ARCOPOL

Preparing a common methodology for evaluating ecological damage

Activity 6

Task 6.1.4

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This report is primarily based on:

- The report produced by the CIIMAR on the ecological impact assessment of past pollutions (activity 6.2.1)
- The report produced by VIGIPOL on the comparison of taking account of the ecological damage in the project partner States (activity 6.1.3)
- The meeting of experts organised in Rennes (France), in December 2009;
- Work from the "VALDECO" project.

1. Reminder of the commitments made in the ARCOPOL project

Activity 6 "*Claims and compensation for small, medium and major spills*" will provide stakeholders (local governments) with a comprehensive tool to help claim and obtain compensation for damages suffered following a marine pollution event. To this end, the knowledge of methodologies and practices available for claims and compensation will be exchanged and improved. The claims presented in the cases of the Erika and Prestige will be analysed and a comparative study into compensation for ecological damages in France, Spain, Portugal and the United Kingdom will be developed, based on a bibliographic review. **Based on this exchange, a standard methodology for assessing environmental and ecological damages will be drawn up** and, ultimately all the data will be included in operational guidelines.

In summary, the project proposes to provide local authorities with a standard methodology for assessing environmental damages suffered by them with a view to indemnification / compensation.

2. Definition of the purpose of the work (theoretical approach)

In theory, ecological damage due to marine pollution is the expression, in monetary terms, of the negative component of its ecological impact, excluding any possible positive impacts. Assessing the ecological damage therefore requires prior assessment of the impact, in terms of the nature and quantity (number and biomass) of individuals affected (killed, unborn, affected in the short, medium or long term, etc.). This assessment will be converted into a prejudice by assigning a value to each individual affected, varying according to the species concerned, its stage of development and the damage suffered.
The ecological impact is thus one of the components of the overall impact of pollution in a specific zone of the marine and coastal area. This situation can be represented very simply, by placing the various impact fields side by side (see figure below).

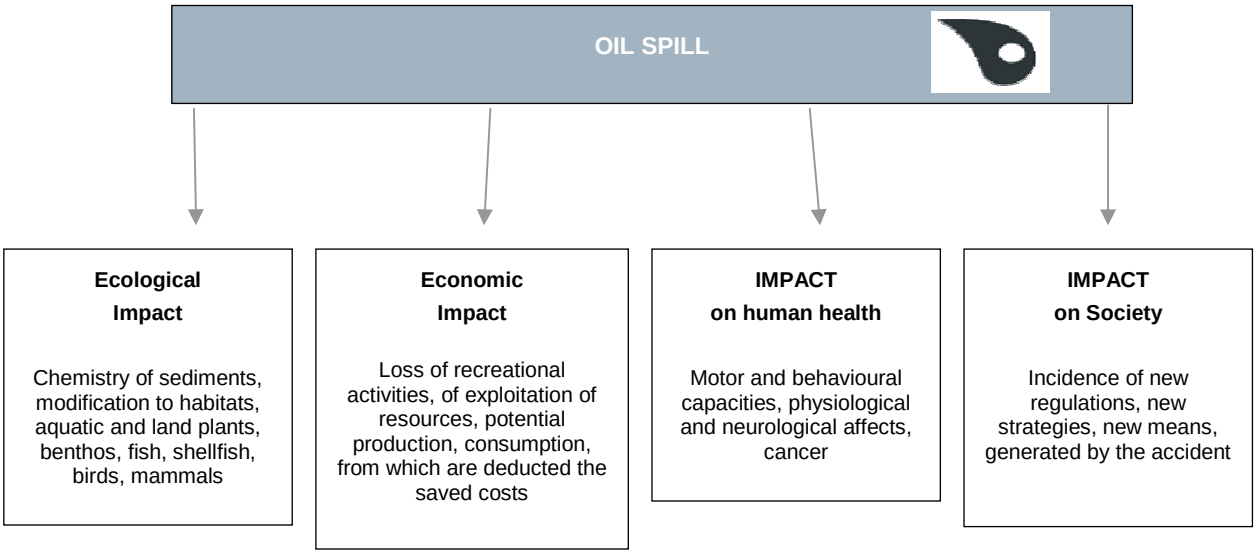
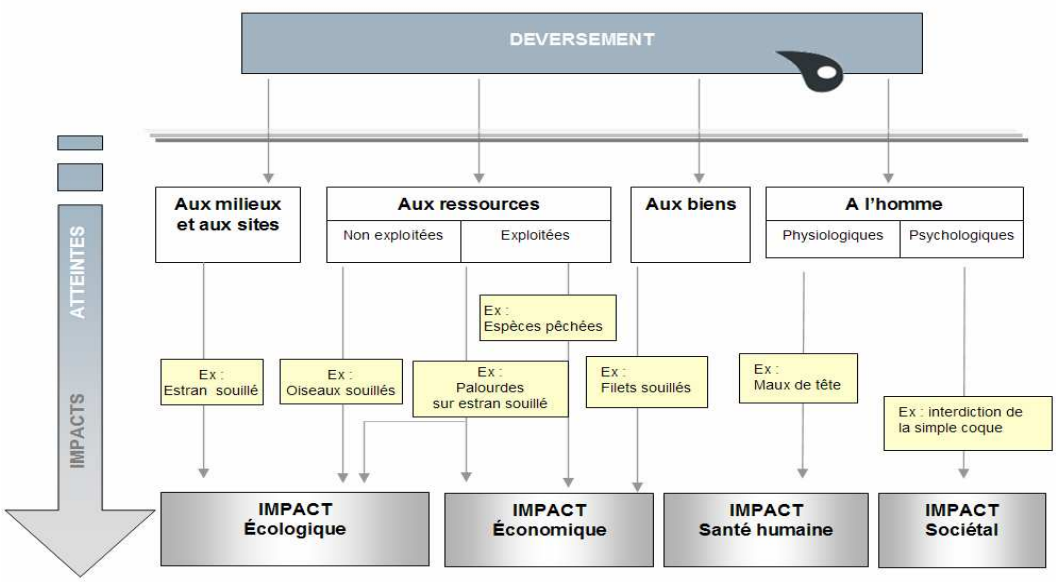


Figure 1 – The fields of impact of an oil spill

Although this figure is interesting in the summary it provides of the various impacts of a spill, the reality of what occurs will be better represented on the following diagram, highlighting the flows between:

- **the damage** = the targets affected by the pollution;
- and **the impacts** specifically = the final affect on each field of impact.



Déversement	Oil spill	Psychologiques	Psychological
Aux milieux et aux sites	To environments and sites	Ex : espèces pêchées	E.g.: fished species
Aux ressources	To resources	Ex : estran souillé	E.g.: fouled tidal zone
Non exploitées	Non exploited	Ex : oiseaux souillés	E.g.: fouled birds
Exploitées	Exploited	Ex : palourdes sur estran souillé	E.g.: tidal clams fouled
Aux biens	To goods	Ex : filets souillés	E.g.: fouled nets
A l'homme	To humans	Ex : maux de tête	E.g.: Headaches
Physiologiques	Physiological	Ex : interdiction de la simple coque	E.g.: Single-hulled forbidden
Atteintes	Damages	Impact économique	Economic impact
Impacts	Impacts	Impact santé humaine	Impact on human health
Impact écologique	Ecological impact	Impact sociétal	Impact on society

Figure 2 - The affected and the fields of impact of an oil spill

For each impact, objective measurement requires the identification of impact criteria and measurement tools for these criteria. For the ecological impact, this gives:

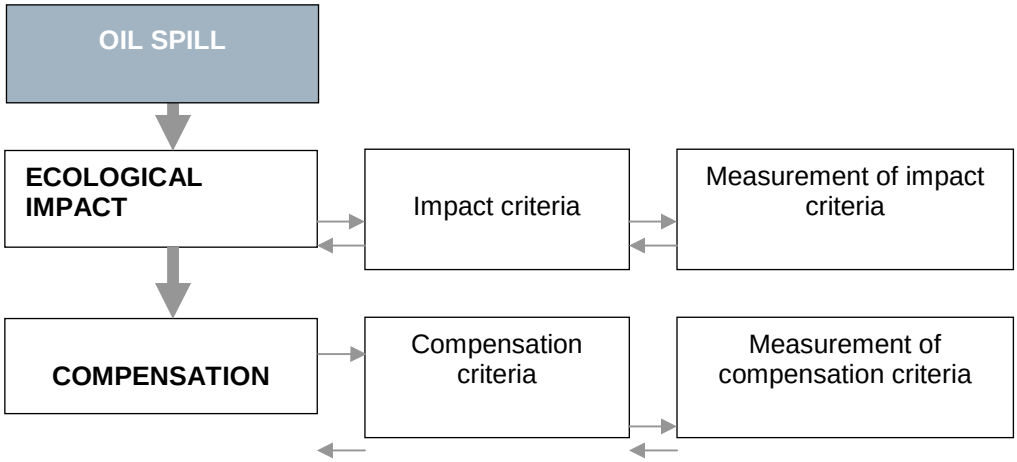


Figure 3 - Impacts, criteria and measurements

Ecological impact criteria could be losses of:

- resources (biomass, biodiversity, resistance to stress, reproductive ability);
- and losses of services.

Measurement of these losses will call on dynamic indices for population, productivity, biodiversity, possible exposure and effect biomarkers. To conduct these measurements and carry out an assessment of the ecological damage that is as accurate as possible, a reference state is necessary. In the absence of such a reference state, other techniques may be used (extrapolation from nearby sites, etc.), but with higher risks of error.

Alleged losses may be:

- functional losses (material recycling, support function, protection function, nurseries);
- such as losses of biodiversity (individuals/species, intra and inter-specific genetic diversity).

Service losses may include:

- sampling services (products from ecosystems excluding merchant circuits);
- control services (climate control, diseases, water quality, self-maintenance of ecosystems, etc.);
- cultural services (intangible benefits: amenity, beauty, education…).

Loss criteria may include, among other things, environment frequentation statistics, or water quality levels.

Loss of resources (dead or unborn individuals) and loss of services are connected variables, influencing each other. The loss of a resource is a major cause of loss of service. For example, the destruction of a herbarium that leads to a loss of reception services of connected fauna. Loss of a service may generate a loss of resource. One example may be the clogging up of a sandy bottom by a layer of heavy hydrocarbon, that removes the permeability of the sediment and kills all the fauna living there.

It should be ensured therefore that losses of resources are not added to losses of services, which would exaggerate the impact by counting some of its components double, but that the following are added:

- (a) resources lost directly;
- (b) resources lost due to a loss of services;
- (c) services lost directly;
- (b) services lost due to a loss of resources.

3. Limits and constraints

In view of the definition set out in point 2, a certain number of limits and constraints apply in pursuing the goal recalled in point 1. These constraints fall within the three fields of skills used: biology or ecology sciences, law and economics.

3.1 The limits applying to biology or ecology

Although the principle for measuring the ecological impact is simple (see point 2), implementing this principle gives rise to complex problems. Ideally, the measurement should be made for each species and for each unit space in the zone affected. This can be imagined for the main species of land-based plants, representative of a given habitat. It becomes much more difficult for algae or sessile animals in tidal zones whose populations, sometimes unevenly distributed, over vast surface areas, are bogged down under a thick layer of hydrocarbons. It is even more difficult for mobile species, samples of which have to be fished using equipment and techniques allowing for quantitative assessments.

The reality of evolution of an ecosystem hit by an oil spill, for example, is complex. A scenario quite close to reality is reproduced below. It is taken from the IMO/UNEP guide entitled *"Assessment and remediation of environmental damage following marine oil spills*". It shows that the establishment of a baseline prior to the pollution and the reference line after recovery may require exploitation of years of measurements, to achieve a result that includes a high degree of variance.

The risk is to obtain an estimation of the loss during the affected and recovery phase that is hardly greater than the uncertainty concerning the basic situation. In addition, it will be often noted, after several months of work with long and costly observations and samples, that only some facies or species could be quantitatively assessed in a way that is exploitable. Then there will only be sector-based knowledge of the impact, with no solution that can be extrapolated to the whole ecosystem.

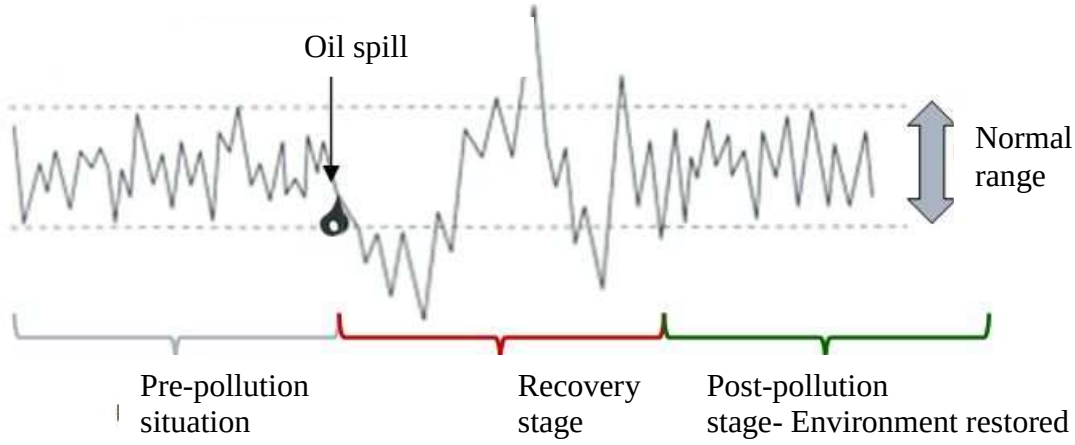


Figure 4 – Diagram of evolution of a typical ecosystem hit by an oil spill: natural fluctuations, impact occurrence and recovery phase (IMO/UNEP, 2009)

It should also be added that, the zero or reference state, from an ecological point of view, is often missing. In general, there are no quantitative data concerning non exploited populations and their structure that are sufficiently accurate to be used as a solid impact study. This type of reference state exists in some regions, at least in part, (for example the REBENT network in Brittany, or the monitoring of some species in the Lavezzi reserve in Corsica[1]), but it is missing in many other regions.

The study conducted by the CIIMAR, as part of activity 6.2.1, concerning the ecological impact of a series of recent accidents in Europe, sets out in its conclusions the extent of the current difficulties:

[1] See Seminar organised on 17th December 2009, in Rennes, for the ARCOPOL project.

"*When an accidental spill occurs, many of the resources available are usually used to set up a monitoring programme applying three scientific approaches (chemical contamination, biological responses and ecological monitoring). However, this is not always done in a coordinated way and consequently, despite the effort and ever-increasing costs, the opportunity of acquiring very valuable information is not well explored.*

***The lack of baseline data was observed in most of the monitoring programmes studied renders difficult the quantification and interpretation of both spill impact and restoration**. The proportion of population fluctuations and changes due to natural (e.g. climatic variations) and anthropogenic factors is also difficult to assess. **Therefore, it is vital to set up reference (i.e. baseline) databases by performing long-term monitoring programmes in order to distinguish spill pollution effects from other factors, such as the natural fluctuations and chronic pollution**. When pre-spill baseline data is not available, the use of contemporary controls should be systematically analysed, either by collecting selective samples before the progression of the spill, or by sampling comparable, unpolluted sites surrounding the polluted area (Kerambrun et al., 2006).*

The monitoring of the effects after an accidental spill should be focused on indicator species. The selection of these species is a key issue. An important gap observed in some of the monitoring programmes analysed is the lack of knowledge concerning the biology of the selected species. This information is central in order to predict recovery, understand sublethal and long-term effects, physiological changes, bioaccumulation processes, etc. Furthermore, local knowledge is important as an input to the species selection process.

*The impact assessments conducted following the incidents studied have demonstrated a range of short-term effects, but in most of the cases, long-term effects of the spills were not identified. It is likely that many long-term ecological impacts are caused by spills but, in general**, these impacts are not detected due to the lack of pre spill data but also due to the end of funding that do not allow the continuation of studies for more than a few years**. As stated before, the assessment of long-term impacts is further compromised by the difficulty of clearly assigning effects to the spill rather than to other chemicals present in the local environment from other local sources and chronic inputs. High levels of natural variability in biological systems may mask the potential effects and add further difficulties in assessing spill impacts.*

***In conclusion, baseline databases and the knowledge of long-term effects are essential factors in a monitoring program for assessing spill effects**. Although there are a general agreement in the need of monitoring certain ecological domains (e.g. pelagic, subtidal/tidal benthic, birds, and marine mammals) and in the use of three types of approaches (chemical contamination, biological responses and ecological monitoring), it is still necessary to define the most relevant species to be monitored in each ecological domain, as well as the most appropriate protocols/procedures. Hence, in a European context, a standardisation of monitoring procedures is needed to better evaluate the environmental damage / restoration after a spill and to better support claims and compensations*".

In conclusion, implementing ecological monitoring of pollution, without preparing the scientific service contracts in advance, takes a long time (several months). Carrying out the monitoring requires several years and heavy funding. As regards compensation, the perspective chosen for ARCOPOL, there are no reports of any such monitoring operations that led to a quantitative assessment of the ecological

impact that can be used directly by economists to evaluate the economic damages suffered. Better methods may be imagined: accelerate implementation of the monitoring, rationalise the work, obtain a more accurate zero state. These are inevitably costly methods and the possibility that they lead to a unanimous quantification of the damages within a satisfactory time after an accident (2 years at the most) is remote.

It would therefore seem reasonable to separate ecological monitoring aiming at ultimately assessing the impacts, from an assessment of the ecological damages based on a simpler approach, that can be carried out within a few months.

3.2 Constraints linked to the diversity of legal systems

The comparative study conducted for activity 6.1.3 shows a significant difference of approach between the legal systems of each of the States concerned:

"*Either France, Ireland, Portugal, Spain and United Kingdom have developed legal precedents on the environmental liability. However there is no harmonised definition of the environmental damage among those countries. As a result the Case law on compensation of environmental damage can be more or less restrictive from one country to the other."*

At the same time, the legal systems have some common features that can be used as a basis. They all recognise the possibility for local authorities to claim compensation after a pollution. They have also all transposed the European 2004 directive on environmental liability. All States have also ratified the international conventions concerning compensation following marine oil pollution (CLC/IOPC), but not the convention on compensation following pollution by noxious or potentially hazardous substances (HNS).

There is therefore a common basis concerning:

- the admissibility of claims from local authorities;
- international law and community law.

3.3 Constraints linked to the nature of the recipients of the methodology

As recalled in point 1, the common assessment methodology is aimed at local authorities. European States have very differing levels of decentralisation. In some cases, the "local authority" concerned will be a region with considerable human, financial and legal resources (for example the Spanish "Autonomias"), sometimes it will be a coastal commune with much more limited means. It is difficult for the solution chosen to take exhaustive account of this wide variety. As a result, it is suggested that it prioritises the most local levels ("communes" in France; "ayuntamientos" in Spain for example). These are indeed the levels with the greatest constraints, especially in terms of available resources. The solution chosen will have to exclude methodologies based on heavy monitoring, with prior realisation of complex reference states when they do not already exist.

Similarly, the skills that the local authorities have differ in nature, even though there is a sort of "common base" for example in terms of environment or safety and public order[2].

The solution proposed will therefore attempt to offer an easily accessible methodology, that can be used by a large number of local authorities in the Atlantic zone.

Adapting the methodology to the needs and resources of the local authorities will be a permanent guide in carrying out this action.

4. The common methodology

The responses given by the partners to the questionnaire on compensation for environmental damage, and the comparative study conducted, confirm that none of the legal systems in the States concerned have settled on a specific method for assessing compensation for environmental damage.

A priori, we have a great deal of liberty. However, it is noted that the 2004 directive on environmental liability relies on a "cost-based" approach (see below) and reasons in terms of remediation obligations, in the form of primary, complementary and compensatory remediation (annexe II of directive 2004/35). All Member states have transposed the obligations of this directive into internal law. Although the directive explicitly excludes from its scope of application the damages covered by the international CLC/FIPOL and HNS systems, the methodology defined in it could be used as inspiration.

4.1 The prerequisites for the methodology

The prerequisites will have to take account of 4 essential criteria, defined below:

- Solution can be applied regardless of the local authority's position in relation to its access to biological data (i.e. baseline databases, pre-spill baseline data, selected and validated indicator species…). The territory of an authority being considered may perhaps be the subject of fine ecological monitoring, but we cannot know this and we will not have the time to study all the alternatives within the limits of the project.

- Use a pillar common to all legal systems, i.e. an approach that may then be adapted to the whole territory within the Atlantic Area independently of the specificity of each local system. It does not mean necessarily that the methodology should be developed besides all legal considerations. It means that the methodology should be able to "plug" to each local legal system.

- Solution will take into account the nature of a local authority, in term of legal competences and financial capabilities.

[2] HOORENS D. (ss.dir.), « Les collectivités territoriales dans l'Union européenne – organisations, compétences et finances », coll. Europe, published by DEXIA, 2008, 684 pages

- Solution will take into account that the final objective is compensation. Then, among other elements, it should be considered that the claim has to be presented within certain time limits (from some week/months to 2 years max.) and that it could not, in such a short time, be the "perfect" scientific solution.

As a consequence, the methodology will certainly move towards an operational solution, doubtless a "default" type solution.

4.2 Assessment methods

4.1 Diversity of assessment methods

Numerous methods have been drawn up to give a value to the damage suffered by ecosystems. Several research projects have regarded or regard the economic assessment of the damages caused to the environment by marine pollution[3].

Diversity is essential to measure the damage to non merchant environmental goods and services. For example, the following have been developed[4]:

- Methods based on the operating principles of ecosystems. In the case of the Amoco Cadiz, assessments of environmental damage followed three methods linked to the biomass destroyed. The American judge did not accept this approach.

- Methods that multiply the benthic fauna lost by the hypothetical unitary values, per category of species[5]

- A method that is based on the trophic chain: "*the biomass corresponded to the second level in the chain (herbivores consume producers). Using knowledge of the food chain and the market prices of commercial species, a value was estimated for the destroyed biomass".*[6]

For activity 6, the ARCOPOL project has not planned a specific research phase. It aims to use existing methods and to select one, suited to the objectives fixed. As a result, we have described below the main economic assessment methods currently validated to assess the environmental damage following marine pollution. Validation is due to a standard text or a legal ruling (we select methods that have been admitted, for local authorities, in the very recent Erika trial). For each, we attempt to indicate what their application implies for a local authority.

4.2 Economic assessment methods

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3 In particular the French project "VALDECO", funded by the National Research Agency, on which the ARCOPOL project is based for scientific analyses.

4 For a fairly complete list, see BASTIEN VENTURA C., GIRIN M. et RAOUL-DUVAL J., « Marées noires et environnement », éd. Institut Océanographique, Paris, 2005

5 We are close to the logic that is used in some States for the destruction of protected animal or plant species. A table is effectively drawn up nationally, with the value of an individual of each protected species. The damage is easy to evaluate: the number of individuals destroyed is multiplied by the value of each individual.

6 BASTIEN VENTURA C. GIRIN M. et RAOUL-DUVAL J., op.cit. p. 290

4.2.1 "Value-based" approaches

They are based on simulated markets, when there is no real market for the goods or service, and hence on the definition of a value for the services provided by the ecosystems (value-based). This approach mainly contains contingent assessment methods and consent to pay.

As François Bonnieux indicates:

"*When no market price is available, several approaches, including travel cost and contingent valuation methods can then be applied. The Amoco Cadiz case, which offered a good example of a comprehensive economic damage assessment, demonstrated that non-market damages represented an important share of total damages. With respect to damages caused by the Erika wrecking, recreational and amenity losses did concerned a quite short period of time but a highly populated shoreline close to an urbanised area, those of Nantes. Residents were disturbed by the accident, through their leisure activities, mainly fishing on foot, a very popular activity on this coastline. For the residents, this is a major component of the whole damage. The problems with valuing ecological losses arise from the extensive uncertainty about how ecosystems function internally and what they do in terms of life support functions. By now, the economic literature favours willingness-to-pay approaches based either on the cost of restoration programmes or stated preference methods*."[7]

For example, the displacement cost method was used to assess the damages suffered by foot fishermen following the Erika pollution. As regards "value-based" methods, we shall conclude quoting François Bonnieux and Pierre Rainelli: "*It shall be noted that a pertinent estimate supposes the implementation of considerable means (...). Finally, it should be noted that the assessment of ecological damages implies numerous investigations, specifically methodological, if the estimate is to be done seriously*."[8]

The application of these methods is sometimes contested[9]. Moreover, they are designed mainly for ex-ante evaluation. Also, as far as the ARCOPOL project is concerned, these methods question the possible link with a local authority. However, they have the advantage of not requiring a complete initial state and adapting to the specific features of a territory (depending on the activities carried out there, for example fishing on foot in the case of Erika).

What implementing this method implies for a local authority:

- Being able to call on economists very rapidly after the pollution;
- Conducting/funding investigations, often long and costly, with the population or part of the population (with complexity which may be considerable to define the scope of the "victim population");
- Having data (site frequentation, practice of an activity, etc.) and sometimes prior studies.

[7] BONNIEUX F., "Economic assessment of market & non-market damages of oil spills", in Les Dommages écologiques causes par les marées noires : évaluations économiques et indemnisations, International workshop, Paris, 18-19 May 2006

[8] BONNIEUX F. et RAINELLI P., « Analyse économique des conséquences de la pollution par l'Erika : problématique et méthodes », in Les conséquences du naufrage de l'Erika, Presses Universitaires de Rennes, 2005

[9] For the VALDECO project, the problems associated with economic evaluation methods were listed with reference to the work of Swanson & Kantoleon.

4.2.2 "Cost-based" approaches

These are based on an assessment of the costs. This approach includes the methods based on remediation / compensation costs in the wide sense.

This methodology is used in the United States where it is enshrined in the Oil Pollution Act (Section 1006). Three elements are considered:

- the primary remediation costs: the costs in terms of human and material resources required to restore the damage resource to its initial state;
- the compensatory remediation costs: the cost required to conduct compensatory remediation measures to remediate the value of the environmental services lost from the time of the damage to the return of the resource to its initial state;
- the reasonable cost of the necessary assessments.

According to the economists questioned (ARCOPOL seminar of 17 December 2009), cost-based methods are currently those most recognised by compensation systems (in the wide sense). Thus part of the cost of the required studies could be borne by the FIPOL. Above all, these methods are logically in line with the 2004 directive on environmental liability. It would then be possible to use the common framework defined in annex II of the directive as inspiration to choose the most suitable measures to ensure remediation for environmental damage.

These methods present advantages that Julien Hay summarised in the presentation given to the ARCOPOL seminar in December 2009:

"*Cost-restoration based approach better suited from a damage compensation perspective:*

- *Legal issues: "easier" standing for a claim; "quantifiable loss"; burden of proof*
- *Social issues: restoration as an obvious mean of compensation; sufficient money collected to restore the environment; less debate about the use of the money collected, and the effectiveness of compensation*
- *Scientific issues: better understanding (multidisciplinary) of environmental interactions and losses; higher level of accuracy required in courtrooms; keeps a little away from the ongoing debate about non-market valuation techniques and concepts."*

What implementing this method implies for a local authority:

- Having a reference state (or initial state) used to know, with more or less accuracy, the level of natural resources and services (the functions provided by a natural resource to another natural resource or to the public). As such, numerous work is in progress to assess the services provided by the environment, which could ultimately serve as useful bases[10], but in a medium-term perspective. Moreover, many data are already available and the "EDMONET" network ("Marine knowledge 2020" Commission initiative) can be used to identify them;
- Being able, shortly after the pollution, to make the necessary assessment and determine the actions to be taken for remediation, as required according to the common framework drawn

[10] For example CHEVASSUS-AU-LOUIS (ss.dir), « Approche économique de la biodiversité et des services liés aux écosystèmes », Report for the Centre d'Analyse Stratégique, April 2009, 376 pages

up by the directive on environmental liability. This means being able to mobilise cross-disciplinary teams (biologists, economists etc.). As a result, there will be costly investigations (range: from 150,000 to several million Euros);
- That the local authority considered is the main contractor of the remediation actions, even if it then delegates their execution to third parties.
- Attention is drawn to the fact that the conclusions of investigations and assessments may be that the cost of the pollution is low. This means that using this methodology is preferable in cases of considerable pollution where the impact is evident. An inexpensive, prior study could rapidly define if damage had occurred or not.

The European "REMED" project (FP6) developed detailed methodologies in support of the "cost-based" approach, based on the European directive on environmental liability. The project website offers decision-makers toolkits: **www.envliability.eu**.

4.3 The methods used in the Erika trial

4.3.1 The "reasonable compensation value" method

The report prepared for activity 6.1.3 highlights a specific method used in the Erika case in support of compensation claims from communes. This method was confirmed and accepted by the judges in the Paris Court of Appeal:

"*The Court of Appeal of Paris has admitted a method based upon a "valeur de compensation raisonnable" ("reasonable compensation value") obtained by the product of the surface of the polluted area and a unit equal to 0.7 Euros per square meter polluted (claims presented by local authorities for the compensation of ecological damage in their territory*[11]*)."*

The calculation of the cost per square meter can include a large number of parameters such as:

- The sensitivity or vulnerability of the polluted zone (confirmed, by studies, sensitivity atlases or by statutory classifications such as Natura 2000);
- Considerations regarding the toxicity of the pollution and its persistence;
- The number or quality of the activities supported by the zone;
- The cultural or historical aspects;
- (…)

Finally, this is a mathematical formula that includes all the parameters and is used to calculate the level of compensation claimed.

For local authorities, this method has the advantage of being able to be built after the pollution and being based on concepts that are central to local authorities (the notion of territory and uses).

[11] Paris Court of Appeal, "Erika" ruling of 30 March 2010, based on a method presented by Yann Rabuteau for the law firm Huglo-Lepage representing the interests of 11 municipalities.

However, it is directly linked to territorial attachment and to the legal responsibilities of an authority to this territory. It is also more delicate to implement when the pollution is not visible.

The VALDECO project identified this method as the most suited to claims from communes, in France.

What implementing this method implies for a local authority:

- Being able to measure accurately the spaces affected by the pollution;
- Having information about the spaces affected (activities practiced, environmental sensitivity of the site – to determine according to the parameters chosen to calculate the value per square meter polluted) without necessarily requiring a complete reference state in biological terms.
- Where possible, anticipating by drawing up a calculation method, using cross-disciplinary teams, before the pollution occurs[12].

4.3.2 The method based on the special competency of the local authority

Although presented separately, due to its use in the Erika trial, this method is part of the cost-based method (point 4.2.2).

In its ruling in the Erika case, the Court of Appeal accepted the claim of the Morbihan General Council for damages resulting from the damage to the environment. It is based on the special competency of the General Council in protecting sensitive natural areas. Using an evaluation of the surface area of sensitive natural areas acquired by the department and affected by the pollution, it allocates an amount corresponding to the expenditure of the local authority over two years (length of the pollution).

This reasoning is based on the method of preventive expenditure or avoidance costs, another traditional method used to estimate the values of a natural environment. It consists of giving the environment a value according to the expenditure committed to protect it. This method can be found in forest fires for example[13].

INSEE[14] defines environmental protection spending thus:

"*Environmental protection activities mainly result from the application of environmental rules and standards. National or European regulations fix the minimum level decided by the public authorities to guarantee environmental protection and the associated benefits, including in terms of health. Environmental protection spending measures the financial effort that the various agents devote to preventing, reducing or repairing damage to the environment. It includes the following fields:*

- *management of wastewater;*
- *collection and treatment of waste (including radioactive waste);*
- *street cleaning;*
- *protection of biodiversity and landscapes: management of protected areas, conservation of species;*

[12] Some states in the US have legally defined methods the spirit of which is quite similar. The law establishes a simplified mathematical formula based on pre-established indices. The formula takes account of the volume spilt, a vulnerability index for the zone, a mechanical damage index, etc.

[13] MEDFOREX project: www.medforex.net

[14] National Institute for Statistics and Economic Studies

- *prevention of air pollution, including purchases of goods and services linked to less pollutant practices (for example "green" fuels);*
- *noise control (for example, sound proofing of housing);*
- *environmental research and development;*
- *general administration: spending of public administrations that cannot be allocated to a single domain (for example, spending by the French agency for Food safety, the environment and work, Afsset).* "

It is undeniable that local authorities bear a certain number of expenses to preserve the quality of the marine environment, either due to statutory regulations or autonomous initiatives.

Example of construction for a case of pollution to the marine environment:
- The 2008 strategy directive for the marine environment requires good ecological status of marine waters to be achieved[15]; - Local authorities contribute directly on a daily basis to this goal (through their public policies, such as for example purification stations, environmental actions, etc.) - Marine pollution damages the good environmental status of a mass of water, at least on one of the four descriptors of the "good environmental status" listed in annex 1 of the directive: on descriptor no. 6 (sea-floor integrity), descriptor no. 8 (concentrations of contaminants), descriptor no. 9 (contaminants in fish and other seafood for human consumption) and descriptor no. 10 (marine litter). - Local authorities can identify the policies and actions undertaken and which contribute specifically to respecting the 4 indicators. They then estimate the damage caused based on calculation methods to be decided (according to the literature on this point), and which should consider the spatial and temporal scale of the pollution, and its gravity.

This method has the advantage of being directly linked to the competencies exercised by the local authority claiming the compensation. Unlike the methodology presented in point 4.3.1, the cost avoidance method is based on implementing the competencies of local authorities, and not on the existence of the competencies alone. However, it is a much further from the environmental damage in the strict sense of the term. It would seem better suited to specific territories (natural reserves, parks, etc.) that would find it easier to quantify the expense of preserving the natural environment.

What implementing this method implies for a local authority:
- Determining the responsibilities of the commune in terms of environmental protection, and as required the protection of the marine environment; - Determining the methods that could be used to demonstrate damage to the environment (samples, etc.), its location and extent; - Determining which actions are undertaken by the local authority to respect the goals set by law, or the operations conducted to go beyond simply legal requirements, and making a calculation that includes several parameters (time, extent, etc.).

15 The 2000 framework directive on water can also be used as it covers part of marine waters.

5. Procedure for choosing a method

The aim of the project is to validate a common method for the Atlantic area. The methods set out above can all be used, as no national European system requires the use of any specific method currently (see report of activity 6.1.3).

However, following the initial analysis, it would appear that two methodologies are advantageous in relation to the aim of the project:

- The "cost-based" approach, i.e. the approach that bases the value of the environmental damage on the cost of restoration and which is based on the 2004 directive (described in point 4.2.2);
- The "reasonable compensation value" approach, which has been validated by French judges and chosen by the VALDECO project (described in point 4.3.1).

The choice is not necessarily exclusive. The American system uses two approaches: a mathematical formula for pollution of a lesser extent and a remediation cost approach for more significant pollution.

For the project, the choice of method should result from a procedure of consultation and validation. As a result, we propose:

- To present the work done during the conference organised in Brest in November 2010;
- To launch a phase of consultation / expertise
- To propose the conclusions during the workshop to be organised in the spring 2011 in Brest, as part of the "Safer Seas" event.