



ECONOMICS OF COASTAL HAZARD PREVENTION



"Economics of Prevention Measures, Addressing Coastal Hazards"

BOOKLET OF PROJECT ACHIEVEMENTS





**Humanitarian Aid and
Civil Protection (ECHO)**

This project has been funded with the contribution of the Civil Protection Financial Instrument of the European Union. The sole responsibility of this communication lies with the author. The Commission is not responsible for any use that may be made of the information therein.

THE ECOSHAZ PARTNERSHIP

EcosHaz consortium involves six project partners with strong academic, technical and research background in the field of coastal risk management, originating from five different EU countries, Greece, England, Spain, Poland and Italy.



SIGMA Consultants Ltd, Greece

<http://www.sigmaconsultants.gr/>



Universidad Pablo de Olavide, de Sevilla, Spain

<http://www.upo.es>



Middlesex University Higher Education Corporation, Flood Hazard Research Centre, England

<http://www.mdx.ac.uk>



Maritime Institute in Gdansk,

<http://www.im.gda.pl>



University of Santiago de Compostela

<http://www.usc.es>



Universita degli Studi di Catania

<http://www.cutgana.unict.it>



THE ECOSHAZ PROJECT

The EcosHaz project is an initiative funded by the DG-Humanitarian Aid and Civil Protection of the European Union.

The main target of EcosHaz was to establish a sustainable knowledge framework addressing the costs and benefits of prevention and response to coastal hazards resulting from hydro-meteorological events (flooding, shoreline erosion, storm surges, sea level rise) and oil spill accidents.

Coastal hazards are a major concern for local population and authorities since the interaction of coastal processes with human activities and structures can adversely affect the economy, health, well being and safety of people and communities. An effective hazard mitigation planning requires the cost-benefit assessment of the various risk prevention measures correlated to the costs for response and rehabilitation (SEC/2010/1626, COM/2011/934 etc).

Notwithstanding the considerable progress that has been made over the past few decades in the fields of hazards' analysis and modelling, successful delivery of Cost/Benefit (C/B) assessment still remains very challenging. The considerable diversity of methodological approaches and terminology in use complicates the deduction of robust and comparable C/B figures. Besides the methodological differences, the lack of reliable publicly available cost assessment data is a major obstacle for process development. Existing cost databases are rather scarce, containing usually heterogeneous data or figures defined at an aggregate level. Moreover many parameters related to the coastal hazards' impacts are hardly reflected resulting in considerable uncertainties during the evaluation process of the appropriate mitigation measures.

EcosHaz project addressed the aforementioned limitations and weaknesses by i) reviewing and analyzing the available frameworks, methodologies and tools ii) providing state of the art guidance as well as necessary data sources and support structures for the economic assessment of coastal risk prevention measures iii) validating the applicability of the developed materials.

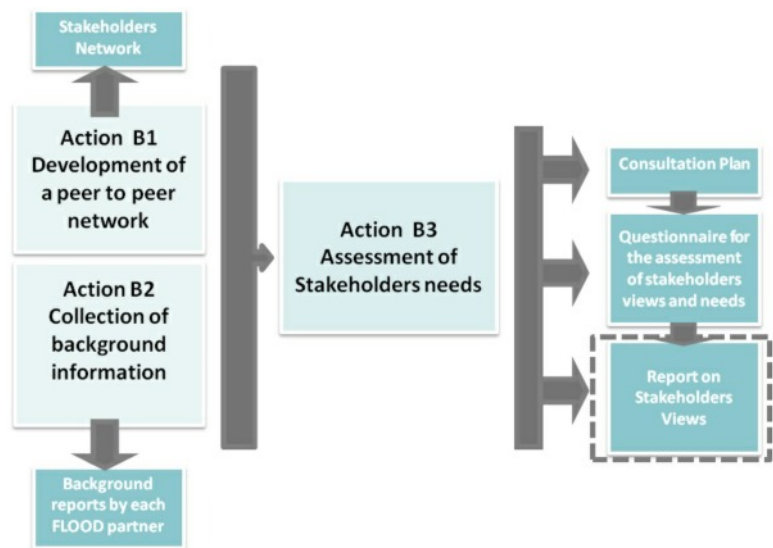
The project included the implementation of the following Tasks from January 1, 2015 until December 31, 2016:

- Task A Project Management and Reporting to the EU
- Task B Building the Stakeholders' Capacity
- Task C Development of the EcosHaz Knowledge Infrastructure and Tools
- Task D Implementation of Pilot Activities
- Task E Information, Dissemination and Capitalisation activities



BUILDING THE STAKEHOLDERS' CAPACITY

A set of activities were dedicated to the enhancement of the partners' capacity to respond properly to the project requirements along with the development of a flexible structure ensuring the involvement of key actors from the private and public sector.



PEER TO PEER NETWORK

Key end users and stakeholders in each country were identified and regional/national networks were established. Most of the consulted end users and stakeholders are public institutions both at national, regional and community level. Only in UK the percentage of public and private institutions is nearly equivalent. While in Italy and Spain institutions are only public. Public institutions work both at national, regional and community level; in Italy and Greece the majority works at regional level, in Spain and UK the majority of the institutions operates at community level. Private sector is represented by consulting firms. End users and stakeholders are almost equally involved in plans/projects formulation, emergency response, monitoring and plans/projects execution. Only few have an economic unit and overall they apply CBA moderately. They all confirmed their interest in being part of the Information Exchange Network.

COLLECTION OF BACKGROUND INFORMATION

The Collection of Background information aims to understand the current framework regarding the official application of CBA for coastal risk management in each participating country. Four key categories are covered: existing legal framework (laws and regulations), technical guidance, responsible institutions for coastal hazard measures and uniformity of CBA application across agencies. The following provide an overview of CBA in EcosHaz countries.



BUILDING THE STAKEHOLDERS' CAPACITY

From the collection of background information three main types of legal and organizational differences can be highlighted. First, in Greece, Italy and Spain, differently from Poland and UK, there are no general laws or regulations that specifically deal with the economic valuation of coastal hazards management measures. Second, whilst in United Kingdom and Poland the competence of the subject is attributed to main national agencies, in the other countries this is fragmented in regional authorities (Italy) or is attributed case-by case (Greece and Spain). Finally, in Italy, Poland and UK, CBA is applied uniformly, contrary to Greece and Spain.

Countries involved in the EcosHaz project present different degrees of development of frameworks and supporting structures to evaluate coastal hazards prevention measures. UK and Poland already have the backbone for coastal hazards management. Specifically they already have laws or regulations that deal with the economic valuation of coastal hazards management measures and an uniform application of CBA. The other countries (Greece, Italy and Spain) present a more fragmented situation, although in the presence of several initiatives.

	Existing Legal Framework	Official Guidance	Responsible Institutions	Uniformity in the application of CBA
Greece	NO	EU Guide to Cost-Benefit Analysis of Investment Projects.	Organization that is responsible for the contingent, case by case, investment.	NO
Italy	NO	NO	Regional Public Administration Unit of Valuation	YES (under specific requirements)
Poland	YES	In existing regulation	The Chief Inspectorate of Environmental Protection-GIOŚ Ministry of Infrastructure and Development National Water Management Authority	YES
Spain	NO	NO at national level	No	NO
UK	YES	In existing regulation	Environment Agency Department for Environment, Food and Rural Affairs	YES



BUILDING THE STAKEHOLDERS' CAPACITY

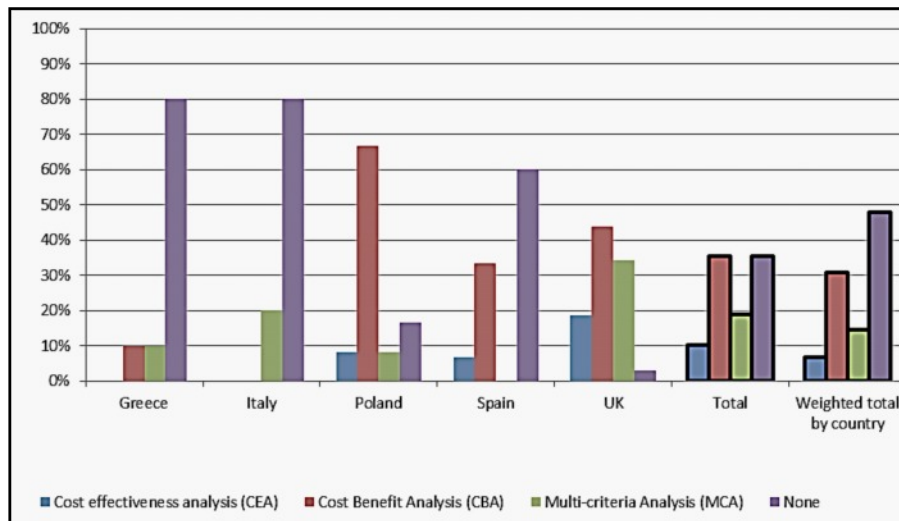
REPORT ON STAKEHOLDERS' VIEWS AND NEEDS

The Report on the Stakeholders' Views and Needs represents an insight into various stakeholders' views and needs in the partner's countries. In particular it includes information on:

- Main economic methodologies applied to coastal management
- Controversial issues and/or aspects that need further clarification
- Gaps in the implementation of CBA for Coastal Hazards management
- Stakeholders' involvement in the implementation of coastal hazards prevention measures
- Stakeholders' opinion about coastal and marine ecosystems conservation.

As to the main economic methodologies applied to coastal management, the majority of respondents, even if actively involved into coastal hazards management, have a modest or no experience with CBA or other economic tools. However, the level of application of the economic tools differs greatly across countries as shown in the figure below.

Application of Economic Tools



BUILDING THE STAKEHOLDERS' CAPACITY

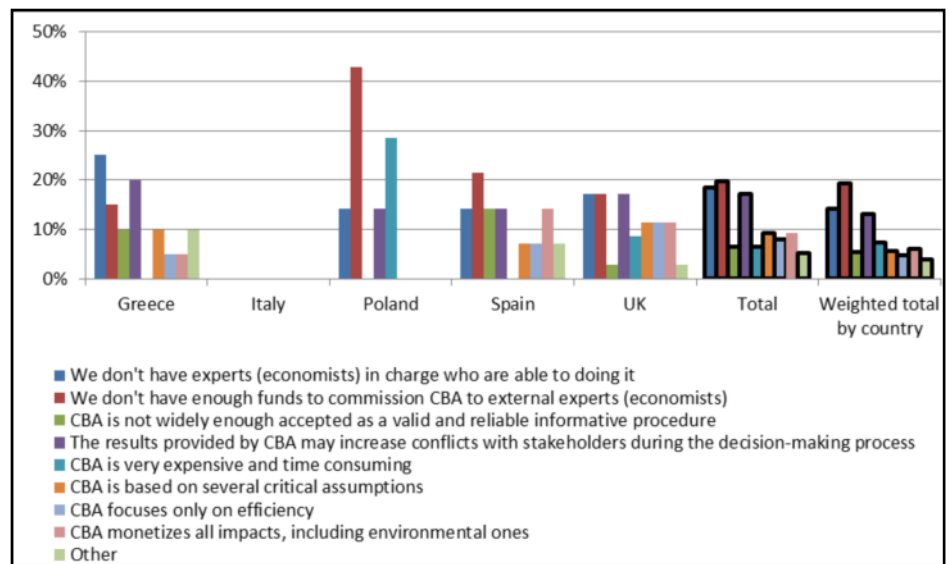
Among the methodologies used for coastal hazard prevention measures, cost benefit analysis is the most applied. The main reason why CBA is considered a useful tool is that it is a procedure that allows the selection of the most efficient option.

Other positive sides are its consistency and transparency, the inclusion of non-market impacts and the evaluation of benefits and cost through time. Some stakeholders showed to dislike this methodology, in particular they question the central role of discounting, and the relevancy of the procedure in the decision-making process.

As to the gaps in the implementation of CBA for Coastal Hazards, respondents in all countries agree that external scrutiny of data and procedures should increase and that estimate of environmental costs and benefits would need more accuracy in all countries. The majority of institutions think that the presentation of results of CBA should be simpler and strongly advocate the introduction of physical environmental impact. The need to increase participatory methods is very controversial across countries.

Several limits to the use of CBA are identified by respondents. The shortage of funds and internal experts, and the possibility that CBA may increase conflicts with stakeholders are the main reasons why its use is limited in decision-making process. Additional limits added by respondents are that CBA requires specific knowledge about types of data and it needs procedures to ensure its maintenance. In several countries a previously approved methodology is still missing.

Limits in the application of CBA in decision-making



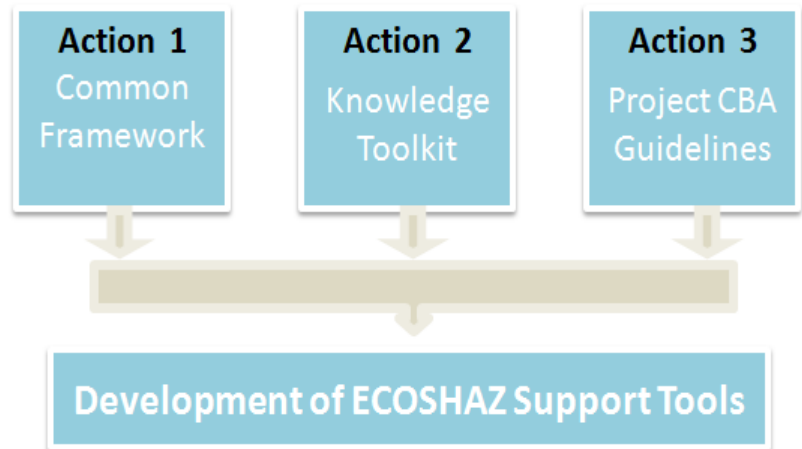
Though CBA is considered a useful decision-aiding tool to select the most efficient option, respondents show a mild preference for MCA. This result may be linked to the opinion expressed by respondents that estimations of environmental costs and benefits should be strongly improved and physical environmental impacts of the option introduced in CBA.



ECOSHAZ INFRASTRUCTURE AND KNOWLEDGE TOOLKIT

The EcosHaz consortium worked on the development of support tools and the establishment of an information exchange structure.

The aim of this Task was the effective stakeholders' involvement in the process of the knowledge exchange and improvement in the field of Cost Benefit and Multi Criteria Analysis of flood risk management.



COMMON FRAMEWORK OF COASTAL HAZARD AND RISK MANAGEMENT

This report provides a framework description of the main characteristics of Cost Benefit Analysis (CBA) and Multi-Criteria Analysis (MCA) with reference to coastal hazards and is a 'taster' and introduction for more detailed accompanying Guidelines. The framework incorporates a common terminology, including a detailed glossary of terms, to facilitate a better understanding of methods, their distinguishing capabilities and their leading-edge functionality. Coastal natural and human-induced hazards are considered. Within natural hazards the focus is hydro-meteorological hazards including flooding, flood surges, sea level rise and erosion, whereas with human induced hazards the focus is upon oil spills. The framework explains hazard management and how it may be guided by economic considerations designed to get best value for any hazard management investment. This may involve CBA or MCA, both of which weigh the costs of any interventions to reduce risk against the benefits thereby achieved, both tangible and intangible. The technical details of these techniques are covered in accompanying Guidelines and in linked training.

Chapters 2, 3 and 4 focus upon flood risk, erosion and oil spill management hazards respectively. The full range of management measures – (a) structural and non-structural and (b) preventive, protective and preparatory – is described together with a detailed explanation of the types of benefit and cost that are associated with each. Chapter 5 explains what is involved in assigning values to individual items of cost and benefit in a CBA or MCA. This includes the use of market prices and inferential and expressed preference techniques (such as Contingent Valuation Methodology) as well as benefit transfer methods where market prices are not attached to amenities. Chapter 6 considers how factors not taken fully into account in economic analyses may be addressed. These include intangible factors such as potential loss of life, disruption and environmental impacts which are difficult to quantify.

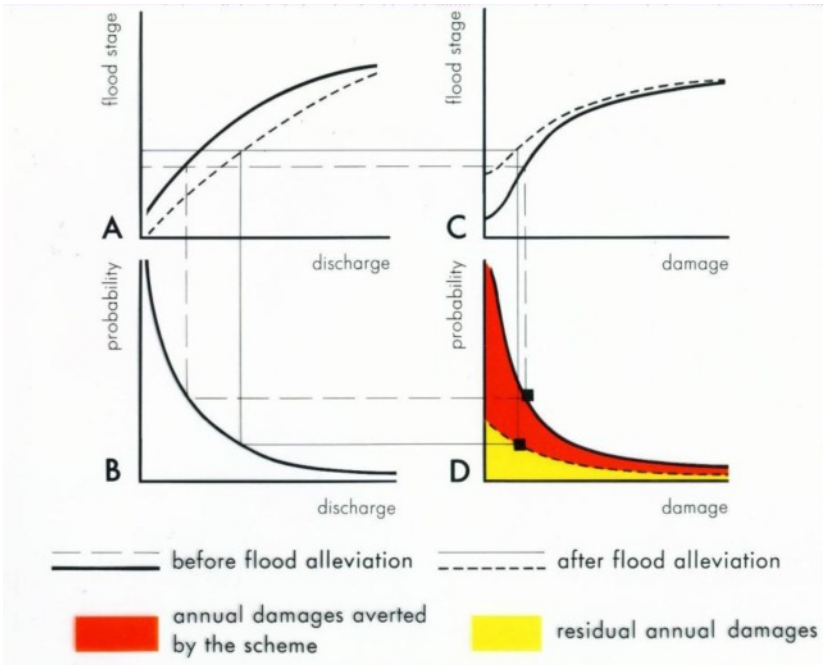


GUIDELINE 1: Implementation of Cost Benefit Analysis of Coastal Risk Management Prevention Measures Against Natural Hazards

These Guidelines are a stand-alone "How to do it" guide to assessing the benefits of coastal flood risk management (FRM) and are a development of the EcosHaz Common Framework of Coastal Hazard and Risk Management. The benefits and costs of coastal FRM plans or schemes should be compared with each other. The aim is to maximise the economic return to the nation by identifying the plan or scheme which represents "best value for money" by being economically efficient. Sometimes, economically efficient FRM solutions can lead towards unfair decisions but benefits weightings may be used to counter this unfairness.

Chapter 2 explains the data required to calculate benefits including land use, georeferenced and topographic data, flood extent and flood probability data and flood loss data. It also explains how the benefit area is determined and the procedure for calculating average annual damages which is a fundamental step in benefit assessment. Subsequent chapters (3, 4 and 5) explain how CBAs and benefit assessments may be undertaken at three levels of detail (strategic/'desk-top' through to detailed feasibility levels); and provide more detail on residential flood damages and intangible effects of floods (e.g. on health); non-residential flood damages and business disruption losses and how they may be assessed. Chapter 6 explains procedures and techniques for assessing the potential benefits of investment in coastal erosion risk management, which are derived from delaying erosion. This chapter provides a recommended approach including a procedure for valuing property-life extension and a hypothetical example. Data requirements include erosion rates and contours, erosion probabilities, erosion-affected property values.

Examples of data commonly used in the UK and key references for further reading are provided. Lessons from experience of performing these kinds of benefit assessments are also provided throughout the Guidelines including some commonly raised and cautionary issues and what to do when data are inadequate or unavailable.



ECOSHAZ INFRASTRUCTURE AND KNOWLEDGE TOOLKIT

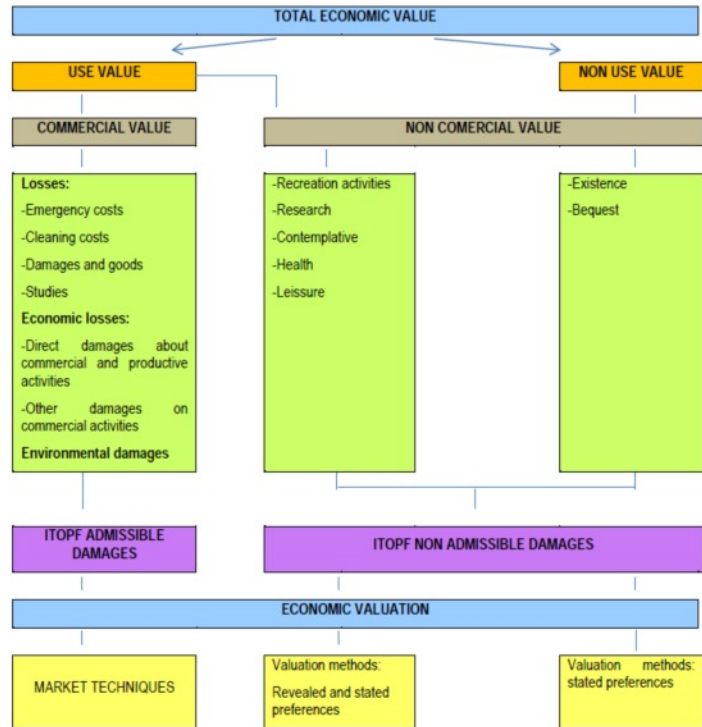
GUIDELINE 2:

Planning for a Contingency Plan for an oil spill disaster is crucial to avoid (or to reduce) potential damages on environment and human health. The severity of an oil spill is highly influenced by the response.

Therefore, the existence of a Contingency Plan allows for a timely and coordinated response. Contingency Plans assist stakeholders before, during and after the emergency action, clarifying their roles.

A quick response needs to be accompanied by the use of the most efficient and effective technologies and a full participation and collaboration of all agents.

This guideline contains the main points that a Contingency Plan should consider in order to manage an oil spill accident. It also describes the benefits derived from the existence of this management tool.



Furthermore, different damages that can be suffered after an oil spill are also presented through examples that have been published in earlier literature. The main aim is to provide information to stakeholders about the importance of the existence of this kind of plans; but overall on the importance of a Cost Benefit Analysis (CBA).

With regards to CBA, it has been highlighted that it is necessary to compare the costs derived, related to the existence of the management plan (writing, updating, equipment, material, etc.), with the potential benefits that can be obtained from its existence (calculated through the avoided damages). At times, the lack of data will preclude the completion of a full CBA exercise, although the relevance of economic aspects should be emphasized in first response actions. It is important to note that in the application of a CBA, we have to compare costs and benefits in a future time. Therefore, and as it is described more in detail in the Annex, we need to consider the concepts of discount rate and the timing.



ECOSHAZ INFRASTRUCTURE AND KNOWLEDGE TOOLKIT

ECOSHAZ KNOWLEDGE TOOLKIT

The EcosHaz Knowledge Toolkit is a combined electronic library and case studies matrix organised under the following Modules:

1. Coastal Risk Assessment Framework. The contents of this Module concern, EU Policy/ National legal and regulatory frameworks; Open Source/Access information tools and methodologies evaluating coastal risks; Links to other relative EU projects and initiatives; Reporting on Climate change and coastal vulnerability; Database of previous CBA – MCA studies; Links to on line information sources of existing coastal risk maps or assessment maps and impact-oriented coastal risk databases.
2. Early Warning Systems. This Module provides links to existing Early Warning Systems worldwide.
3. Coastal Risk Management measures and plans. This Module includes a case study matrix which clusters together examples of good practises, existing coastal Risk Management master plans, coastal Disaster Risk Reduction (DRR) strategies and a wide range of Prevention, Mitigation and Preparedness (PMP) measures.
1. Economics Knowledge Base. This Module provides conceptual elements of Coastal Risk Management CBA and MCA; Definition and classification of benefits and costs; Data essential for coastal hazards' CBA – MCA implementation such as: data needs and sources for quantification of effects, for evaluating the effects in monetary terms and for evaluating the non-priced effects; Methods of data collection; Techniques for adjusting the future prices of costs and benefits to present values; Sensitivity analysis.
5. Oil Spill Accidents. The Module includes articles related to the Economics of Oil Spills and the assessment of oil spill accidents.

KNOWLEDGE TOOLKIT

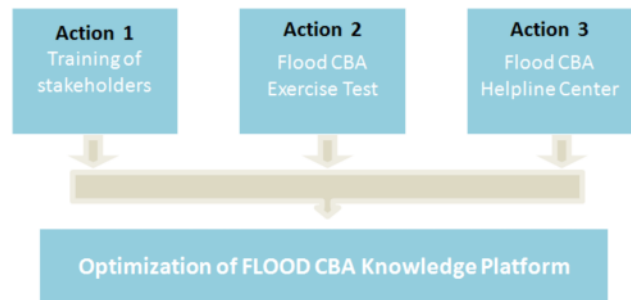


New knowledge developed during the project can be added to the knowledge toolkit including the experiences gained from workshops and dissemination activities. Other European and international competent bodies are invited to add their work. The Knowledge Toolkit contents are accessible via the project website.



IMPLEMENTATION OF PILOT ACTIVITIES

After the completion of the EcosHaz Guidelines and the development of the Knowledge Toolkit, the project partners initialised a participatory procedure in order to raise the awareness of policy makers and other interested stakeholders as well as to facilitate the further improvement of the developed EcosHaz products.



TRAINING OF STAKEHOLDERS

UPO prepared the training material according to the decisions made during the last EcosHaz coordination meetings. Training was delivered via an educational platform, that was developed especially for the training of the EcosHaz stakeholders. It is based on Moodle Open Educational Resource program. All training modules are uploaded on the EcosHaz Platform. In addition, the EcosHaz Knowledge Toolkit is directly linked to the platform giving to the trainees the ability to use the Toolkit contents during their training, too. The use of the training platform is providing the opportunity for distant training increasing the number of trainees and expanding EcosHaz valorisation potential. The EcosHaz Training Platform is linked to project's website. SIGMA was in charge of the technical support and development of the web-based course. FHRC and USC were also in contact with UPO for revision purposes of the training material as well as for providing data for the building of case study examples. The training materials included slides, exercises with calculator and trainer guidelines. The training seminar was designed to cover 8 hours according to the following program:

Module 1: Get Started

- Introduction to the training seminar
- EcosHaz project introduction
- Scope
- Different needs and different visions regarding the outputs related to the Assessment of Stakeholders Needs

Module 2: Common framework for coastal hazards and risk management

- Legal and Regulatory Framework
- Introduction to natural coastal hazards
- Introduction to oil spills accidents
- Introduction to CBA
- Difference between financial and economic point of view in CBA
- Kind of costs in CBA – beach flooding, erosion and oil spills.
- Types of benefits in CBA – beach flooding, erosion and oil spills



IMPLEMENTATION OF PILOT ACTIVITIES



Module 3: Natural hazards risk management and CBA case study

- Procedure to apply CBA in natural hazard risk management, data needed, calculus and case study

Module 4: Oil spills risk management and CBA case study

- Procedure to apply CBA in oil spills risk management, data needed, recommendations

Module 5: The Knowledge Toolkit

The training material was produced in the English language and it was translated in all partners' languages.

All EcosHaz partners realised training sessions which were addressed to the members of the national clusters.

At least 60 stakeholders had the opportunity to attend these sessions and be trained on the main aspects of CBA in coastal risk management.



ECOSHAZ EXERCISE TEST

This Activity was dedicated to the evaluation and fine-tuning of the proposed EcosHaz Knowledge Toolkit and the respective supporting material. UPO prepared a demonstration exercise (exercise test) which was included in the training seminar as well as the EcosHaz Knowledge Toolkit Evaluation Questionnaire. The Evaluation Questionnaire was introduced to the stakeholders who attended the training seminar and were completed by all of them. The Evaluation Questionnaire is available online, <http://www.ecoshaz.eu/site/questionnaire/>. This process helped the partners to identify potential deficiencies of the IT tool both in operational and contents' aspects. Based on the outcomes of the evaluation procedure, the Knowledge Toolkit will be further improved while continuous updates will be realised for at least five years after the completion of the project.



IMPLEMENTATION OF PILOT ACTIVITIES

ECOSHAZ HELP LINE CENTER

The EcosHaz Helpline Center provides services to individuals who are interested in implementing cost and benefit appraisals of coastal prevention measures against hydro-meteorological hazards and oil spill pollution.


It operates on a pilot basis within the framework of EcosHaz project. The users may contact the Help-Line Centre via the contact form provided on the project website.

All questions/ requests are assessed by the EcosHaz consortium as well as by the experts of the EcosHaz Network. The answers to the questions are given free of charge.

HELP LINE !

ECOSHAZ HELP LINE CENTER

HELP LINE

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Organization	Profession
<input type="text"/>	<input type="text"/>
Email *	Phone Number
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Full Address (Str / Str No / City / Country)	
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Title of your request	
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Question / Request / Description *	
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DISSEMINATION ACTIVITIES

INFORMATION AND PUBLICITY ACTIONS AT NATIONAL AND EU LEVEL

The EcosHaz project was promoted in the framework of a broad range of national and international events by all project partners:

- Marbella, July 2015. VIII National Conference on Coastal Geomorphology.
- Oxford, October 2015. EcosHaz stakeholders informative workshop.
- Santiago de Compostela, February 2016. EcosHaz stakeholders informative workshop.
- Sydney, Australia, March 2016, XIV International Coastal Symposium ICS 2016.
- Gold Coast, Australia, March 2016, Griffith University.
- New Mexico, USA, March 2016, New Mexico University.
- Gdansk, May 2016, EcosHaz stakeholders informative workshop.
- Thessaloniki, July 2016, EcosHaz and FLOOD CBA 2 stakeholders informative workshop.
- Catania, September 2016, EcosHaz stakeholders informative workshop.



DISSEMINATION ACTIVITIES

A set of information and publicity means were exploited by the EcosHaz consortium in order to achieve the wide visibility of the project.

- Project Logo, depicted on all project deliverables, presentations and publications
- Website including information about the project identity, products, latest news and results
- Six multimedia videos explaining the identity and the role of each partner in the project
- EcosHaz guidelines and training material translated in all project countries languages
- Newsletters in electronic version disseminated via e-mails at almost every 4 months
- Leaflets presenting the project identity and major targets in all project countries languages
- Posters and Banners accompanying all EcosHaz events
- Press releases in all participating countries announcing the results of the core EcosHaz events
- One insertion in the Regional Review and circulation at the 2016 Brussels Open Days.



CAPITALISATION ACTIVITIES

A Capitalization Plan has been designed in order to promote the sustainable use of the project outputs as well as the sustainable enlargement of the project network after the project completion. It comprises activities of mainstreaming and multiplication.

The project partners will take advantage of their strong market position to undertake initiatives ensuring that as many as possible institutions and individuals will make use of the project outputs and start working in cooperation with the EcosHaz network as a reference point.

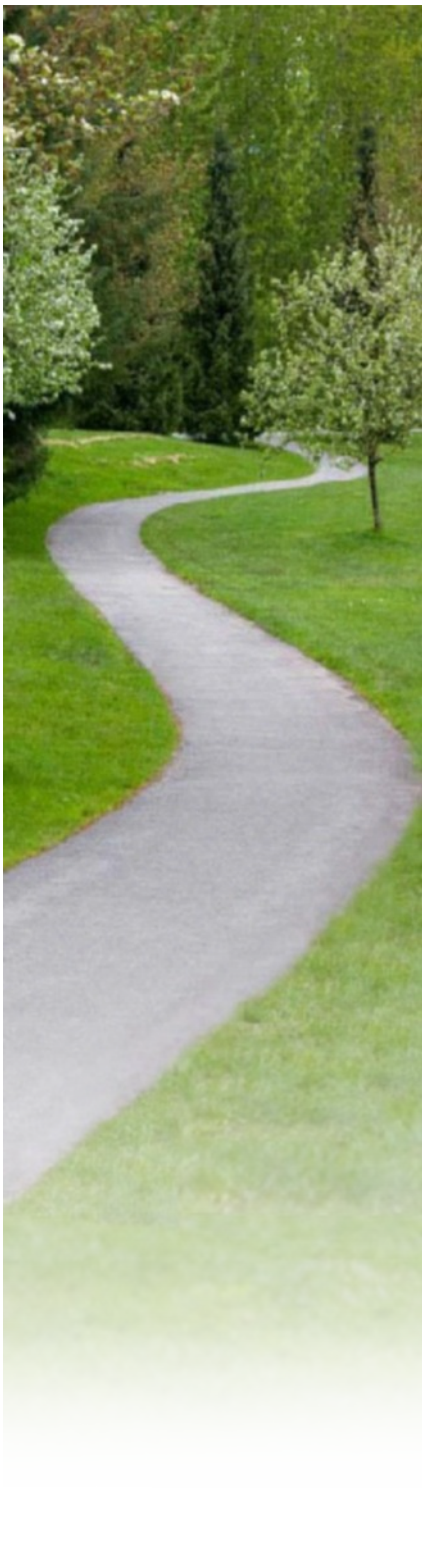
ECOSHAZ PORTAL

The Knowledge Toolkit platform will be advanced into a more interactive and dynamic environment, the EcosHaz portal. The operation of the EcosHaz portal will certify the continuous interactive communication of project partners with existing and new stakeholders, networks and further dissemination of project's results. The project website will remain active as a part of the EcosHaz Portal for at least 5 years after the project's completion. The EcosHaz Portal will be continuously updated, disseminating high quality of information and acquired knowledge.

ECOSHAZ SUSTAINABILITY FORUM

In order to continue and maintain active any new contacts and collaborations, the project partners will establish the EcosHaz Sustainability Forum which will be responsible for the provision of future coordination and technical support actions after the project completion. More specifically the aims of the Sustainability Forum will be: i) the coordination on items like know how and experience exchange, research and technology transfer etc. ii) the expansion of the cooperation in other geographical areas iii) the entering into new joined collaborations and projects.





CONTACT INFORMATION

SIGMA Consultants Ltd - ECOSHAZ Project Coordinator

2, P. Ioakeim str. 54622, Thessaloniki, Greece

Tel.: +30 2310 242801, +30 2310 286920

Fax: +30 2310 286612

E.mail info@ecoshaz.eu

Project Website: www.ecoshaz.eu



Humanitarian Aid and
Civil Protection (ECHO)

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