particular, salmon lice measurements from the fjord will be used in order to provide data for modeling dispersal of lice and other pathogens. An important context for applying model studies is the spreading of diseases, in relation to spatial management of aquaculture farms, and studies of their interactions with wild fish. Diseases are an integral part of the existence of all organisms, including both cultured and wild fish populations (Bergh 2007). Parasitic organisms naturally exist in an unstable equilibrium with their hosts which is clearly affected environmental changes and anthropogenic activities, such as for instance the development of for instance aquaculture (Reno 1998). Limited research has been undertaken on diseases of wild fish populations, and on the interactions between wild and farmed populations in terms of exchange of pathogens. This is at least partly due to the tremendous difficulty in studying diseases in wild fish populations: infected fish die and disappear often before they can be detected. Although the greatest risk may be introduction of new pathogens to an area, the dynamic interactions between aquaculture and fisheries include alterations in the disease situation, with major impact for instance on the public perception of aquaculture.

Whereas many pathogens may at least to some extent be controlled within farms by means such as fish vaccines (Bergh and Nerland 2008, Lillehaug et al. 2003, Sommerset et al. 2005), proliferation of pathogens in aquaculture, with subsequent dispersal to wild populations may have severe effects on wildlife, and thus on fisheries as well as the general quality of the environment. In the case of salmonid production, salmon lice, *Lepeoptheirus salmonis* is still the best studied, and economically as well as ecologically the most important example, and is thus chosen as a model pathogen in the present project proposal. The spreading mechanisms of salmon lice, which is well adapted to the hydrographic situations in fjords, as will be demonstrated by data from the Hardangerfjord case study. Hydrographic models describing spreading of surface layers in the fjord has already been generated by national projects.

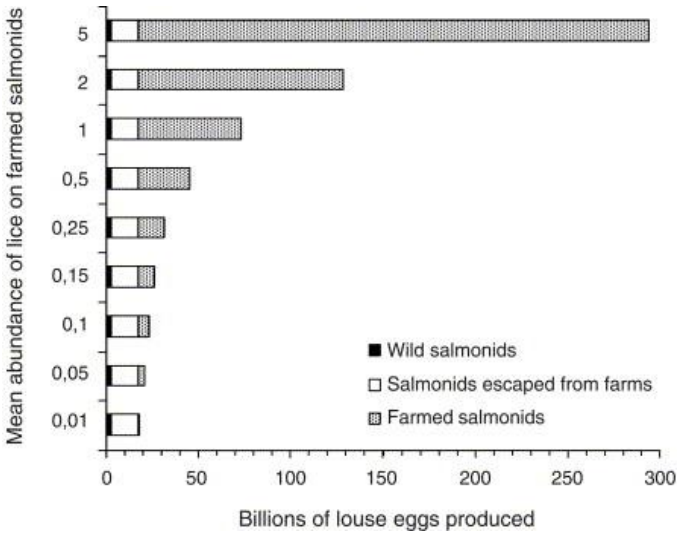

Fig. 3. *Estimates of the number of eggs produced by adult female salmon lice* Lepeophtheirus salmonis *on different hosts between April 1 and June 1, 1999 in the coastal area between and including the counties of Vest-Agder and Nordland in Norway, at different mean abundances of lice on farmed salmonids (adapted from Heuch and Mo 2001). Note that the higher the aquaculture production, the more dominant farmed fish becomes as sources of lice eggs*

Heuch and Mo (2001) modelled the production of salmon lice on the part of the Norwegian coast where most farms are situated. The model focused on the period of the smolt runs (April–June) and used publicly available data on host and lice numbers. At two adult female lice per farmed fish, which was the maximum number allowed by regulations until 2000, an estimated 111 billion lice eggs would have been produced by

farmed fish in 1999. (Figure 1) The number of eggs from lice on wild salmonids was calculated to be 2.6 billion, while lice egg production on escaped farmed fish was estimated at 15 billion. The model predicts that if the allowed limit is set lower than 0.5 adult female lice fish^{-1}, more lice eggs will be produced on escapees than on farmed salmonids. Historically, the number of salmon in Norwegian farms has increased with time; thus the total number of lice would have increase if the number of lice per fish is fixed. For lice egg production to remain constant, the state allowable limit must therefore be lowered every year. However, the level of lice production at which wild salmonid stocks are undamaged has been be deduced from challenge experiments (Heuch et al. 2005). A lower limit of salmon lice in farms will also be at the expense of increased development of resistance towards delousing agents. This type of models can easily be adapted to model spreading of various viral and bacterial agents from fish farms, and – with greater efforts - to other coastal environments.

Case study 2: Atlantic coast areas:

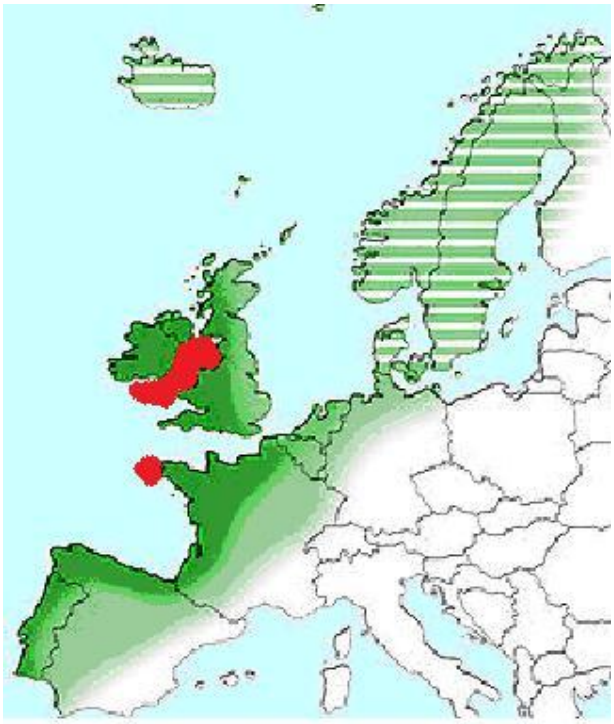

Figure 4. *Atlantic areas, with study areas marked (red).*

Europe's Atlantic coastal waters contain some of its most productive but heavily exploited fisheries while at the same time supporting high levels of aquaculture production. There are also increasing additional spatial pressures from other sectors such as offshore wind and tidal energy installations. The combination of these driving forces inevitably results in some spatial conflicts and requires an integrated approach to management of interactions between these multiple pressures. The Irish and Celtic Sea areas are the site of interesting interactions of which we have a particular interest in those involving mussel seed extraction, whelk potting and scallop dredging.

The area also presents possible spatial management models in the Isle of Man and potential opportunities for beneficial interactions between aquaculture, fisheries and offshore wind farms. Previous initiatives dealing with managing human activities at a regional sea scale have been implemented in the Irish Sea, including the Irish Sea Pilot project and a multiple-use zoning scheme approach to the management of marine activities (Boyes et al 2007). Both identified critical shortcomings in spatial measures to deliver conservation objectives of the Habitats Directive. Existing legal mechanisms do not provide adequate protection to important nature conservation features within the Irish Sea. Thus, despite progress in designating Natura 2000 sites, the studies confirmed that the network alone is unlikely to deliver a fully coherent coverage of protected areas, with sufficient protection for all the important conservation features which have been identified in the regional sea.

This case study will gain data focusing on aquaculture – fisheries interactions using examples from shellfisheries (scallop, mussel, whelk, sea urchin and lobster) and fin-fisheries (salmon, plaice). The main issues will be implications of overfishing, translocation and restocking (ecological, genetic). In addition the possible interactions between new technologies such as wind farms and artificial reefs with fisheries and

aquaculture will be investigated. A small wind farm has recently been established on the Arklow Bank off the east coast of Ireland and another large one is planned for 2014 off the North Wales coast (The Gwynt y Mor Farm, Guardian, Dec 4, 2009). Several small artificial reefs exist around the UK coast (eg Poole Harbour) and relevant data will be obtained from the European Artificial Reef Research Network.

The Iroise sea is located on the western part of Brittany, France. (Figure 2) Located on the western part of Brittany, seaweed and bivalve fisheries provides an original example of interaction between coastal fisheries and aquaculture in a context of the establishment of public marine protected area.

Case study 3: Algarve coast

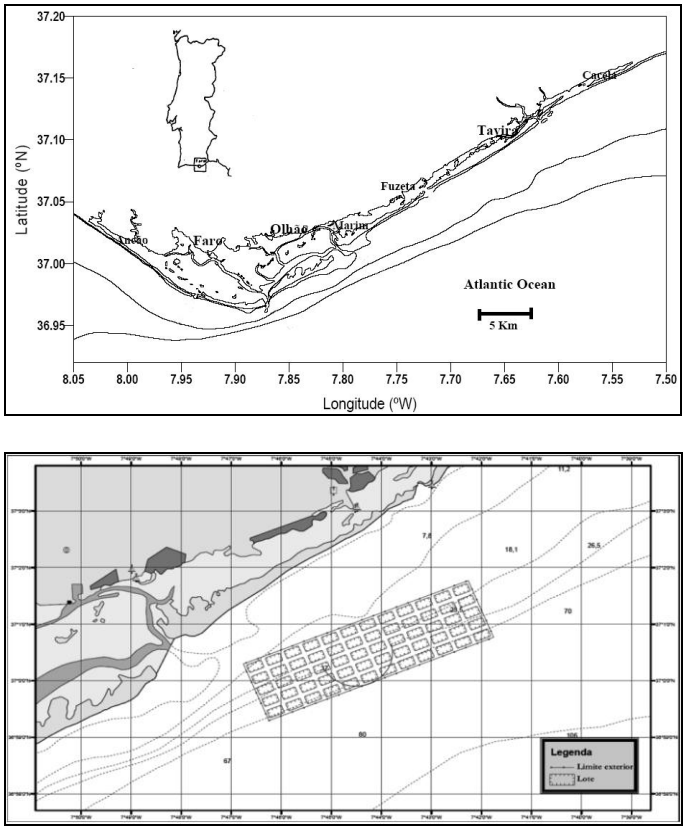

Figure 5 *A) Algarve Case study area Ria Formosa, B) APA, offshore aquaculture area (Diário da República, 2008)*

Due to its geo-location (Figure 5a) between the Mediterranean Sea, North Africa and the eastern Atlantic), the Algarve (southern Portugal) coastal waters are among the most productive of the Iberian Peninsula. However, due to the high diversity of the resources and generally calm ocean conditions, there are heavily exploited fisheries. Moreover, there is a high level of aquaculture production occurring in inshore estuarine-lagoon systems pressures.

On the other hand, the need to increase fish production (Portugal imports 50% of seafood products consumed) together with these favourable conditions, recently promoted the establishment of a large (1440 ha) offshore aquaculture area (APA, figure 4b). There is also increasing additional spatial pressures from the recreational sector, namely from eco-tourism (eg. diving, fishing and whale watching) and recreational fishing. The combination of these driving forces inevitably results in some spatial conflicts and requires an integrated approach to manage the interactions among these multiple pressures. In the southeastern Algarve coast, a number of interactions are of particular interest, namely those involving inshore and ofshore aquaculture, octopus potting/trapping, seabream and sole netting, small pelagic purseining and bivalve dredging. This case study will principally focus on aquaculture – fisheries interactions using examples from shell and finfish aquaculture (mussels and seabreams) and shell and fin-fisheries (clams, seabreams and soles). The main issues is implications on the wild shell and finfish assemblages, local fisheries and restocking (ecological, genetic). In addition the possible interactions between off-shore aquaculture and artificial reefs will be investigated, as inside and near the APA there are a small (60 ha) and a large size (650 ha) artificial reefs and relevant data will be obtained from IPIMAR.

Case study 4: Adriatic Sea coast

The Adriatic Sea is a peculiar, narrow epicontinental basin whose dimensions are about 200x800 km and shows a low topographic gradient, ~ 0.02° in average, that increases only at South of the Gargano promontory (Fig. 5). The coastal area chosen for the Adriatic Sea model (Fig. 5) is seat of several human activities, including fisheries and aquaculture. The former include small-scale fisheries (set nets, traps), hydraulic dredge fisheries of baby clams (*Chamelea gallina*), Mediterranean mussel (*Mytilus galloprovincialis*) harvesting on wild banks, recreational fisheries (spare fishing, traps, lines and long-lines) and, in some areas, intensive and extensive mussel (M. *galloprovincialis*) culture.

Small-scale fishermen usually set gears up to 5.5 km off the coastline, because at longer distances they could

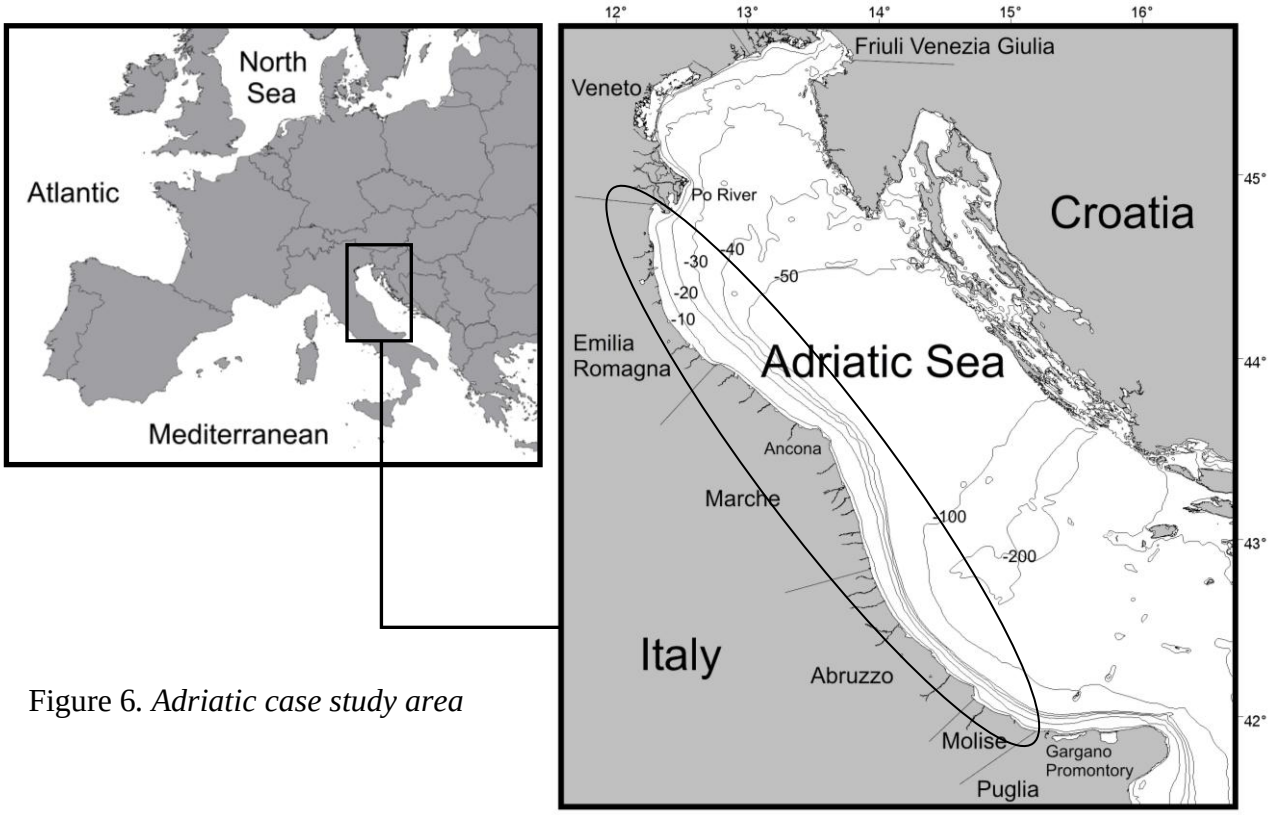

Figure 6. *Adriatic case study area*

be damaged by trawling. The main gears are: gillnets to catch common sole from late spring to fall, basket traps for the gastropod *Nassarius mutabilis* from middle fall to spring, and pots and fyke-nets for cuttlefish in spring. A total of 1,250 fishing vessels having an average GRT of 23 and mean engine power of 32 kW were allowed to operate in the case study area in 2007 (IREPA, 2007), even though a census carried out in the same year by CNR ISMAR evidenced that around 40% of them were regularly active during the main fishing seasons. In fact, this sector includes many small vessels often owned by old fishers who carry out only a few fishing trips all year round.

Hydraulic dredges for baby clam operate on the sandy bottoms from 3 to 11 m depth (3.7-4.0 km offshore). This fishing activity is regulated through a license and daily quota system. A total of 384 hydraulic dredges operated in the study area in 2007 with an overall yearly production of 19,608 tons, corresponding to about 36,500,000 €. Vessels have an average GRT of 11 and a mean engine power of 107 kW (IREPA, 2007).

Harvesting of mussels on wild banks is a traditional local activity carried out on three natural rocky areas just close to the coast and at some artificial reefs from late spring to late summer. It is regulated year by year through a license system and daily quotas. In addition, a limited fishing season is established in a few Maritime Districts (usually from middle spring to late summer). In this case fishermen's activity follows a

seasonal trend with mussel harvesting in spring and summer and set gears in fall and winter. Around 20 vessels were active in 2007 and their production was around 400 tons.
Recreational fishing consists of fishing with line and hooks, longlines, pots for cuttlefish, mussel harvesting on wild banks and spare fishing. The current national legislation on recreational fishing establishes a limited number of pots and hooks in longlines, and quotas for molluscs, crustaceans and fish. Recreational fishing takes place everywhere, overlapping with all the above fishing activities. In the northern Maritime Districts trawlers are allowed to operate inside the 5.5 km coastal area in winter and spring on the basis of national derogations that will be in force until 2010. In the other districts illegal trawling is often carried out inside the coastal zone as well often causing damages to the set gears.
Aquaculture consists of open-sea suspended mussel (*M. galloprovincialis*) cultures and, in a few cases, of extensive mussel culture on artificial substrates (artificial reefs). Most of farms are placed inside the 5.5 km coastal area. In 2005 the Italian production of cultured Mediterranean mussel accounted for more than 55% of the total world amount (Table I; FAO, 2008). About one third of the Italian product came from the case study area, where 42 offshore suspended farms were located (Prioli, 2008).

	Set gears (gillnets, traps, pots)	**Hydraulic dredges for baby clam**	**Trawling**	**Mussel harvesting on wild banks**	**Recreational fishery**	**Tourism**	**Artificial Reefs**
Intensive mussel culture	Conflict for space	Conflict for space	No conflict	Economic conflicts	No conflict	Positive economic interaction	Possible integration and diversification
Set gears (gillnets, traps, pots)		Conflict for space and resources	Conflict for space and resources	No conflict	Conflict for space and resources	Positive economic interaction/ Development opportunities	Development opportunities
		Hydraulic dredges for baby clam	No conflict	No conflict	Conflict for space	Positive economic interaction	Conflict for space
			Trawling	No conflict	No conflict	Positive economic interaction	Protection against illegal trawling
				Mussel harvesting on wild banks	Conflict for resource	Positive economic interaction	Development opportunities
					Recreational fishery	Development opportunities	Development opportunities
						Tourism	Diving opportunities

Figure 7: Adriatic Sea Case Study: Synthesis of major interactions/conflicts. Source: Gianna Fabi, Fabio Grati and Giuseppe Scarcella (CNR ISMAR Ancona), unpublished data

Level of interaction/conflict: = Low = Medium = High

Tourism is also a very relevant sector in the case study area especially in summertime. It induces an increased income for all the coastal fishing activities and aquaculture. Moreover, it may contribute to somewhat extent to reduce/solve problems connected with some coastal fisheries offering alternative/integrative opportunities related to recreational fishing (e.g. "pesca-turismo"). The same is in particular the case for case study 1 (Hardangerfjord), and 3 (Algarve), allowing for comparative analysis between regions far apart in Europe

In this context, the Adriatic model will provide source for an overall description of the situation currently existing in the north-central Adriatic Sea using a multidisciplinary approach which will take into account ecological/biological, spatial, legal, social, economic and nature conservation aspects and will analyse in detail the interactions/conflicts between coastal fisheries, aquaculture and other sectors/resource users. The final objective is to evaluate all possible solutions for managing space and allowing coexistence of coastal fisheries and aquaculture, and to highlight possible mutual opportunities either between these sectors as well as between them and other resource users.

Case study 5: Coastal North Sea

The Coastal North Sea case study comprises coastal areas of the Netherlands, Germany and Denmark in the southern and south-eastern North Sea. The major part of the area belongs to the territorial waters of the Wadden Sea, which is characterised by large tidal flats and is bordered to the open North Sea by a chain of islands. Besides, this case study will also include the adjacent part of the EEZs and thus reach beyond the 12-nautical mile zone of the territorial waters. The area is highly productive with tidal mixing and discharges from large rivers being the major sources of nutrient supply.

At present the demand for space changes rapidly in coastal areas. Tools for marine spatial planning e.g. zoning are used to allocate areas to different human activities. In the North Sea, coastal fisheries, especially for brown shrimp (*Crangon crangon*) and mussels, as well as blue mussel aquaculture are the major activities that will be affected by changes in management including the spatial planning of the coastal area. Currently, brown shrimp and blue mussel fishery and cultivation are relatively unaffected by each other. However, with increasing demand of other stake holders for marine areas competition between these two sectors may arise. Furthermore, already today farming of the Pacific Oyster (*Crassostrea gigas*) affects natural seed mussel beds through settlement of oyster larvae originating from cultured oyster sites.

Natura 2000 sites and wind farms are amongst the most important human uses competing for space with fisheries and aquaculture in the case study region. It can be expected that some of these designated sites, particularly for wind farms, will be closed for fishing and possibly also for aquaculture. This would cause a re-location of fishing activities to other areas nearby or lead to a reduction of fishing activities. For other areas – e.g. the Natura 2000 sites – a suit of restricting measures for fisheries and aquaculture will be implemented in management schemes, depending on the conservation objectives.

Within the European coastal seas, the most pronounced changes as a consequence of spatial management can be expected within the forthcoming few years when management actions required by the European Birds and Habitats Directives, or by the Marine Strategy Directive, will come into force.

Therefore, the main objective of this case study is to investigate the full suit of potential interactions and conflicts between

(i) Coastal fisheries (brown shrimp, being the commercially most important target species, seed mussels and blue mussels for consumption)

(ii) Offshore aquaculture activities (bottom cultures of mussels; collection of mussel seed in the water column with long-lines or nets; impact of invasive Pacific oysters (*Crassostrea gigas*)

(iii) Offshore wind farms

(iv) Natura 2000 sites

Description of the work/Actions

The Dutch, Danish and German waters to be investigated in this study are linked through the common distribution of living resources, aquaculture enterprises, and international fishing activities, which extend into neighbouring EEZ(s). The analyses will map the activities and quantify conflicts or benefits in order to provide a basis for spatial planning.

Mapping and modelling of interactions:

Analyses will include the steps outlined in Table 1 to cover the potential interactions. The conflict analyses and modelling components will link to various work packages through their deliverables:

Table 1. Interactions between aquaculture, fisheries and Natura 2000 areas in the Coastal North Sea

	Aquaculture: Settlement of mussels on devices in the water column	**Aquaculture: *Crassostrea gigas***	**Fishery of *Crangon crangon***	**Fishery of seed mussels and mussels for consumption**	**Natura 2000**	**Windparks**
Aquaculture: Bottom cultures of mussels *)	A	B DK, D, NL	B DK, D, NL	A	C DK, D, NL	C ("B" for existing windparks in DK)
	Aquaculture: Settlement of mussels on devices in the water column	A	B DK, D, NL	A	C DK, D, NL	C ("B" for existing windparks in DK)
		Aquaculture: *Crassostrea gigas*	A	B DK, D, NL	C DK, D, NL	C ("B" for existing windparks in DK)
			Fishery of *Crangon crangon*	A	C DK, D, NL	C ("B" for existing windparks in DK)
				Fishery of seed mussels and mussels for consumption	C DK, D, NL	C ("B" for existing windparks in DK)
					Natura 2000	C

A = no conflict

B = Map temporal and spatial distribution of both elements. Describe relevant legal constraints. Analyse and quantify current interactions.

C = Management plans for Natura 2000 sites and newly built windparks are yet to be developed. Map temporal and spatial distribution of the fishery / aquaculture element. Describe existing regulations. Analyse potential conflicts and benefits under different management scenarios.

For all current or potential conflicts: Identify options for mitigation measures.

- Brown shrimp (Crangon) fisheries -

With respect to economic value, beam trawling for brown shrimp (*Crangon crangon)* is the most important fishery in the Wadden Sea and adjacent coastal waters of the North Sea. Most of the *Crangon* fishery is conducted with small beam trawlers, less than 300 hp. These vessels are mainly run on short trips of one or a few days and are able to operate in the shallow coastal areas. They are allowed to fish within the 12 nautical mile coastal zone and in the "Plaice box" area, which extends further from shore into the waters of the NL, D and DK, where large vessels are excluded for the purpose of protection of plaice. Shrimp fishermen currently also operate in areas that are designated for wind farms or Natura 2000 sites, and may hence come into conflict with these activities when management measures will be put into place.

- Culture of blue mussels and capture fisheries of mussels and clams –

Aquaculture for blue mussels is being performed in the Netherlands and Germany, with the most extended bottom cultures in Dutch waters - 7000 ha of licensed plots in the Dutch Wadden Sea. The seed mussels have always been fished from the subtidal and tidal flats. A new development is collection and cultivation of seed from artificial substrates in the water column. Different devices are used as substrate for the growth of seed mussels. Seed mussels are most often cultured on anchored devices (e.g. smart farm, easy farm, and devices developed by individual farmers). These devices have the advantage that they can be moved to another place without interruption of the growth process (an aspect to be considered in this analysis). In contrast, bottom cultured mussels are mostly grown on spatially fixed mussel beds on natural ground. These cultures are supplied through seed mussels that are fished elsewhere and concentrated over a suitable area for settlement. – Thus, some aquaculture activities of blue mussels are tightly linked to fisheries for mussel seeds and need to be considered in combination when spatial management options are being discussed. Additional fishing activities exist for clams, but not permitted in some national waters due to high impact on the sea bed.

- Natura 2000 sites -

EU Member States were requested to nominate Natura 2000 sites in their national waters by the end of 2008, and a network of well-managed marine Natura 2000 sites is to be established by 2012 (EU COM, 2006). Already in 2004, Germany as the first MS proposed 10 sites in the EEZs of the North Sea and Baltic Sea, covering a total of 31.5 % of its EEZs. Three of the four sites in the North Sea have been nominated as Sites of Community Importance (SCI) under the Habitats Directive and have been approved by the European Commission in January, 2008. The fourth is a proposed Special Protection Area (SPA) for the protection of seabirds under the Birds Directive. This German SPA has been proposed to the OSPAR/HELCOM network of MPA's.

From 2006 to 2008, ICES and the German Federal Agency for Nature Conservation (BfN) jointly led a project 'Environmentally Sound Fishery Management in Protected Areas' (EMPAS, www.ices.dk/projects/empas.asp), to gather information on the distribution and impacts of fisheries in proposed Natura 2000 sites in German offshore waters. In November of 2008, ICES formulated an Advice related to the outcome of the EMPAS project and options for further steps in defining fisheries management measures in the designated Natura 2000 sites (ICES, 2008). Scientists from DTU-Aqua, IMARES and vTI-SF were involved in the ICES/BfN project and in the ICES advisory process. At present, no management measures for Natura 2000 sites have been defined, but they are expected within the duration of this project.

- Wind farms -

While many of the potential interactions may be characterized by competition for space, others may lead to a mitigation of conflicts or mutual opportunity. Wind farms, for example, could have a potential to positively affect the production of valuable shellfish and fish, and the undisturbed bottom may be an asset to nature conservation. Large offshore wind farms are currently being established across Europe. These areas are usually closed to commercial fisheries, but are widely considered to have large potential for aquaculture and / or as artificial nursery areas for commercially important fish and shellfish species. The study will focus on mutual opportunity/optimisation of mussel culture, sea ranching of crustaceans and development of wind farm sites into suitable nursery grounds for commercially important fish species. Management of the allowed activities in wind farm areas in Denmark, Germany and the Netherlands will be described and contrasted. Applying the methods of a preceding Danish project in the Limfjord (Dolmer & Geitner 2004), this case study will use a combination of GIS mapping and detailed descriptions of the local activities.

Stakeholder involvement:

Stakeholders will be involved for consideration of the actual or potential interactions of the four categories mentioned above. Management options will be discussed in order to find solutions that mitigate conflicts or even lead to mutual benefits. A stakeholder meeting will be arranged shortly after the kick off meeting of the project and throughout the project in connection to planned meetings with the broader group of stakeholders.

Contribution to WPs 3 & 4 Modelling and Scenario Evaluation

A comprehensive modelling study will be applied to develop and evaluate viable coexistence scenarios for the competing uses in the coastal North Sea described above. Existing model components will form the basis for an integrative modelling approach: population models linked to dynamic and economic fishing activity models interlinked with various management modules will allow the evaluation of consequences of spatial management decisions (i) for living resources, (ii) the economic viability of the fisheries and (iii) aquaculture activities.

Specifically the model components will comprise:

(I) Fleet model for individual metiers, specifically *Crangon* and Blue mussel fisheries

(II) Conflict analysis for the different spatial planning elements (compare Table 1)

(III) Simple population dynamic models for *Crangon*

(IV) Inventory of Blue mussel cultures and distribution of invasive Pacific oysters

(V) Management model and economic model to evaluate selected management options and response scenarios

Model development

(I) Spatio-temporal distribution of individual fleet components can partly be obtained from VMS data. Approximately 90% of shrimpers in the German section of the North Sea are equipped with VMS, but only very few of the Dutch shrimpers have a tracking system. It is expected that the Dutch fleet will be equipped in the course of 2009 in relation to MSC certification of the brown shrimp fishery. This will also involve introduction of electronic log books. In order to describe the effort distribution with high resolution, a model combining VMS data for fishing activities and the related reported landings will be applied (Fock 2008). This

allows for down-scaling landings data to a resolution of ~ 3 by 3 nm model grid. For the fishing effort within the Wadden Sea (< 12 nm) most information will be obtained based on interviews with fishermen and (where available) electronic logbooks.

(II) Based on the already designated sites for windfarms, proposed sites for Natura 2000, as well as known distribution of blue mussel culturing activities, various aspects of interactions with coastal fisheries will be mapped and evaluated using GIS techniques. Interviews with fishermen or questionnaires may be used to include the fishermen's own perception of present or potential conflicts with respect to space, and to complement our theory-based assumptions and predictions with behavioural components of the fishing fleet.

(III) A simple population model for *Crangon crangon* in the North Sea will be applied. Poxies will be used to analyze the distribution and abundance of the *Crangon* fisheries resource, using several elements: Utilising VMS data on vessel location, the spatial patterns of the shrimp fleet reflecting the migrations and contractions of the marketable stock component may be linked to environmental clues. Oceanographic and meteorological data will be used to describe such relaationships. These findings will be contrasted with fishermen's rules of thumb (to be collected via questionnaire) concerning the quality of certain fishing grounds in connection with prevailing weather conditions. Models will be fine-tuned with the swept area estimates from the Demersal Youngfish Survey, DYFS.

(IV) Distribution maps of intertidal and subtidal cultured and natural mussel beds will be generated. The maps will indicate which beds are considered seed beds and which are (potentially) mature and stable. Potentially mature beds may not be available for seed fishery under present and future regulations in relation to Natura 2000. Maps of culture lots will be generated, as well as maps for (potential) sites for mussel seed collection using suspended devices. Additionally, the level of occurrence of invasive oysters, *Crassostrea gigas*, will be quantified within the mussel beds. The implication of *C. gigas* on mussel production and on the form and function of the ecosystem will be evaluated.

(V) Different scenarios of possible management decisions will be simulated with respect to their biological and economic impact. Predictions will be based on mapping anticipated behaviour of fishing fleet in response to measures restricting activities in certain areas (e.g. temporal closures), using GIS techniques to visualize spatial planning decisions and possible patterns of effort reduction or displacement. Economic consequences of potential restrictions will be estimated applying a model approach developed on the basis of costs and revenue of individual fishing trips and locations, before and after such measures. Scenarios will take into account changes of steaming time required or changes in catch per unit effort, as well as the possible seasonal variation of e.g. market prices and fuel costs.

Related National Projects

This international case study will link to several existing national initiatives that address spatial planning, data exchange between institutions or coastal zone management:

In Denmark, DTU-Aqua has an ongoing project in cooperation with windpark owners of the already established Horns Reef just northwest of Esbjerg.

Germany, under the contribution of vTI-SF, is in the process of defining the monitoring requirements for future windpark operators in the German EEZ (BSH 2007).

A German project "MDI-DE" (Marine Data Infrastructure Germany) is currently being proposed for national funding. The initiative MDI-DE is led by several institutions, including the Federal Waterways Engineering and Research Institute (Bundesanstalt für Wasserbau – BAW), the Federal Maritime and Hydrographic Agency (Bundesamt für Seeschifffahrt und Hydrographie – BSH), and the regional (county) offices responsible for Nature and Environment, and for the Wadden Sea National

Park. vTI-SF contributes to this project. The goal of MDI-DE is to establish gateway to a comprehensive databank system of georeferenced data and information about the German coasts and ocean areas, which enables multidisciplinary analyses. MDI-DE will link a variety of diversified data sources to a common platform to supply science, society, politics and administration with easily accessible environmental data as requested in the Blue Book on an Integrated Maritime Policy in the EU (EU Com 2007).

Case study 6: Baltic Sea

In the Baltic Sea Fisheries and Aquaculture industries have faced environmental and social conflicts which have affected the economy of the industries. New approaches to develop more sustainable governance have been raised by administration, researchers and stakeholders. The central idea is to consider all the interactions in spatial planning in purpose to change the conflicts to synergies. The Baltic Sea is, in the contrary to the other case study sea areas, a semi closed brackish water sea. The salinity is in most coastal areas low, mainly about one third of that in the high oceans. As a consequence Baltic Sea has a very stable deep water halocline which is causing the special nature of the Baltic Sea: it is very sensitive against oxygen consuming loading and thus suffers on the consequences of the eutrophication. In the contrary to other seas The Baltic is sensitive to the nutrient loading.

Typical for the Baltic Case study area in the SW-Finland (the Archipelago Sea including the county of Åland) is the rainbow trout net cage aquaculture. The fingerlings are produced in freshwater farms but the ongrowing, the last one or two summers, take place in the Baltic Sea. About 10 thousand tons of rainbow trout and about 700 tons of European whitefish were produced in the Finnish sea areas in 2007. The producer value of this was about 35 million €. About half of this was produced in the area of the Archipelago Sea. There are about 150 fish farms in the Finnish sea area (http://www.rktl.fi/tilastot/), most small family based corporations.

The Baltic Sea fishery accounts for major part of the Finnish catch. There are about 700 full time and about 1 300 of part time professional fishermen in Finnish Sea areas. The total Finnish catch in sea areas in 2007 was about 118 million kilos with a producer value of about 25 million €. The main species are herring and sprat which are caught mainly by a few effective trawlers fishing in the open sea. The small scale coastal fishery, which often is connected in the same household with fish farming and maybe other insular source of livelihoods, has as various target species with perch and pikeperch among the most important ones. Both coastal fisheries and aquaculture have suffered of a decline: the production volumes as well as the number of producers have decreased rapidly in past years. In aquaculture, production licences for the production sites have been for environmental reasons restricted and the production has become inefficient (Saarni et al. 2003). The main threats for commercial fishermen have been posed by the increasing numbers of the grey seals, low profitability, water quality problems and the difficulties in renting sufficient access to the fishing grounds' water areas (Saarinen 2005). Additionally, a growing part of the catch consists of species, which have very low or none market value (Mäkinen 2008). Instead, they are an extra cost due to increased work.

In the Archipelago Sea area the recreation is one important way of area use. Recreational use and fish farming have a clear confrontation: on the other side are fish farmers and fishermen with local inhabitants and on the opposite side the recreational users and summer house owners mostly from urban areas (Salmi *et al*. 2008).

Three new innovative management options will be studied, and compared with the present situation. The economic consequences of these management options for the fishing and fish farming industries in the study area are analysed. The interconnected options are:

- Net loading option (fisheries of low-valued stocks for nutrient removal to justify aquaculture licenses*)
- Localized value chain by changing global feed ingredients to local resources (nutrient recycling within the Archipelago fisheries and aquaculture)
- Rationalized farming site location strategy (fewer, bigger and better located farms)

The differences in the environmental impacts between the Finnish coastal waters management options are assessed based on Life Cycle Assessment (LCA) method. LCA is a tool, which was originally developed to evaluate the environmental implications of manufactured products or services during their entire life cycle. It has also been applied to study the environmental performance of alternative production systems (e.g. conventional vs. organic food) or management systems (e.g. regional waste management alternatives). Besides the direct environmental impacts arising from the activity under consideration LCA helps to recognise the indirect environmental consequences caused by the activity and the possible side-effects in other product systems or areas. In the Baltic case study, the main focus is on the environmental consequences related on nutrients and energy use, i.e. on eutrophication, depletion of fossil fuels and climate change. For these impact categories quantitative, scientifically-based assessment methods are available.

The LCA, according to the international standards of LCA (ISO 2006a and ISO 2006b), will include all relevant phases of the wild and farmed fish production chains. For example, for farmed fish the product system starts from the feed raw material production, including all relevant sub-systems such as electricity and fuels production, and ends to the retailing of the final fish products. In comparative study like this, the systems being compared must be equivalent. This means that the system boundaries, functional units, data quality and allocation rules should be the same in the compared systems and the possible differences must be reported.

The governance will be studied assuming that governance covers the whole of public and private interactions taken to solve societal problems and create societal opportunities. The three above-mentioned options will be interpreted as possible future management instruments and the variety of images regarding these instruments among the governance system will be studied. The approach will include evaluation of the structural aspects of the fisheries and environmental governance system, such as the scale of decision-making and inclusion of livelihood and other stakeholder interests.

The economic sustainability of emission trade, nutrient recycling and site relocation is analysed. In the emission trade system fish farmers will organise and finance trash fish removal, if they get compensation through larger production licenses in suitable water areas. The objective of the system is better profitability for both industries, less harm for other water users and lower net loading. External loading to the Baltic Sea would substantially decrease, if Baltic herring can be used as raw material for feed manufacturing companies to circulate the nutrients instead of import them like nowadays. The benefits of relocating the widely dispersed fish farms to concentrate farming units to socially acceptable and environmentally sound places will be studied. The win-win-win synergies are achievable with a location strategy where socio-economic and environmental factors are considered simultaneously.

Note: References are lised at the back in Part B of the COEXIST proposal.