INDECO

DEVELOPMENT OF INDICATORS OF ENVIRONMENTAL PERFORMANCE OF THE COMMON FISHERIES POLICY

Project no. 513754

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Development of Indicators of Environmental Performance of the Common Fisheries Policy

Specific Targeted Research Project of the Sixth Research Framework Programme of he EU on 'Modernisation and sustainability of fisheries, including aquaculture-based production systems', under 'Sustainable Management of Europe's Natural Resources'

Indicators: An Overview

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[Final]

The INDECO project

The purpose of this Co-ordination Action is to ensure a coherent approach to the development of indicators at EU level, in support of environmental integration within the CFP and in the context of international work on indicators. The principal objectives of INDECO are:

1. to identify quantitative indicators for the impact of fishing on the ecosystem state, functioning and dynamics, as well as indicators for socio-economic factors and for the effectiveness of different management measures;
2. to assess the applicability of such indicators; and
3. to develop operational models with a view to establishing the relationship between environmental conditions and fishing activities.

A consortium of 20 research organisations from 11 EU Member States is implementing INDECO. An Advisory User Group will provide a link between the researchers and policy makers, managers and stakeholders.

More information on INDECO can be found on the project's website: http://www.ieep.org.uk/research/INDECO/INDECO_home.htm

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1 INTRODUCTION

This note was prepared as a follow-up on the INDECO kick-off meeting on 15.12.2004. It is not intended to be an exhaustive literature review. Rather its function is to assist in forging an agreement on:

- terminology and definitions;
- conceptual frameworks; and
- criteria for indicator selection.

Much of the document is based on earlier IEEP work (Grieve et al, 2003). It was also discussed at various internal meetings and circulated to all partners.

2 TERMINOLOGY AND DEFINITIONS

2.1 What are indicators?

Various institutions and authors have proposed definitions for the concept of indicators.

According to the Quality of Life Counts 1999 report of the British Government indicators are 'broad brush, highly aggregated statistics which summarise the overall picture'.

FAO (1999) defines an indicator as a variable, pointer, or index related to a criterion. Its fluctuations reveal the variations in those key elements of sustainability in the ecosystem, the fishery resource or the sector and social and economic well-being. The position and trend of an indicator in relation to reference points or values indicate the present state and dynamics of the system.

For Slocombe (1999) an indicator is an *a-priori* defined system characteristic that can provide feedback on progress towards management goals and objectives.

Garcia and Staples (2000) state that indicators are pointers that can be used to reveal or monitor conditions and trends in the fisheries sector and the marine environment.

For Sainsbury and Sumaila (2001) an indicator is something that is measured, not necessarily numerically, and used to track an operational objective. An indicator that does not relate to an operational objective is not useful in this context.

Australia is one country where a significant move has been made towards reporting on ecologically sustainable development in fisheries. Fletcher et al (2002) define an indicator as a quantity that can be measured and used to track changes with respect to an operational objective. The measurement is not necessarily restricted to numerical values.

According to the OECD (2003), an indicator is a parameter, or a value derived from parameters, which points to, provides information about, or describes the state of a phenomenon/environment/area, with a significance extending beyond that directly associated with its value.

Another way to define indicators is to look at the functions they are supposed to fulfil. According to the European Environment Agency (EEA) (Smeets and Weterings, 1999), indicators are used for three major purposes:

1. to supply information on environmental problems in order to enable policy-makers to value their seriousness;
2. to support policy development and priority setting by identifying key factors that generate pressure on the environment; and
3. to monitor the effects of policy.

For FAO (1999) indicators provide a bridge between objectives and actions. They should reflect the state of the system with respect to how well goals and objectives are being pursued or achieved, providing a transparent link between policy objectives and management action (Garcia *et al*, 2000).

Indicators can help to harmonise reporting at various levels from local to regional, national and international level, particularly where countries are required under conventions and agreements to report on progress towards sustainable development (Garcia *et al*, 2000).

The United Nations Commission on Sustainable Development (UNCSD, 2001) has developed indicators for sustainable development in order to:

1. translate physical and social science knowledge into manageable units of information that can facilitate the decision-making process;
2. help to calibrate and measure progress towards sustainable development goals;
3. provide early warning to prevent damage; and
4. communicate ideas, thoughts and values.

In a recent report, the Royal Commission on Environmental Pollution (RCEP) (2004) argues that indicators are a formal measure of performance that can be used to judge the success of management strategies.

These different definitions and lists of functions largely overlap. The difference between them is mostly one of emphasis not substance. They do point to one specific characteristic of indicators and three fundamental functions in which they are used. Indicators are essentially standardised units of information related to societal goals and objectives. The three functions are monitoring, evaluation and communication. It is important to note that each function has specific requirements and is important at different stages in a policy cycle.

Monitoring is the more operational of these three functions. It entails a continuous assessment of management actions in the framework of policies and plans that have been decided on. Evaluation is a more periodic assessment of relevance, efficiency, impact (both intended and unintentional) and performance against stated societal objectives or goals. It is normally linked to a control mechanism that should lead to corrective actions being taken if necessary. It will also feed into the process of specifying the objectives, developing policies and plans to achieve them and the allocation of resources. In considering the communication function it will be necessary to identify the audience and the message that will need to be conveyed. The

first two functions point to the role of indicators as an integral part of a management information system. Indicators that are relevant in a specific context will therefore depend both on the management objective and on the management institution that is to be informed by the indicator (Degnbol and Jarre, 2004).

2.2 Types of indicators

There are different types of indicators, often corresponding to the level of a management system to which the indicator refers, or just due to the fact that different groups working on indicators have approached the subject in slightly different ways (see Table 1). For instance, indicators can be based on either processes or outputs. Process-based indicators aim to assess the organisational efficiency of processes that achieve results, whereas outcome-based indicators measure results or the degree to which an (environmental) goal has been met.

Table 1. Some examples of different types of indicators (after Grieve et al, 2003)

Type of indicator	Definition
Process-based indicator	Aim to assess the organisational efficiency of processes that achieve results.
Outcome-based indicator	Measure results or the degree to which an environment goal has been met.
Headline indicator	Strategic; providing feedback on progress against overarching policy objectives, eg a measure of stock health or ecosystem diversity.
Operational indicators	Measure the more detailed components of headline indicators, eg stock mortality or recruitment, or number of species within a particular ecosystem.
EcoQ metrics[1]	Measure the pressure of a particular problem on a Ecological Quality to enable evaluation of progress towards the EcoQ Objective
Driving force indicator	One of the DPSIR indicator categories Measure human activities and natural processes and patterns that have an impact on sustainable development of a sector or issue.
Pressure indicator	One of the DPSIR indicator categories Represents the pressure on the environment exerted by different driving forces.
State indicator	One of the DPSIR indicator categories Refer to the 'state' of a particular environmental or socio-economic resource or feature, eg water quality, stock numbers.
Impact indicator	One of the DPSIR indicator categories Describe the immediate impact on the environment
Response-type indicator	One of the DPSIR indicator categories Measure policy response to achieve objectives, eg number of boats decommissioned if capacity reduction is an objective supported by aid for decommissioning.

[1] Term for indicator used by ICES and OSPAR/CONSSO in their work on Ecological Qualities and Objectives for these qualities.

It is important to note that indicators are only a tool first for monitoring and then for evaluation and communication. Their selection has normally involved the implicit or, preferably, the explicit formulation of assumptions on the links between actions taken, the indicators and the goals pursued. Indicators need to be supplemented by other qualitative and scientific information, particularly research to explain the causes of change as measured by indicators (OECD, 1998).

3 CONCEPTUAL FRAMEWORKS

3.1 General

In order to clarify the inter-relationships between human beings and the environment, the OECD, the FAO, the European Environment Agency (EEA), Eurostat and many other institutions have adopted conceptual frameworks for the derivation of indicators. The conceptual frameworks are essentially variations on a similar theme and provide a convenient way to organise indicators in relation to system components and ensure they correspond to different purposes within the system.

A framework can be devised in a way that reflects the *pressures* of human activities, the *state* of human and natural systems and the *responses* of society to changes in those systems. Commonly used terms for this type of framework are Pressure-State-Response (PSR), Driving force-State-Response (DSR) or Driving force-Pressures-State-Impact-Response (DPSIR) (Garcia *et al*, 2000; Smeets and Wetering, 1999; EEA, 2000; FAO, 1999; Coffey and Baldock, 2000). EEA, Eurostat and European institutions tend to use the DPSIR framework, while OECD uses PSR and the UN Commission on Sustainable Development favours DSR. It is important to be explicit what any indicator relates to.

There are critics of these frameworks. DPSIR and its variations, as direct cause-effect models, have limitations because they over-simplify reality and ignore many of the linkages between issues and feedbacks within the socio-ecological system. The relations between the elements of the framework such as driving forces and pressures may not always be simple; responses to one pressure can become a pressure on another part of the system. The demarcation between components is not always clear and debate on the usefulness of these models is ongoing (Garcia and Staples, 2000). Indicators and reference points should explicitly relate to the high-level objectives of management (Sainsbury and Sumaila, 2001). Some of the boxes are likely to be more relevant than others. As an analytical framework, it may therefore be a distraction, from a management point of view, to try to fill-in all boxes.

Alternatively, frameworks may represent the different dimensions of sustainable development (eg economic, social, environmental and institutional/governance), called a Sustainable Development Reference System or SDRS.

FAO (1999)

Sustainable development reference system. The sustainable development reference system (SDRS) is a means of representing the sustainability of a system of exploitation (eg a fishery or a fishery sector), composed of reference points (selected on the basis of objectives, constraints and limits) and indicators. The SDRS will generally include a wide range of indicators that covers broad ecological, social,

economic and institutional objectives. However, despite having as its primary purpose the measurement of achievement and progress in sustainable development, the SDRS should also, in a general sense, provide an incentive to review strategies for achieving sustainable development.

It is also possible to combine frameworks and to use two sets of dimensions to elaborate an as complete set of indicators as possible (see for instance Annex 1).

Australia has been introducing such a Sustainable Development Reference System to fisheries. In the EU, the project FISH/2002/08 also aimed at the development of preliminary indicators of environmental integration of the Common Fisheries Policy.

3.2 Australia's ESD framework[2]

All Australian fisheries agencies and industry groups are committed to implementing the principles of ESD (Ecologically Sustainable Development). ESD recognises the need to integrate the short and long-term economic and social and environmental aspects of activities. It is now enshrined in most fisheries legislation in Australia. Strong support to develop the ESD was received from all stakeholders groups.

The basic reporting unit is a fishery, as defined by the management agency. The framework is designed to document a fishery's contribution to ESD - where ESD is defined as:

> *'Using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased.'*

ESD has been divided into eight major components relevant to fisheries, which can be grouped in three categories:

Contributions of the fishery to ecological well-being
- Retained species
- Non-retained species
- General Ecosystem

Contributions of the fishery to human well-being
- Indigenous well-being
- Local and regional well-being
- National social and economic well-being

Ability to Achieve
- Governance
- Impact of the environment on the fishery

[2] The following section is based on the ESD website (http://www.fisheries-esd.com/c/home/index.cfm) and on Fletcher et al (2002).

These eight components are further sub-divided into more specific sub-components, using a 'component tree' structure for which specific objectives and subsequently indicators may be developed. An example of such a component tree is shown below.

The generic component trees associated with the eight components are to be tailored to suit the particular circumstances of each fishery to which ESD reporting is applied, expanding some sub-components and collapsing or removing others.

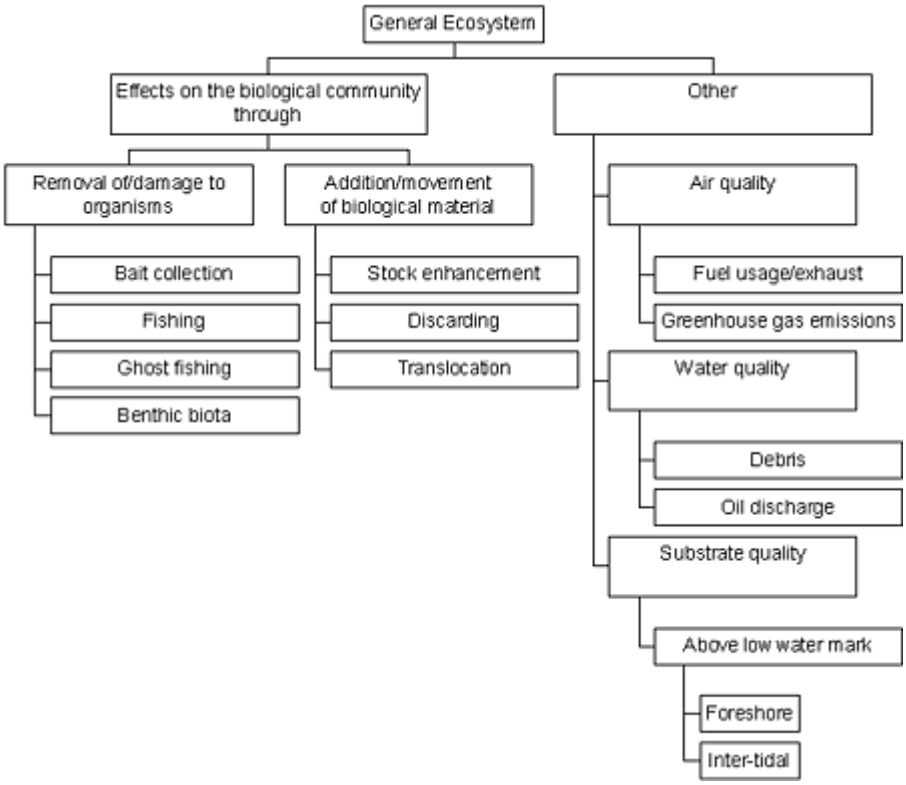


Figure 1 An example of one of the eight generic component trees used in the ESD reporting framework

For each of the lowest level of sub-components, a risk assessment is then carried out, in order to determine the appropriate level of management response and monitoring required, and what complexity of report needs to be written.

If an issue is of sufficient risk to require specific management, a performance report must be produced. These reports must include:

1. an operational objective for the particular sub-component;
2. an indicator; and
3. the levels where performance will be viewed as acceptable with respect to the operational objective (ie reference points).

In addition, the management responses necessary to achieve acceptable performance are required to be listed in the reports.

Where data are already available, the report must include a graph of the performance indicator over time. Where data are not available, the report must describe the process that is necessary to be undertaken to obtain them.

The report provides the framework to determine if the proposed management actions are appropriate, given the levels of risk and current knowledge (ie give justification for the actions).

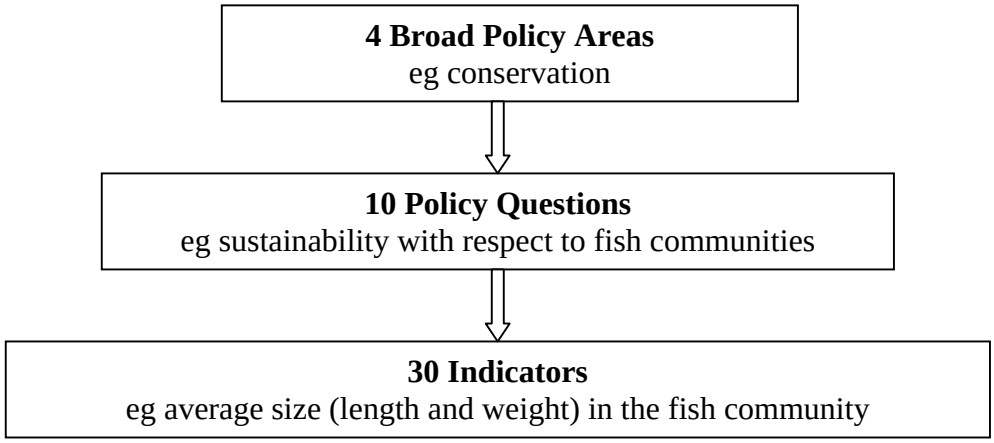
The reporting method differs from 'top-down' fisheries reporting approaches, where a set of indicators and performance measures is imposed on all fisheries without regard to their individual circumstances.

3.3 FISH/2002/08

In 2002 DG Fisheries launched a call for tenders for a study with the following terms of reference:

- To examine the progress made in other for a on environmental indicators for fisheries (EEA, OECD, Eurostat, FAO, SCOR, ICES, etc..);
- To review the indicators studied in the above fora and to select a few indicators […].

The study report was finalised in August 2003 (Jaako Pöyry Infra, 2003). An STECF Expert Group reviewed the report was then discussed at a plenary meeting in November 2003. The set of indicators proposed is organised along three levels. The report distinguishes 4 broad policy areas (conservation, market measures, structural measures and horizontal) for which it lists specific policy questions. One or more specific indicators are then suggested to give answers to each policy question (CEC, 2004a, 2004b, 2004c).



The Commission has now contracted a consortium to put actual numerical values on the indicators proposed.

4 INDICATOR SELECTION

4.1 Norms

Various projects or institutions sought to identify properties for good indicators. According to ICES (2001), indicators should be:

- relatively easy to understand by non-scientists and those who will decide on their use;
- sensitive to a manageable human activity;
- relatively tightly linked to that activity;

- easily and accurately measured with a low error rate;
- responsive primarily to a human activity (eg fisheries), with low responsiveness to other causes of change;
- measurable over a large proportion of the area to which the indicator is to apply (eg EU policy area); and
- based on an existing body or time series of data to allow a realistic setting of objectives.

The work done on the European Marine Strategy has lead to a similar list of properties for indicators[3]. They should be:

- Measurable;
- Cost effective;
- Concrete;
- Interpretable;
- Grounded in theory;
- Sensitive;
- Responsive;
- Specific.

According to the FAO, the choice of indicators should be based on the following considerations:

- policy priorities;
- practicality/feasibility;
- data availability;
- cost-effectiveness;
- understandability;
- accuracy and precision;
- robustness to uncertainty;
- scientific validity;
- acceptability to users/stakeholders (consensus among parties);
- ability to communicate information;
- timeliness;
- formal (legal) foundation; and
- adequate documentation.

The US Environment Protection Agency (EPA, 2000) has developed a set of 15 evaluation guidelines for ecological indicators. In its guidelines it stresses that the review should include both 'technical experts and environmental managers'. The guidelines are structured around four distinct phases seeking to answer four fundamental questions. :

Phase 1 – Conceptual Relevance: Is the indicator relevant to the assessment question (management concern) and to ecological resource or function at risk?

[3] CEC (2004) Guidance to the application of the Ecosystem Approach to Management of human activities having an impact on the marine environment

Phase 2 – Feasibility of implementation: Are the methods for sampling and measuring the environmental variables technically feasible, appropriate, and efficient for use in a monitoring programme?

Phase 3 – Response variability: Are human errors of measurement and natural variability over time and space sufficiently understood and documented?

Phase 4 – Interpretation and utility: will the indicator convey information on ecological condition that is meaningful to environmental decision-making?

The OECD has also developed a set of criteria for selecting environmental indicators based upon three simple ideas: policy relevance and utility for users, analytical soundness, and measurability (OECD, 1993).

Indicators should be easily understood by those who need to make decisions based upon them. Degnbol & Jarre (2004) point to the need for indicators to be accepted as valid characteristics by at least a sufficiently powerful sub-set of stakeholders to be used as the basis of management decisions to be taken.

Again it can be said that these considerations largely overlap and the difference is mostly one of emphasis. The single most important function of an indicator is to communicate information that is relevant to a particular societal goal or objective.

One characteristic that is also worth emphasising more is that of timeliness or responsiveness. It is at this level that the difference between indicators for monitoring and for evaluation may become important. An indicator used for monitoring should show clear trends in a fairly short-time frame. Indicators used to inform the policy debate and for policy evaluation may show changes on another longer time scale.

4.2 Processes

One way to proceed would be to take a conceptual framework and aim for indicators covering the different components. However, to manufacture indicators to fit into indicator categories (such as PSR) may not focus reporting activities on the whole of the management system, nor on overall fisheries (or environmental) management performance. The important point is that indicators are a means to an end, *a priori* defined system characteristics that can provide feedback on progress towards management goals and objectives (Slocombe 1999). Indicators development is not a contribution to basic natural science but the development of a tool to solve specific management problems (Degnbol and Jarre, 2004).

The FAO guidelines for developing indicators on sustainable development set out five sequential steps that need to be addressed in order to develop a meaningful set of indicators out of thousands of actual and potential indicators (FAO, 1999). These are:

1. specifying the scope of the Sustainable Development Reference System [or other indicator framework] eg its purpose, which human activities to cover, the issues to be addressed and the boundaries of the system under consideration, ie fishery, area, region, ecosystem;
2. developing a framework to agree on components within the system;
3. specifying the criteria, objectives, potential indicators and reference values (targets, thresholds or standards);
4. choosing a set of indicators and reference values; and

5. specifying the method of aggregation and visualisation.

Rice and Rochet (in press) propose an evaluation framework structured as a sequence of 8 steps. This decomposition disentangles the numerous issues to be addressed in the selection process, enhancing efficiency and transparency. Step 1 consists of determining the user needs, step 2 lists candidate indicators related to these objectives. Step 3, determining screening criteria, requires value judgements about the importance of scientific and governance issues to stakeholders. Step 4 scores indicators against criteria, step 5 is summarizing scoring results, 6 deciding how many indicators are needed; and 7 is final selection. Once the suite of indicators has been selected, a way for reporting on them must be chosen (step 8).

4.3 The use of proxies

It is likely that an ideal indicator is impossible to identify. There is normally a need to identify proxies, second-best choices. For instance, a pressure indicator may be used instead of a state indicator simply because the desired state characteristic cannot be measured or changes in it are too slow to become evident. This implies the formulation of assumptions on the link between the proposed (proxy) indicator, the management actions taken and the objectives or goals pursued. These assumptions must be revisited regularly. This may lead to the rejection of a particular indicator after some time, either because the assumptions were proven wrong or the nature of the links have changed.

5 IMPLICATIONS FOR INDECO

INDECO originated in response to a European Commission need. Financing is drawn from a budget line under FP6 for Specific Support to Policy. The budget is to finance scientific support that is targeted on and responsive to policy needs. In the specific case of the INDECO project the Terms of Reference state that:

> The purpose of this Co-ordination Action is to ensure a coherent approach to the development of indicators at EU level, in support of environmental integration within the CFP and in the context of international work on indicators. The principal objectives of INDECO are:
>
> 1. to identify quantitative indicators for the impact of fishing on the ecosystem state, functioning and dynamics, as well as indicators for socio-economic factors and for the effectiveness of different management measures;
> 2. to assess the applicability of such indicators; and
> 3. to develop operational models with a view to establishing the relationship between environmental conditions and fishing activities.

At the kick-off meeting in Brussels on 15 December 2004, the scientific officer responsible for the project, Mr Jacques Fuchs (DG-FISH), summarised these by stating that INDECO should lead to the identification of ‘robust and operational indicators describing the links between fisheries and environment, applicable across a large range of ecosystems and fishing zones’. These indicators should also be useful as ‘communication tools to keep the wider public duly informed’.

5.1 Glossary

It is suggested that to avoid confusions and misinterpretation of concepts, INDECO sticks to the terms and concepts as they are defined in FAO (1999). Key definitions are given in Annex 2.

5.2 Developing a reference framework

The objectives of INDECO point to the same three dimensions used in the Australian ESD framework (where they are called categories). They also largely correspond to the policy areas identified by the project FISH/2002/08. Table 2 relates the three different sets of dimensions.

Table 2 : Comparing reference framework dimensions

	Dimensions	*Australian ESD framework categories*	*FISH/2002/08 Broad Policy Areas*
1	Ecological	Contributions of the fishery to ecological well-being	Conservation
2	Social and economic	Contributions of the fishery to human well-being	Market Structural
3	Institutional	Ability to achieve	Horizontal

It is suggested that INDECO adapts the ESD reference framework to an EU context. This will give a structure to be used to select and organize criteria, indicators and reference points. This will entail:

1. Deciding on the reporting unit or scale. The Australian framework uses the fishery. Is this appropriate in the EU context?
2. Identifying the components under each dimension. Most to the components identified in the Australian ESD should be useable in the INDECO reference framework. However, an EU level component under the socio-economic dimension is missing and will need to be included;
3. Developing generic component trees down to the criteria level. This is necessary to have a consistent approach.

To assist in arriving at the answers to these questions, the INDECO Advisory User Group will be consulted (Annex 3 and 4). We will also refer to other frameworks for developing indicators (in particular DPSIR) in order to insure that a as complete set as possible is developed. Table 3 presents the possible lay-out of a summary table.

Table 3: Draft lay-out of indicators summary table

Dimensions	**Components**	**Criteria**	**Drivers**	**Pressure**	**State**	**Impact**	**Response**
Ecological	To be developed	To be developed	Indicators				
Social and economic							
Institutional							

5.3 Evaluation of potential indicators

The development of the generic component trees will lead to the identification of the criteria for which objectives and indicators will need to be defined or identified. It is suggested to use the FAO standards or norms to evaluate the indicators developed for each criteria. However, for each criteria there will be a need to assess whether the different management functions or levels that indicators have to inform will be covered, namely:

1. Strategic (Evaluation);
2. Operational (Monitoring); and
3. Communication.

These considerations point to the need for a suite of indicators, some of which are likely to be very specific while others will be highly aggregate. It is also likely that in several cases reference directions will be used instead of reference levels.

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ANNEX 1: EXAMPLES OF PSR INDICATORS (FROM FAO, 1999)

Dimensions	Pressure	State	Response
Environment (Ecosystem/ Resource)	· Total catch · Total area fished · Catch/sustainable yield · %resources > target · Total effluent discharge	· Biomass / target B · Fishing mortality / target F · Exploitation rate / target E · %target resource > target · %non-target resource > target · Biodiversity index · Community structure · Trophic structure · Area of critical habitat	· TAC/sustainable yield · % depleted stocks rebuilding · Reduction in land-based pollution · User rights established · User fees established
Social	· Fishing effort · Number of vessels · Growth rate of number of fishers · Unemployment rate · Immigration rate · Social unrest	· Number of fishers · Demography · Number of associations · % below poverty line · Income and asset distribution	· Unemployment assistance · Support to associations · Resources allocation decision
Economic	· Sector unemployment · Subsidies · Excess fishing capacity · Resource rent potential	· Profitability · Wages and salaries · Sector employment	· Economic incentives and disincentives (e.g. subsidies, taxes, buy back) · Command and control measures
Institutions/ governance	· Employment policies · Absence of user or property rights	· % resources assessed · % with management plans · % management cost recovery · Rate of compliance	· % resources assessed · Job conversion programmes · Retraining programmes · Number of compliance operations

Dimensions	Pressure	State	Response
		· % resources co-managed	

ANNEX 2: GLOSSARY (from FAO 1999)

Criteria. Components of the sustainable development reference system whose behaviour can be described via indicators, proxy-indicators and reference points. For example, *fishing capacity* is a criterion related to fishing pressure, *spawning biomass* is a criterion related to the well-being of the stock and *total income* (in cash and in kind) a criterion related to the well-being of humans in the fishery.

Dimension. The classes used to describe a system. Examples include: i) ecological, economic, social and institutional; ii) pressure-state-response; iii) human and environmental; and iv) operations, management, research, aquaculture and coastal zone management.

Indicator. A variable, pointer, or index related to a criterion. Its fluctuations reveal the variations in those key elements of sustainability in the ecosystem, the fishery resource or the sector and social and economic well-being. The position and trend of an indicator in relation to reference points or values indicate the present state and dynamics of the system. Indicators provide a bridge between objectives and actions.

Objective. A purpose to be achieved within the overall principles of sustainable development. Objectives are often hierarchical, referring to specific scales within the system. Objectives encompass all the dimensions and relevant criteria of sustainable development.

Opportunity costs. The benefit foregone by using a scarce resource for one purpose instead of its next best alternative; typically applied to capital and labour inputs to reflect their real costs to society as against their costs to a private entrepreneur which may be lower or higher because of subsidies, taxes and various kinds of market distortions including externalities.

Reference point. A reference point indicates a particular state of a fisheries indicator corresponding to a situation considered as desirable (‘target reference point’), or undesirable and requiring immediate action (‘limit reference point’ and ‘threshold reference point’).

Scale. Various levels of organization to be considered within the SDRS. Scales can be based on geographical area (e.g. global, regional, national or local), sectoral activities (e.g. individual fishery, fishery sector at various geographical levels, or cross-sectorial to include other uses and activities within a system) or a combination of both.

Stakeholder. Any individual, group, organization or sector in society that has a clearly identifiable interest in the outcome of a policy or decision-making situation. The interest may be in the form of a specific management responsibility, a commercial interest (resource supply, revenue, employment, trading activity), a subsistence need or some other commitment, as a member of civil society.

Standard. Reference point (or reference value) which has been formally established and enforced by an authority (e.g. MSY is established as a standard by UNCLOS and could become a minimum international standard for stock rebuilding).

Sustainable development framework. Structure used to select and organize criteria, indicators and reference points. It is based on a particular set of dimensions. Examples include: pressure-state-response; ecological sustainable development; and the FAO Code of Conduct for Responsible Fisheries.

Sustainable development reference system. The sustainable development reference system (SDRS) is a system of representation of the sustainability of a system of exploitation (e.g. a fishery or a fishery sector), composed of reference points (selected on the basis of objectives, constraints and limits) and indicators. The SDRS will generally include a wide range of indicators that covers broad ecological, social, economic and institutional objectives. However, despite having as its primary purpose the measurement of achievement and progress in sustainable development, the SDRS should also, in a general sense, provide an incentive to review strategies for achieving sustainable development.

ANNEX 3: WHAT OUGHT TO BE THE BASIC REPORTING UNIT? QUESTION POSED TO ADVISORY USER GROUP

There is a need to agree on what ought to be the basic reporting unit for any indicators system INDECO may develop eg stock level or geographic area. A major criterion is that it should be used in decision-making. This does not provide a clear-cut answer as decision-making occurs at many different scales and each possible basic unit has advantages and disadvantages. One possibility is also to use several reporting units, such as working on the basis of both the RAC regions and a limited number of 'important' fisheries.

Reporting unit	Advantages	Disadvantages
The fishery (French: métier)	• This is what the fishermen can probably relate to best. • This is what management wishes to influence. • Several developments seem to indicate a trend to move away from stocks towards fisheries as basic management units	• Not easy to define • There are many fisheries. This would have large cost implications. It may even be impossible to develop indicators for all.
Stocks	• Many decisions (such as TACs) are currently taken at stock level • In principle, reasonably easy to define	• Stocks are not currently defined exclusively on biological grounds. • There are many stocks. This would have large cost implications. • Several fisheries exploiting the same stocks
Regional Advisory Councils (RAC) areas	• Direct link to the EU fisheries management system	• May be too large eg Mediterranean • Geographical areas of competence not clearly defined at this stage, although should be with time • Only the North Sea RAC is operational at present, although progress is being made on the remaining six
Marine Thematic Strategy (MTS) Eco-regions	• ICES and OSPAR are likely to move their 'boundaries' to match the MTS regions • Favour environmental integration	• May be too large

It should be noted that the differences between the RAC areas and the MTS eco-regions are not large. The main differences are that the whole Mediterranean Sea is covered by the Mediterranean RAC while the area it is split into three MTS eco-

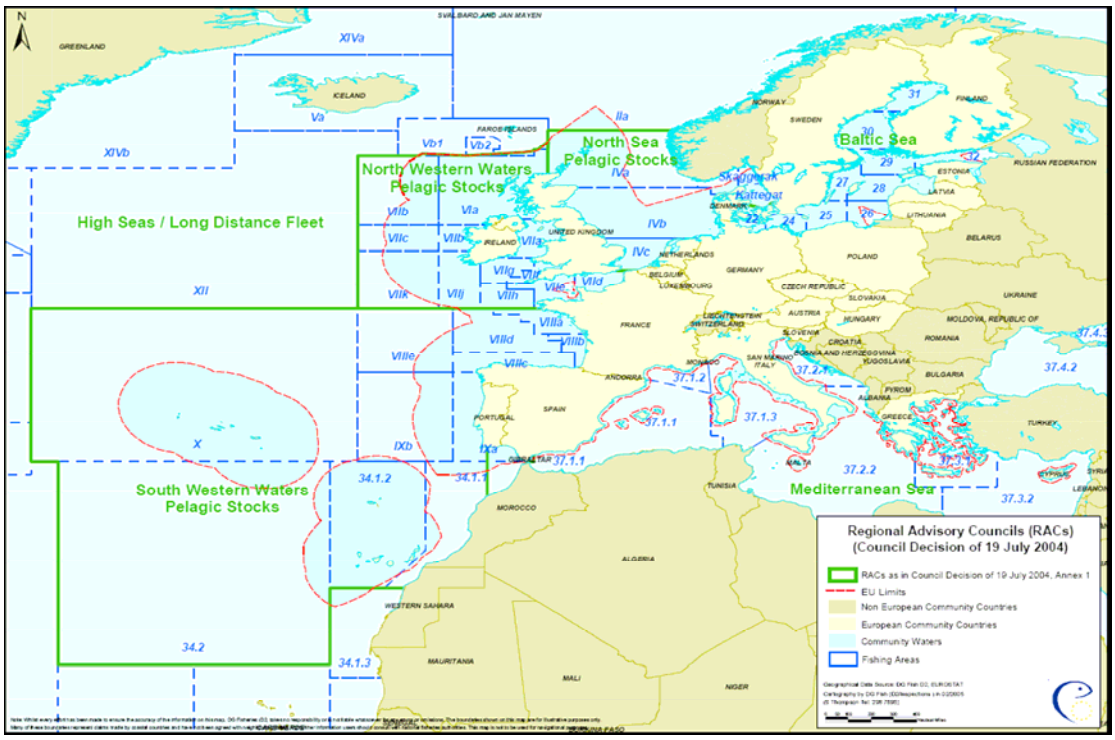
regions. The boundries between the North Sea and North Western Waters RAC.The Arctic and Faeroes Islands Eco-Regions and the Distant Water RAC are will not be relevant to INDECO.

The question we would like to put to the Advisory User Group is which option is preferable.

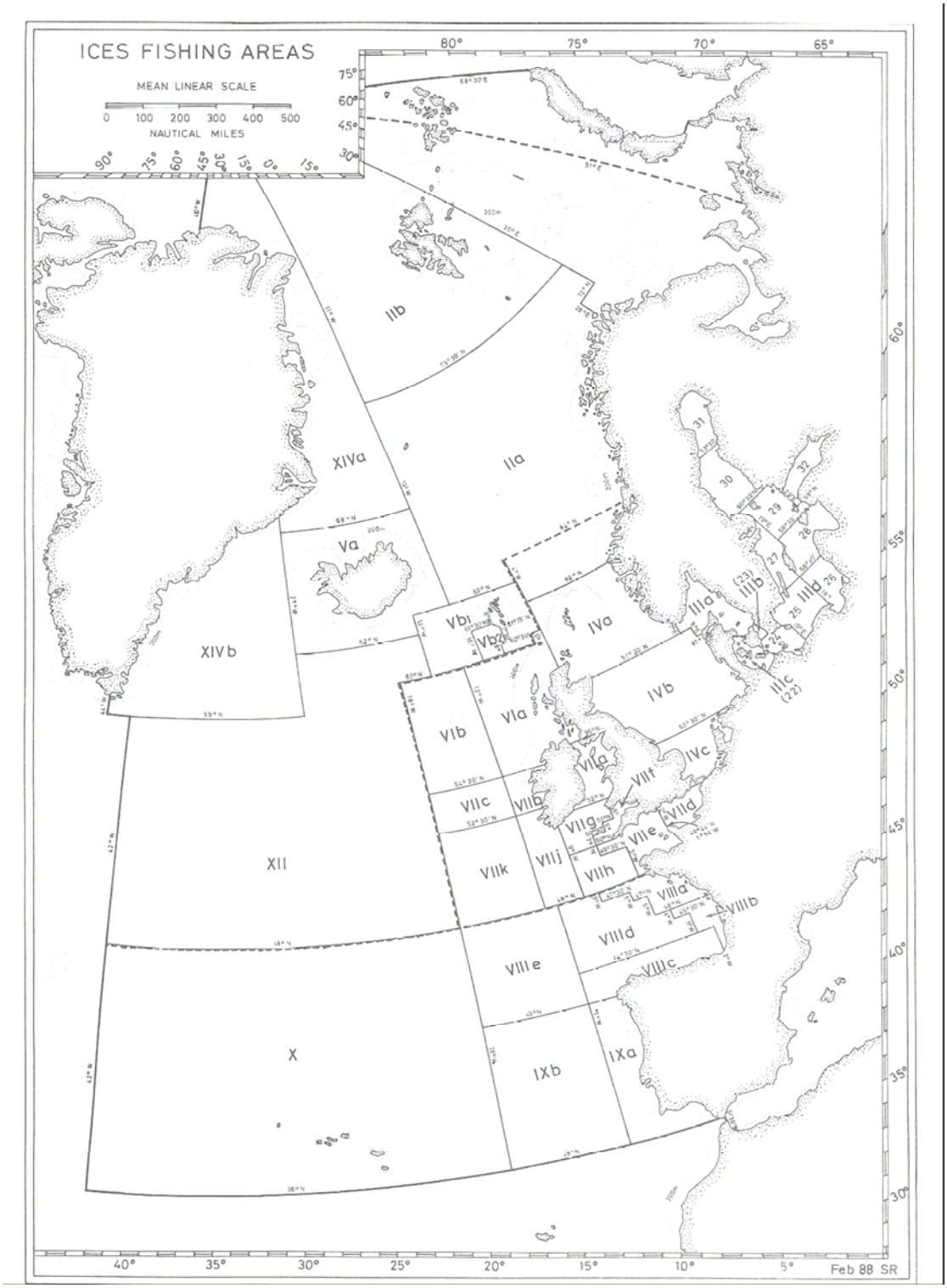
RAC boundries and overview map:

Name of the Regional Advisory Council	ICES areas, CECAF divisions and General Fisheries Commission for the Mediterranean
Baltic Sea	IIIb, IIIc and IIId
Mediterranean Sea	Maritime Waters of the Mediterranean of the East of line5°36' West
North Sea	IV, IIIa
North Western waters	V (excluding Va and only EC waters in Vb), VI, VII
South Western waters	VIII, IX and X (waters around Azores), and CECAF divisions34.1.1, 34.1.2 and 34.2.0 (waters around Madeira and the Canary Islands)
Pelagic stocks (blue whiting, mackerel, horse mackerel, herring)	All areas (excluding the Baltic Sea and the Mediterranean Sea)
High seas/long distance fleet	All non EC-waters

Source: Council Decision 2004/585



ICES areas


ICES FISHING AREAS
MEAN LINEAR SCALE
0 100 200 300 400 500
NAUTICAL MILES
IIb
IIa
XIVa
Va
XIVb
Vb1
Vb2
IVa
IIIa
IIIb (23)
IIIc (22)
IIId
IVb
IVc
VIb
VIa
VIIa
VIIt
VIIc
VIIb
VIIg
VIId
VIIe
XII
VIIk
VIIj
VIIh
VIIIa
VIIIb
VIIId
VIIIe
VIIIc
X
IXb
IXa
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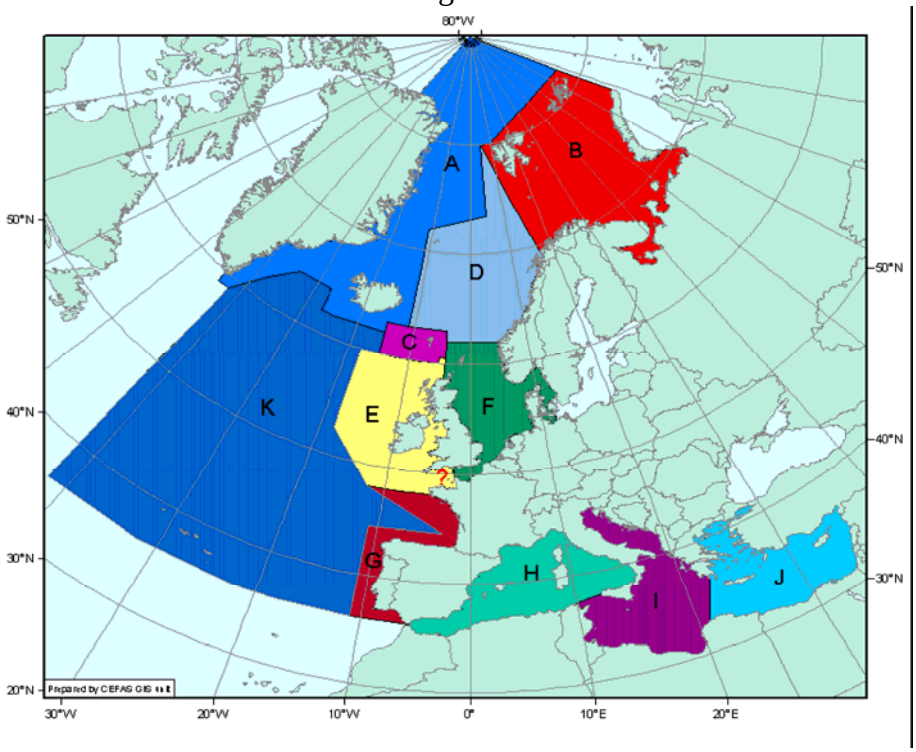
Proposed eco-regions for the implementation of the ecosystem approach in European waters.

The eco-regions are Greenland and Iceland Seas (A), Barents Sea (B), Faroes (C), Norwegian Sea (D), Celtic Seas (E), North Sea (F), South European Atlantic Shelf (G), Western Mediterranean Sea (H), Adriatic-Ionian Seas (I), Aegean-Levantine Seas (J) and Oceanic northeast Atlantic (K). Equidistant azimuthal projection. The question mark denotes the western Channel (ICES Area VIIe), which could be placed in either the Celtic Sea or North Sea eco-region.



Source: OSPAR, 2005

ANNEX 4: HOW TO DEFINE THE BASIC COMPONENTS? QUESTION POSED TO ADVISORY USER GROUP

As part of the INDECO outcome we consider to provide a series of 'component trees' as used in the Australian ESD framework. The aim is that these 'trees' would provide a guide or help in the identification of indicators. There is broad agreement that INDECO needs to consider three dimensions being the ecological, socio-economic and institutional dimensions. There is however some debate about how to define the components under the 'ecological' dimension. Two options are being discussed.

1. The first option is to identify 'utilitarian components'. They would then be four:
    i. Retained species;
    ii. Non-retained species;
    iii. General ecosystem impact of fisheries; and
    iv. Impact of the environment on the fisheries.

2. The second option is to identify 'ecosystem components'. A first set would then be defined on the basis of broad taxonomic groups such as:
    i. Fish;
    ii. Shellfish;
    iii. Crustaceans;
    iv. Mammals;
    v. Reptiles, etc; and
    vi. A second group of 'ecological dimension' components would then be situated at a more aggregate level such as habitats, communities or ecosystem.

Possible advantages of the 'utilitarian option' are that it is more directly related to the activity the indicators would help to describe and that this is also more directly related to the manner in which data are collected and processed. On the other hand the distinction between retained and non-retained species is not clear-cut. The 'ecosystem' option is probably more 'integrative' of the environment. However, it is not as explicitly linked to the activity (fishing) the indicators would help to follow. It does also not correspond to the current data collection and processing set-ups.

The question we would like to put to the Advisory User Group is which option is preferable.