

**Economic assessment of policy measures for the implementation of the Marine
Strategy Framework Directive**

Contract N° 070307/2010/577902/ETU/F1

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“Economic assessment of policy measures for the implementation
of the Marine Strategy Framework”
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Executive summary

The Marine Strategy Framework Directive (MSFD) requires Member States to develop, by 2015 at the latest, a programme of measures designed to achieve or maintain good environmental status (cf. art. 5.2). When drawing up their programme of measures, Member States shall give due consideration to sustainable development and, in particular, to the social and economic impacts of the measures envisaged. Member States shall ensure that measures are cost-effective and technically feasible, and shall carry out impact assessments, including cost-benefit analyses, prior to the introduction of any new measure (cf. Art 13.3). **The objective of this study** is to provide building blocks for policy makers when preparing a programme of measures to achieve or maintain good environmental status.

Measures originating from good implementation of existing legislation have not been targeted by this study, as the ecological benefits they aim at are assumed to be accomplished in any case (within the time framework of MSFD). In order to maximise the relevance for Member States, the identification of measures had a clear focus at the operational level, ignoring the numerous descriptive initiatives or high level targets that are present in strategic and action plans. In order to structure the wide variety of measures, these have been further allocated to 4 categories of measures:

- *Command-and-Control* or regulatory *instruments* (CAC) have a direct influence on the behaviour of actors by imposing rules that limit or prescribe the actions of the target group. These instruments have a legal basis and enforcement and control is a key element in the success of the instrument.
- The common underlying rationale of *economic* or *market-based instruments* is to modify the behavior and decisions of actors and individuals (to enhance the protection of the environment) by affecting the cost or price in the market. Economic instruments can have both an incentive-effect and a revenue-raising effect, with the relative importance depending on the ability of the market to respond to the “price signal”.
- Like economic instruments, *social instruments* influence or provoke the desired behavior indirectly. A key feature of this type of instruments is the voluntary aspect of actions. Polluters or stakeholders are stimulated to take actions based upon own motivation, often through information (education, training) or awareness raising campaigns.
- The *technical, technological* or *research oriented measures* refer to the physical measures having a direct impact on the environment. A physical measure may be carried out by any stakeholder, whereas an instrument is usually created by the governmental level.

Searchable and workable inventory of measures

A first specific output of the study is a **database of +/- 140 policy measures** (Excel format). Besides descriptive and detailed information on the individual measures, the database has been completed with additional relevant data elements regarding indicative pressures and impacts (Annex III of the MSFD), sectors and uses driving or causing these pressures and GES-descriptors (Annex I of MSFD). Moreover, where evaluation information was available it has been reported, e.g. on the effectiveness of the measure, its costs and benefits or cost-effectiveness, social and economic impacts, factors that could positively or negatively affect the success of the implementation, etc. The tool also includes a rough assessment of the quality of the available and consulted information sources.

Member States can make a targeted search to identify measures suited for their own implementation of the MSFD. The structure of the database and the use of standard terminology facilitate searches through filters and allow future updates and additions to the presented inventory. The inventory is based on a review of published literature as well as interviews with a large number of relevant institutions, aimed at gathering any available (also unpublished) information about specific instruments and their evaluation. It includes measures that are already implemented in the EU or in countries that are, to some extent, comparable to the EU in terms of environmental, economic, social and institutional settings. Some examples of measures (non-exhaustive) have been listed in the following table, split-up according to the 4 defined categories.

Category	Type	Examples of instruments or measures
<i>Command-and-Control instruments</i>	Regulation (including e.g. bans)	Mandatory use of selective gear technical solutions or limiting use of certain techniques (e.g. gillnets), ban or stricter regulation of deepwater drilling, ban on highgrading (High-grading is the practice of discarding low-value small fish in order to fill the quota allotted with higher-value big fishes), Noise limits on ships, ...
	Norms (and control systems)	Reduction of the amount of phosphates in detergents, License system for (sustainable) aquaculture (e.g. fin-fish farming), Fines for litter and illegal disposal of waste items, ...
	Zoning and spatial controls	Establish no-fishing areas or temporary/ permanent closures, Designation of no anchor zones on protected shellfish areas, creation of Marine Protected Areas (MPAs), ...
<i>Economic instruments</i>	Fee-based measures	Taxes / levy on aggregates extraction, plastic bag tax, Application of user fees for MPA, e.g. fees for scuba diving, ...
	Subsidies	Financial support for the installation of waste management systems on board of ships, Agri-environmental schemes, Free waste water service for cruise ships in ports, ...
	Other (e.g. trading systems, liability and compensation regimes)	Fishing Individual transferable Quota (ITQ), Habitat banking for wetlands, Liability for pollution/marine litter, Nutrient emission trading scheme
<i>Social instruments</i>		Certification system for ports and marinas, Eco-tourism in coastal Natura 2000 areas, Award-based incentives for coastal villages with Integrated Waste Management ...
<i>Technical, technological or research oriented measures</i>		Seabed restoration/aftercare measures to speed recovery or improve certainty of recovery, Installation of noise reduction techniques in ships, Ditch dams and ditch filters to reduce phosphorous leakage from arable land, Bioremediation or biomanipulation measures, such as mussel farming (it has been recognised since 1950s that bivalve species can help regulating pollutant and nutrient concentration in lakes and seas), ...

Efforts have been made to identify and briefly discuss innovative instruments or measures that have not yet been implemented for the marine area, but could be suited to it, such as habitat banking, carbon credits or mari-environment schemes.

The measures from the inventory target a wide variety of pressures and sectors, covering all the key challenges for the different EU regional seas. Several measures were identified to address impacts of fisheries (overexploitation and destructive techniques) which is a common threat in all EU seas. The same applies to the eutrophication problem, impacting all EU seas or certain specific (coastal) regions. The available knowledge in the Baltic Sea region - severely impacted by the problem - can help other regions to cope with the specific pressure from excess nutrients (predominantly from agriculture in most areas). Several measures have also been identified to address pollution and contamination with hazardous substances or marine litter. The problem arises from land-based and sea-based sources, and measures vary from 'basic' improved enforcement (some EU regions) and improved capacity for waste and waste water treatment facilities to 'innovative' (pilot) measures to mitigate/remediate e.g. polluted sediments in harbors. The Mediterranean Sea and the Black Sea have been particularly impacted by the introduction of non-indigenous species. Some potential measures have been identified, though it is of note that prevention (e.g. through awareness raising) can be regarded as the most effective solution, together with the entry into force of the IMO Convention on Ballast Water once a minimum number of members (Parties) ratify the text.

The inventory has been tested by national experts and members of the MSFD Working groups WG ESA and WG GES. Overall, it was indicated that the inventory could serve as a good onset for an integrated database on measures and instruments and related information (effects, costs, influencing factors). The long list of measures makes it important to have a clear understanding of the structure of the database. Several experts have underlined the importance of the relation between uses, pressures, measures and GES. Considering the growing experience in Member States, it would be advisable to make the inventory a **living tool** which would be regularly updated with new measures and / or new information on their implementation, as the practical experience with them grows.

A limited set of measures from the database has been briefly assessed *ex ante* according to the following set of **evaluation criteria**:

- (Environmental) effectiveness of the policy,
- Costs and benefits (cost-effectiveness analysis, cost-benefit analysis),
- Suitability (fit for use for the specific context of Member States, feasibility, scale of implementation)
- Social and institutional context (capacity, legal basis, equity / fairness and acceptance),
- Flexibility and adaptability

The *ex ante* assessment has been qualitative and based upon expert judgment and a review of relevant literature. Moreover, **key success and limiting factors** that would be needed for (a mix of) measures to be cost-effective and flexible have been identified for each (group of) measures, based on desk research. The *ex ante* evaluation criteria have been tested and the anticipated success and limiting factors are discussed based on evidence found in 5 **case studies**¹, more specifically policy measures already in place in Europe:

- NOx-tax and NOx Fund (Norway)
In 2007, a tax was introduced on NOx emissions from ships within Norwegian territorial waters. A temporary NOx-Fund was established for the support of the installation of abatement technologies in vessels paying the tax. A number of Business Organizations signed an agreement with the Ministry of Environment to pay a reduced contribution to the Fund instead of the tax to the government (tax exemption). In return, the NOx Fund (and participating undertakings) has the collective obligation to reduce NOx emissions according to an agreed absolute reduction target. The temporary NOx-Fund provides financial support for cost-efficient measures to reduce NOx.
- Aggregates Levy (UK)
The Aggregates Levy was introduced by the UK Government as an environmental policy to reduce the impacts of aggregate extraction. The Levy was set at a (relatively low) fixed rate per tonne across all aggregate types regardless of the source or extraction method (with a few specific exceptions). Revenues raised from the Levy were originally hypothecated back to the industry in the form of reduced National Insurance payments and a Sustainability fund

¹ The main conclusions for each case study can be read at the end of this chapter. More extensive descriptions are provided in the main report (assessment) and in the annexes to the report (full description).

(now curtailed). The Fund had a strong and flexible design which helped to meet objectives of encouraging recycling and later objectives of wider research.

The Levy is not a specifically marine-focused policy but does have the potential to be used in other countries as a measure to work toward the MSFD.

- No Special Fee system for ship-generated waste collection (Baltic Sea)

The No Special Fee system is a charging system where the cost of reception, handling and disposal of ship-generated wastes, originating from the normal operation of the ship, as well as of marine litter caught in fishing nets, is included in the harbour fee or otherwise charged to the ship irrespective of whether wastes are delivered or not. The concept thus means that every ship (with some exemptions) entering the port pays a fee which is not related to whether the ship delivers the waste or not or to the quantity delivered. This should encourage ships to bring waste to the port reception facilities, reducing the risk of illegal dumping at sea.

The measure is a way to (re)cover (part) of the costs of waste management in ports. In the European Directive 2000/59/EC on port reception facilities, ports should have partial recovery (at least 30%) through indirect fee but can still choose how much and how (partly variable). HELCOM states have all introduced the No Special Fee system, with variable implementation characteristics. The indirect fee system is one of the possible schemes for cost recovery and to fulfill the requirements of EU Directive 2000/59/EC.

- Real Time Closure scheme for fisheries (Scotland)

The Conservation Credits Scheme (CCS) is the scheme set up by the Scottish Government in 2008 to manage fishing effort in order to meet the Cod Recovery Plan's targets of 2007. The Scheme has the aim of making sure that whitefish stocks in Scottish waters can recover to sustainable levels, specifically by lowering instantaneous cod mortality. In the scheme, a basic time quota is given to certain fishing boats and extra days quotas can be awarded if the boats take up certain practices such as more environmentally sensitive equipment. Measures set up by the scheme included the original Real Time Closures, alongside also other measures.

By using up-to-date information systems, closing access to fisheries can be managed in 'real-time', that is, on a day-to-day or week-to-week basis. Such systems reflect the flexibility of fish population movements as well as changes in the economic and social context of fishing. The Scottish Real Time Closure scheme was the first in the EU and has inspired other RTC schemes both in the EU and further afield.

- Marine Protected Areas (MPAs) (Medes Islands in Spain)

The designation, establishment and management of MPAs is regarded as an important instrument to safeguard biodiversity and the integrity of ecological processes in the coastal and marine environment. MPAs can range from areas of strict protection to areas zoned for multiple use and must be managed to maintain the full range of biodiversity. The Medes Islands constitute one of the principal marine flora and fauna reserves in the Western Mediterranean. The case study discusses two measures, one of which is the establishment of a Marine Reserve and its “reserve” effect on fauna and flora. The other measure consists of the regulation of underwater tourism to control impacts and optimise its benefits as to co-finance the Marine Reserve.

The following section outlines the conclusions on the appropriate timing and conditions for different measures and mixes of measures to be applied to marine contexts in the EU to help the implementation of the MSFD.

Overall recommendations combining results from the 5 case studies

The results of the evaluation exercises (case studies) have led to some conclusions on when and under which conditions different measures and policy mixes would prove more useful and appropriate. The case studies have identified several useful insights for policy makers. The most important elements from the different cases have been combined into a set of recommendations that are described in more detail below.

A clear environmental goal and robust measurement is important

When deciding on policy instruments to tackle environmental problems or increase the level of environmental protection, a key priority lies in achieving the desired **objectives**. Environmental effectiveness depends on the progress that has been recorded towards the defined objective (target achievement) and the degree of contribution of the policy measure to that result (additionality). Clearly stated and SMART objectives allow a proper evaluation of the policy measure and may even steer intermediate adjustments based on robust distance to target measurements.

Complex environmental processes in marine systems require spatially specific design to be environmentally effective, with more research to be oriented on this aspect

In the framework of the MSFD, it is important to further clarify the relation between the recorded results and the potential **progress towards GES for the relevant descriptors**. Potential influences should be considered at least qualitatively and it is also advisable to pay attention to potential (negative) impacts on (other) GES-descriptors while aiming at

improvements in certain axes. The case studies have shown that these interconnections are difficult to establish, for multiple reasons.

The environmental processes in marine systems are **complex** by nature. The relation between actions or changes and the state of the marine environment is often multiple and not direct. For instance, the impact of pollution is affected by different factors such as salinity level, different rates of mixing in the water column and water temperature. Mixtures of pollutants have been shown to have differing impacts on marine organisms. This complexity and limited evidence complicates appropriate policy choices, for example in the allocation of the burden of the damage cost to the pollutant in the case of environmental taxes and in the identification of the appropriate command and control measure to address any given marine pollution issue.

Depending on the local characteristics of the marine waters, different measures may be more or less environmentally (or cost) effective (**spatial specificity** of policy options). From this perspective, it is highly important to learn from experiences in other MS, but it should be born in mind that a simple copy will often not work. There is a clear need for more research on the complex environmental processes in the marine system and the link with policy design.

Open access poses a threat to successful implementation and calls for common systems on a broader scale

Marine environments are characterised by an open access, with a risk of **transboundary pollution movement** leading to specific issues when drafting and implementing policy instruments (e.g. impacted population is not in the same jurisdiction as the pollution source). The lack of property rights or allocation of temporary rights for the use of the seas poses a threat to the successful implementation or environmental effectiveness of policy instruments targeting particular users of marine space, as other users may move into these areas and in this way could negatively influence the environmental status.

Some economic instruments require implementation at a broader or minimum geographical scale in order to be effective. Lessons could be drawn from the *pollution haven hypothesis*, with a pollution haven arising if stringency of environmental standards differs between countries and lower standards become a source of comparative advantage. This phenomenon holds the risk of a “race to the bottom” with countries mutually competing environmental standards down in order to capture economic benefits. For certain policies and environmental problems, **international cooperation** is essential for (cost-)effectiveness e.g. the Convention for Control and Management of Ships’ Ballast Water and Sediments. This cooperation may imply costly and potentially lengthy negotiations (specifically when international), but there is also a clear potential of cost-sharing. Generally, Member States can share the high costs of certain technological

measures when they are organised at the appropriate scale e.g. disaster management, surveillance activities or some monitoring systems.

Strong design and effective legal framework are essential

The case studies showed that a strong design of measures and an effective legal framework are essential in the marine context. There is a need for **policy coherence** with other policy areas (WFD, energy, ...) and for **clear departmental responsibilities and coordination** between marine departments and e.g. transport, energy, tourism and fisheries. It is important that other objectives of EU policy be implemented consistently with the MSFD and that potential "win-win" measures be identified when implementing or reviewing e.g. the Water Framework Directive or the CAP.

There is a potential of revenue recycling of fee-based instruments to increase efficiency and policy acceptance

The integration of external costs through environmental taxation into the decision making of marine users may increase efficiency of the tax system. In order to maximise direct impacts of fee-based instruments on the marine environment, it is recommended that **revenues** are used to improve the environmental conditions of marine waters. The revenues may also be used for generating other environmental benefits, however **without** having a **direct impact** on the marine environment.

Even if emission payment schemes are generally efficient from a social welfare point of view (by internalising associated external costs), political viability often depends on the distribution of the costs and the varying degrees of opposition. Revenue recycling within the group of polluters may increase the **acceptance** of the policy.

An early involvement of key stakeholders is important

Lack of consultation of key stakeholders and lack of political acceptability are likely to be a major issue in the marine context, where there is open access and the need for self-regulation because of the difficulties of monitoring in many marine contexts.

Open access resources are potentially subject to over-exploitation. In the marine context, there is particular need for self regulation of users because of the number of users and the costs and feasibility of monitoring. This implies the need for a "buy in" on the part of stakeholders to ensure implementation of measures. Communication may need to be across sector and country boundaries to be effective.

Provision of sufficient lead time increases cost-efficiency

Costs of policies to support the implementation of the MSFD may differ significantly, depending on the measures, locations and technical specifications of the policies. A

certain measure may imply losses/costs in the short term, but it can create welfare gains in the long run. Returning the marine environment to good environmental status generally takes long, because of the hysteresis in the ecosystem response to changes in pressures. Depending on the time lag between the implementation of a measure and its effect on the GES, different measures can be cost-effective at different moments in time. Effective implementation of policy at lower cost to industry could be improved through sufficiently long **lead times** on implementation, i.e. by giving adequate prior notice to industry of policy measures. This is certainly valid for economic instruments (especially taxes and charges), where it may be recommended to involve consultations with stakeholders allowing them to react optimally to the changed conditions, thus improving overall efficiency.

High administrative costs should be avoided and enforcement capacity available

The design policy measures should aim to contribute to lower administrative costs and avoid excess compliance costs. The setup and organisational framework should however provide sufficient **capacity** to implement and **enforce** the measures envisaged. Ensuring stakeholder engagement and acceptance is essential for the implementation of measures where monitoring and enforcement is likely to be difficult.

It is important to identify "win-win" measures

Although certain barriers may exist to their implementation (e.g. information or educational barriers), there is some potential for "win-win" solutions under the implementation of policy to support the MSFD. Some examples were identified from the inventory of measures, though further research is encouraged in this field:

- An adequately sized marine protection area with sufficient potential for revenue capture to cover the costs and for gains to fisheries from increased catches;
- alternative shipping lanes;
- use of green lights instead of red and white light (oil platforms) for migratory birds (potential to integrate in licensing procedures);
- larger mesh sizes and innovation in selective fishing methods (provided that profitability of fishermen is not reduced);
- preventive measures to reduce loss of fishing gear: biodegradable nets, deposits and name tags on fishing nets;
- energy savings in shipping leading to reduced emissions and costs;
- ecolabelling of marine products including aquaculture and tourism (provided that the price premium is high enough);
- the use of marketable filter feeders (e.g. mussels) around fish farms to reduce the impacts on the marine environment.

A balanced policy mix increases environmental and cost-effectiveness

A mixture of policies is needed to implement the MSFD, as not one instrument impacts on all categories of GES. Using combinations of measures is also likely to lead to more cost-effective outcomes. Combining traditional command and control instruments and rather innovative social and technological instruments may assist in ensuring more effective environmental outcomes. This is likely to be particularly true in the implementation of the MSFD, because of the competing uses of the seas. Additionally, social measures may positively impact on the outcomes of economic instruments and command and control measures.

Annex: Summary of the 5 case studies

NOx-tax and NOx Fund (Norway)

The NOx (nitrogen oxides) tax was implemented in order to fulfill Norway's commitment to the Gothenburg Protocol under the Convention on Long Range Transboundary Air Pollution. As of 1 January 2007, the Norwegian State introduced a tax per kilogram of NOx emitted during energy production delivery. The NOx tax covers energy producing units within a variety of sectors including the following: domestic shipping (including fisheries), aviation, railway operations, land-based activities and off-shore activities on the Norwegian Continental Shelf. The environmental tax targets NOx-emissions from larger units. The tax is calculated on the basis of actual NOx emissions. If these are not known, it is calculated on the basis of a source-specific emission factor or (if both are not known) based on standard values. In 2007, the tax was NOK 15 per kilogram (+/- 1.95 €), in 2011 it is NOK 16.43 per kilogram (2.14 €).

Several Norwegian business organisations (15) have entered into an environmental agreement with the Ministry of Environment to be exempted from the tax (i.e. the NOx Agreement, notified and approved by ESA²). Instead of paying the entirety of the NOx tax to the Norwegian State, undertakings that are party to the NOx Agreement will pay a reduced contribution to the NOx Fund (earmarked for the implementation of emission reducing measures). In return, these undertakings sign a participant agreement in order to fix rights and obligations towards the Fund.

The combination of the Norwegian tax and Fund is innovative in a number of ways. The economic instrument includes sectors where NOx abatement measures have not been widely implemented (shipping, fisheries) and undertakings pay according to the pollution they create. Experiences gained in Norway provide further insights on the factors contributing to the success of the instrument. The economic instrument of the NOx scheme relies on a *strong design* (increase acceptance through tax exemption, payment post implementation³), a *participative approach* (agreement between industry and the authority) and good *knowledge and control* of both emissions and reductions.

The emission reductions achieved through the NOx scheme illustrate the suitability of the scheme to aim at responses from specific target groups. In the Norwegian context for example, coastal / short sea shipping and fisheries are a key contributor to NOx emissions and deliver the highest reductions under the scheme. These sectors appear to

² EFTA Surveillance Authority. The temporary tax exemption (and privately organised NOx Fund) is considered as state aid. As a party to the European Economic Area (agreement), Norway must notify state aid to the ESA.

³ Support payments for measures are only granted after implementation and full documentation in order to ensure that the support goes to actual NOx reductions.

have relatively low unit abatement costs compared to other sectors and their emissions are generally not targeted by other policies. The Fund is managed by industry and requires strong Business Organisations and cooperation between sectors in order to fulfil the collective targets. Successful cooperation can be confirmed as a key success factor for the policy instrument, without ignoring one important driver for cooperation from the business side: lowering of the cost burden through the scheme. The cooperation between public government and business installs a double control of emission reductions with strict reporting requirements. Good knowledge and information on the tax base (real NO_x emissions) is therefore crucial both for emitters and the authorities.

The scheme has installed cost-effectiveness as a decision criterion to grant support for abatement measures, allowing maximised efficiency to reach the collective emissions reduction target.

Having now been 4 years in operation, the reduction obligations of the Environmental Agreement - at the basis of the NO_x Fund - have been met. The instrument has contributed to curb the upward emission trend in the sectors covered by the tax scheme and absolute emission reductions have been achieved (effectiveness). The impact of the isolated NO_x tax cannot be assessed as it has only run for one year in isolation from the Fund and the market did not respond to the tax immediately, counting on anticipated support measures. NO_x emissions have complex impacts and benefits (e.g. reduced nitrogen inputs) are not readily traceable to the (own) marine environment. Impact on eutrophication (GES 5) is therefore not easy to relate to the instrument.

Through the tax exemption, the NO_x scheme can be considered as a tax system where revenues are recycled back to enterprises to lower the cost burden and increase the acceptance for the instrument. This design element compensates the impact on the target group and can be particularly relevant where businesses operate in a highly competitive (international) setting and where increased costs cannot be integrated in the selling price (for example, shipping, fisheries or oil and gas). From the government perspective, there is still some potential to renegotiate overall reduction targets (adaptability) though policy certainty should not be ignored (investment risks for companies).

In brief:

- The NO_x scheme has succeeded in curbing the increasing trend in Norwegian domestic NO_x emissions. The instrument can be targeted to include specific sectors (e.g. shipping, fisheries) not or insufficiently covered by past policy.
- The collective obligation to reduce emissions may help to achieve targets more efficiently.
- Strong business organisations are needed in order to coordinate the operation of the Fund, also allowing to operate the Fund in a lean manner and transfer administrative costs from authorities to businesses.

Aggregates Levy (UK)

The UK Government implemented the Aggregates Levy in 2002 as an environmental policy to reduce impacts of aggregate extraction. As well as the price impacts of the Levy, intended to reduce demand by increasing costs, monies raised were redistributed back to the industry via an employment cost rebate and a Sustainability Fund. The marine extraction of aggregates was not specifically targeted by the Levy. The rate of the Levy, originally around €2.50/tonne, was low compared to other policies which encouraged the use of recycled aggregates, and may have been too low to make a difference based on other trends in construction and aggregate use.

The Sustainability Fund provided monies for remediating local impacts, for encouraging the use of recycled aggregates, and for research into the impacts of extraction, including marine-specific impacts. The Marine Sustainability Fund received around €13 million between 2002 and 2007, rising slightly from 2008-2011. The Fund was discontinued in 2011 due to budget cuts.

The Levy does not appear to have changed extraction rates significantly since other factors are more likely to be behind the changes in extraction levels. The Fund has probably had some impact in improving the environmental impact of extraction via research informing the licensing and extraction processes. This change has not been valued or quantified however.

The Levy is not costly to implement, since it is a flat level across all applicable aggregates. The Levy does not distinguish between extraction types, and so does not in itself encourage pro-environmental practices, however, the Fund, in part, was set up to do this.

The suitability of the Levy is in question, since it is a relatively blunt instrument and does not cover all aggregate extraction. The Fund however does appear to have been suitable for the different contexts it was applied in. There is some flexibility within the Levy, since it can be raised (or lowered) to reflect changes in the wider context, but in general was designed to be simple rather than adaptable. The Fund was more flexible in design, but smaller in scope.

When installing an aggregates levy to mitigate marine impacts, the success may be influenced by the design elements, stakeholder acceptance or involvement and information and control. The Levy was designed to be simple and to be easily implemented, with the Fund adding flexibility and adaptability. In the marine context, the Levy is probably not appropriate enough to change environmental quality, but the design of the Fund, along with stakeholder involvement in setting the research agenda, has been useful. The level of the Levy is important, especially when compared with other policies and existing economic trends. The Marine Sustainability Fund involved stakeholders in the setting of research targets and has been helpful in providing relevant research. On

the other hand, there is some significant stakeholder opposition to the Levy, which may question its future viability.

In general, the Levy would be applicable to many other contexts and countries, and specific details would vary from context to context. For a policy that targeted good marine environmental quality the example of the Sustainability Fund is more likely to provide useful lessons than the Levy itself. This could be applied to any marine extractive industries, not just aggregates. For an aggregate levy to have an effect, the level needs to be set high enough to change behaviour. However, the Sustainability Fund – provided by monies raised from the Levy – has been able to provide useful and policy relevant research which can improve extraction practices and so lower the environmental impacts of extraction.

In brief:

- The Aggregates Levy is not an instrument specifically designed for marine environmental sustainability but can be used to increase the quality of marine environments.
- The Levy may not have much impact on extraction rates, but some revenues from the Levy were used to support a Sustainability Fund which, in part, funded research into marine environmental impacts of aggregate extraction. This research can be used to inform policy and practice and so help achieve good environmental status.

No special fee system for ship-generated waste (Baltic Sea region)

The No Special Fee system (NSF) is defined as a charging system where the cost of reception, handling and disposal of ship-generated wastes, originating from the normal operation of the ship, as well as of marine litter caught in fishing nets, is included in the harbour fee or otherwise charged to the ship irrespective of whether wastes are delivered or not (HELCOM Recommendation 28E/10). The concept of “no-special-fee” thus means that every ship (with some exemptions) entering the port pays a fee which is not related to whether the ship delivers the waste or not or to the quantity delivered. The fee covers the waste collecting, handling and processing including infrastructure and is distributed among ships and collected as part of or in addition to the port dues. The system is not restricted to any specific type of ship-generated waste and thus includes the most common wastes from normal operation of ships: oily wastes, sewage and garbage.

The idea of an indirect fee system (e.g. no special fee) is that ships will use the facilities they have already paid for as the marginal cost should be close to zero. Multiple factors can influence the success of the inherent incentive in the No Special Fee charging system to encourage delivery of wastes in ports, most importantly the institutional framework and design or roll-out of the instrument. The lack of harmonisation (in the Baltic and the EU by extension) hinders the full potential of the instrument. This harmonisation is sought by HELCOM but is not enforceable (no strict legal framework). The EU Directive on Port Reception Facilities (PRF) aims at the further development of these facilities in Member States leaving ports and countries a degree of freedom to decide on the port reception facilities financing mechanism. The no special fee system can only work in combination with other policy instruments (prohibition of discharging, e.g. MARPOL special area, mandatory delivery) that are generally difficult to control. These difficulties cannot be overcome at national level and would require an international or at least regional cooperation (e.g. Baltic and North Sea) in order to create a level playing field for competitors. Additional difficulties arise from equity issues (fair sharing of the cost burden amongst ports and between ships and ports) or bottlenecks in the extended waste chain. Cooperation and the involvement of all stakeholders in defining the requirements (e.g. adequate port reception facilities) may help to increase acceptance and uptake of the necessary actions.

Based upon some quantitative elements for selected ports or countries, it is reasonable to assume that the No Special Fee system contributed to increased delivery of wastes in ports (effectiveness), though uniform and reliable statistics to confirm this positive evolution are generally lacking. The effect of the no special fee system cannot be isolated from the wider strategy to reduce (illegal) pollution from shipping. The no special fee mechanism is combined with (and requires) mandatory delivery, strict legislation on the prohibition of (harmful) discharges, sufficient port reception facilities and effective control.

The no special fee system has gained acceptance from different stakeholders. Shipping industry believes it is a good and suitable system if it is applied in a transparent and

harmonised manner. Environmental NGOs oppose (all) direct charging for waste services as this is considered as the largest disincentive to deliver on land. A majority of Baltic ports is also in favour of the system while not ignoring the necessity of an increased harmonisation of the implementation in order to have a fairer sharing of the waste burden. The case study has shown the potential positive effect of the No Special Fee or (100%) indirect fee system. A key element for charging systems should be to avoid any financial disincentive to use waste reception facilities in ports. Fee systems should be fair and transparent. For them to be really effective, (incentive) cost recovery systems should preferably be harmonised over a wider geographical area. Diversity in implementation, aggravated by varying levels of adequacy of port reception facilities has maintained uneven waste flows (and associated waste costs) between Baltic ports. The risk of 'waste tourism' is even higher at the wider EU level and considering the competitive environment where ports and ships operate.

In brief:

- The No Special Fee system removes the economic motivation to discharge waste at sea and can have positive effects on several GES descriptors if properly installed.
- Both ports and the shipping sector are rather positive towards the No Special Fee system. The lack of harmonisation in both the implementation of the system and availability of port reception facilities however hampers the effectiveness of the system.
- Increased harmonisation is difficult in a wider geographical area as provisions are usually not enforceable (e.g. HELCOM Recommendations).

Fisheries Real Time Closures scheme (Scotland)

The Real-Time Closures (RTC) policy is part of a wider Scottish fisheries management policy known as the Conservation Credit Scheme (CCS) and the Common Fisheries Policy (CFP) of the EU. The CCS limits days at sea for cod fishing vessels, but increases this limit in return for voluntary participation in a number of effort control systems, with the RTCs being the most popular. Areas of the North Sea which are identified as having abundant cod stocks are temporarily closed to those vessels who have joined the scheme – the closures are implemented as soon as levels of high cod abundance are identified and are only in place for 21 days. By diverting fishing effort away from these areas, the scheme increases the total effort needed to reach a quota, which should in turn create an incentive to reduce over-fishing, discards and overall cod mortality.

The scheme is monitored by Marine Scotland on behalf of the Scottish Government, but many of the key parameters and details of implementation are set by the Fisheries Management and Conservation Group. This group contains representatives from all the main stakeholder groups, including fisheries associations, environmental advocacy groups and government, and the group acts as a steering committee and is able to change how the scheme is implemented based on changes in scientific knowledge, economic conditions and so on. The scheme has been adjusted frequently which highlights its flexibility.

The closures are set based on either landings data (combined with known fishing times) to gain an estimate of abundance, or from at sea observational data. The areas closed are limited by size and number, and there cannot be too many closures in a given location; the parameters for these change over time based on input from stakeholders represented in the Fisheries Management and Conservation Group. This means that RTCs are data-intensive, requiring monitoring of vessels and landings to set the closures and to monitor compliance. Without data of catches, the assessment of the scheme is limited to estimations based on landings.

A number of studies have explored the effectiveness of RTCs and have found that it is likely to have a small reduction in cod mortality due to the closures, but this is hard to measure without clear catch data and without a control study. The principal costs are the data gathering costs, for both the setting of closures and monitoring of compliance whilst benefits arise from the lowered levels of cod mortality. The RTC scheme can be considered suitable for a context in which relatively little is known about fish stocks and movement, since the flexibility of both the closures and the scheme itself allows it to adapt to new information or demands. The number of changes that have been made to the scheme illustrate this.

The scheme has a lot of support from most stakeholders and works within the Scottish policy context. This is largely due to the flexibility of the scheme – both in the areas closed, but also in the way that the parameters can be adjusted based on input from stakeholders.

The measure is applicable to other contexts within the EU especially if there is already a framework for gathering the vessel and landings data. The in-built flexibility of the scheme means that it should be usable in other contexts, and the ability of the scheme to adapt to changes in the wider context should be kept in other situations. The support of stakeholders is necessary and their involvement in the development of the scheme is therefore crucial. Stakeholder input is important to how the policy functions, particularly as the Conservation Credits Scheme (CCS) is voluntary. Participation is high and non-compliance is low. Furthermore, proper functioning of RTCs relies on good information, which increases costs but allows for the flexibility and relevance of the closures. In any other context, information and data gathering would have to be prioritised. The design of the scheme is relevant to the local context and the flexibility and adaptability is a strong factor in its support. It is also possible to be improved as greater scientific knowledge of fish stocks becomes available. The existing framework allows enforcement of the scheme via the CCS, and days at sea limits for vessels are used as a reward for participation and deterrent to noncompliance. This keeps the control and enforcement relatively quick and simple without the need for criminal proceedings.

The RTC scheme is a popular policy for managing cod stocks in Scotland and fits well within existing policy contexts, but so far only appears to have had a small impact on cod mortality.

In brief:

- Real Time Closures (RTCs) allow for a flexible and targeted approach to reduce cod mortality by closing areas of high cod abundance in the North Sea to cod fishing.
- The policy is part of a wider effort-control system, and is highly flexible in both the short- and medium-term.
- Stakeholder participation and support is high, but the environmental impact on cod stocks is likely to be small.
- Therefore, the instrument should be used in complement to other policies, such as wider quotas and active research into fish movements.

Marine Protected Area (MPA) Medes Islands (Spain)

The establishment of marine protected areas is a measure aiming to provide long-term protection, enabling restoration and the careful use of the marine natural heritage. Situated in the heart of the Costa Brava, Catalunya, Spain, the Medes Islands constitute since 1983 one of the principal marine flora and fauna reserves in the Western Mediterranean. The analysis of the case study focuses on :

- The establishment of a Marine Reserve and its effect on fauna and flora.
- Regulation of underwater tourism to control impacts and to optimise its benefits as to co-finance the Marine Reserve (50% of the annual budget comes from diving fees) and therefore contributing to the conservation and improvement of the marine ecosystem and related resources.

Protection of the marine area dates back to a Decree of 1983 which prohibits fisheries and the extraction of live marine resources in a zone of 75 meters around the islands. This protection was extended in 1990 establishing the Marine Partial Nature Reserve and regulating activities as fisheries, sailing, anchoring and diving. In 2010 the reserve was transformed into a much larger marine and terrestrial Natural Park allowing a more integrated regulation and protection of the area. The marine area has been extended to 2,037 ha while a terrestrial (coast, river mouth and mountain) area of 6,155 ha has been also included. This extension is important to improve the environmental status of the new protected areas, and to help lower the tourism pressure on the Medes providing sound alternatives in the field of nature based responsible tourism.

Each year an average of about 65.000 dives take place in the Protected Area of the Medes Islands. Diving represents a very important income for the neighbouring village (70% of GDP) and diving taxes represent 50% of the MPA budget. This practice has however negative impacts on benthonic organisms due to physic contact with flippers, body, hands or diving equipment. The MPA established a set of measures to try and control these impacts: freezing the number of commercial licenses; limiting the number of daily dives to 450; establishing measures to control the number of dives; organising specific routes for cruise boats and setting up an evaluation committee as a body to discuss new measures to be introduced.

The Reserve provides a good model to understand the evolution of natural systems in a zone where certain activities are prohibited. In the case of Medes Islands, it can be concluded that the MPA has met its objective of protecting vulnerable fish species and in reaching recovery of populations (even) to the level of its carrying capacity. This effect is however not demonstrated outside the strictly protected zone. The lack of “reserve effect” outside its boundaries is, most likely, due to illegal fishing practices in the buffer zone and Nature Park. A larger surveillance effort would be required.

The prohibition of anchoring and the installation of ecologic mooring buoys within the Marine Partial Nature Reserve since 1990 have resulted in lower impact of diving

activities on *Posidonia oceanica* in this area. Negative impacts are still visible in those areas of the Nature Park and Reserve Buffer Zone where anchoring is not yet regulated. These anthropogenic pressures are to be taken into account when agreeing on new regulations for the management of the area (Management Plan 2012-2016). The new plan will face the challenge of balancing conservation and economic development, with an emphasis on protection.

Several factors can influence the real effectiveness of the establishment and management of MPAs. These could be grouped in following categories, also reflecting certain order of importance:

- Legal and institutional framework: to create legislative conditions and a strong legislative framework. In EU countries the implementation of related EU directives triggers this process.
- Strategic planning and management: including the need to agree with all relevant stakeholders on an adequate and implementable Management Plan, addressing key conservation objectives; make sure to establish a good mechanism of surveillance and monitor the effectiveness of the measure in order to evaluate and improve management.
- Financial and socio-economical: beware that the measure has a positive impact on major economic sectors or at least does not harm them; try and keep the costs of implementation low and consider the use of taxes on recreational activities in the MPA as a potential source of income.
- Public acceptance and ownership: through communication, awareness, participation, conflict resolution and agreements; stress ownership of the measure; emphasize the socioeconomic benefits for the local communities, and prove that by means of research and monitoring.

In brief:

- MPAs are a key instrument for the conservation and restoration of marine habitats and species.
- MPAs can provide a recreation offer that brings socio-economic benefits to neighboring populations.
- The use of taxes or fees, e.g. on diving, can provide an important income to the MPA budget.
- The conservation principle must be at the forefront of the regulation of activities in the MPA.

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