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EUROSTAT'S ENVIRONMENTAL PRESSURE INDICATORS PROJECT

Paper submitted by EUROSTAT¹

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1. The growing concern of European citizens for the quality of their environment is a message which comes over clearly from opinion polls and the level of media interest in environmental matters. The Community's environmental responsibilities are substantial, both as the primary legislator for environmental protection and through the influence of its wider policies on the environment. These factors underline the need for an environmental information system which helps to measure progress in reducing the various man-made pressures on the environment.

2. In 1994 the Commission services issued a Communication to the European Parliament and the Council on "Directions for the EU on Environmental Indicators and Green National Accounts" (COM(94)670) which, among others, foresaw the creation of environmental indicators to balance the usual economic indicators.

3. Eurostat was charged with the development of a consistent and comprehensive system of environmental pressure indicators, to show the important trends for ten policy fields, based on the "themes" of the European Community's Fifth Environmental Action Programme:

- *Air Pollution,*
- *Climate Change,*
- *Loss of Biodiversity,*
- *Marine Environment & Coastal Zones,*
- *Ozone Layer Depletion,*
- *Resource Depletion,*
- *Dispersion of Toxic Substances,*
- *Urban Environmental Problems,*
- *Waste,*
- *Water Pollution & Water Resources.*

I. Identification of indicators

4. The first step is to identify the relevant indicators. Instead of the usual approach of asking politicians which indicators they want for policy purposes, the decision was taken to ask the scientific and environmental community to identify the most important issues for each of the above-mentioned policy fields.

5. A panel of 2300 European environment experts (the Scientific Advisory Groups, SAGs), consisting mainly of senior natural scientists from all 15 EU Member States, was consulted via survey in which they were free to identify any indicators which they felt were needed to cover the most important pressures on the environment. In a second survey, the experts were asked, inter alia, to select from the list of approx. 30 proposed indicators **five** indicators which they considered to be essential for describing the overall pressure in the respective policy field². On the basis of this survey, which included, among others, an assessment of the policy relevance and the

² For a more detailed description of the selection process, please consult the web site set up by the project team: <http://e-m-a-i-l.nu/tepi/>

responsiveness of the proposed indicators, and after consultation with statisticians and indicator experts, a set of 100 quantitative indicators covering these issues was defined, i.e. 10 per policy field. The indicators were ranked according to their perceived importance by the SAGs.

In general, there were no big surprises in the list of indicators which resulted from this process, it was similar to what would be expected if policy makers had been asked to produce a list, though occasionally the ranking is unexpected. For example:

- Water Consumption was ranked the number one pressure in the policy field *Resource Depletion*, ahead of Energy Consumption. This is for the European Union, most of which does not have a major water supply problem.
- For the policy field *Waste*, Landfilling of waste was seen as a more important pressure than hazardous waste.
- Under *Climate Change*, Emissions of NO_x and SO_x turned up in fifth and sixth position of importance, although the global warming potential of the indirect effects of NO_x are not yet quantified, and the cooling effect of SO_x is difficult to quantify. However in future, these will be replaced in the indicator list by the 'Kyoto' gases.

II. Overview table of the 60 indicators

Air Pollution	Emissions of nitrogen oxides (NO _x)	Emissions of NMVOC	Emissions of sulphur dioxide (SO ₂)	Emissions of particles	Consumption of gasoline & diesel oil by road veh.s	Primary energy consumption
Climate Change	Emissions of carbon dioxide (CO ₂)	Emissions of methane (CH ₄)	Emissions of nitrous oxide (N ₂ O)	Emissions of chloro-fluoro-carbons	Emissions of nitrogen oxides (NO _x)	Emissions of sulphur oxides (SO _x)
Loss of Biodiversity	Protected area loss, damage and fragmentation	Wetland loss through drainage	Agriculture intensity: area used for intensive..	Fragmentation of forests & landscapes	Clearance of natural & semi-nat.l forests	Change in traditional land-use practice
Marine Environment & Coastal Zones	Eutrophication	Fishing pressure	Development along shore	Discharges of heavy metals	Oil pollution at coast & at sea	Discharges of halogenated organic compounds
Ozone Layer Depletion	Emissions of chloro-fluoro-carbons	Emissions of bromo-fluoro-carbons	Emissions of hydro-chlorofluoro-carbons	Emissions of nitrogen oxides (NO _x)	Emissions of chlorinated carbons	Emissions of methyl bromide (CH ₃ Br)
Resource Depletion	Water consumption per capita	Use of energy per capita	Increase in territory permanently occupied	Nutrient balance of the soil	Electricity production from fossil fuels	Timber balance (new growth/harvest)
Dispersion of Toxic Substances	Consumption of pesticides	Emissions of persistent organic pollutants	Consumption of toxic chemicals	Index of heavy metal emissions to water	Index of heavy metal emissions to air	Emissions of radioactive material
Urban Environmental Problems	Energy consumption	Non-recycled municipal waste	Non-treated wastewater	Share of private car transport	People endangered by noise emissions	Land use (change from natural to built-up..)
Waste	Waste landfilled	Waste incinerated	Hazardous waste	Municipal waste	Waste per product	Waste recycled/material recovered
Water Pollution & Water Resources	Nutrient use (nitrogen & phosphorus)	Ground water abstraction	Pesticides used per hectare of agric.l area	Nitrogen used per hectare of agric.l area	Water treated/water collected	Emissions of organic matter as BOD

III. Data availability

6. The second step was to try to find relevant data for these indicators. Because of the difficulties of this, it was decided in the first place to restrict the exercise to the first 60 indicators of this set, six per theme, in the order of preference expressed by the experts in the SAG. Approximately one third of the indicators are available from data collected by Eurostat through regular activities. Other indicators make use of data gathered and processed by other international bodies, such as OSPAR and the European Environment Agency and its Topic Centres, which in some cases have been further processed treated by the international team of consultants for this project to arrive at a suitable indicator. In many cases the indicators shown are not exactly those identified as important by the SAGs, but rather a proxy, because of the lack of relevant data. An example is TX-2 *Emissions of POPs*, where only data for dioxins could be found.

7. Perhaps one of the most surprising results of this work is the lack of good, reliable data for the whole topic of land use. Variations on land use indicators appear in the policy fields *Loss of Biodiversity* (where all the indicators reflect the concern for loss of habitats as a result of changes in land use), *Marine Environment and Coastal Zones*, *Resource Depletion*, and *Urban Environmental Problems*. Apart from the Corine Land Cover exercise of the European Environment Agency, very little data exists. And Corine Land Cover (CLC) has so far been a one-off exercise, focused on land cover, rather than land use. It was carried out once, with the result it cannot be used to show trends, and was carried out in different years by different countries, over the period 1985-1995. The result is that some of the indicators show a 'snapshot' based on CLC, rather than a trend in land use. However because little else is available, both the EEA and the JRC have used CLC data in combination with other data to attempt to produce an indication of trends, with all the resulting uncertainties that brings. For lack of anything better, these have been reproduced in the first publication of these indicators (known as TEPI "Towards Environmental Pressure Indicators").

8. Trying to find data for the policy field *Urban Environmental Problems* proved almost as difficult. Although information for most of the indicators identified is available at national level, almost nothing is available at urban level. The result is that most indicators are based on national figures, and simply presented in units per capita.

9. Similarly difficult situations exist for other policy fields, in particular *Marine Environment and Coastal Zones*, and *Dispersion of Toxics*.

IV. Data quality and transparency

10. Because the indicators presented in TEPI come from various data sources, many of which have not yet been harmonised, and which use methodologies that are not always well-established, a "semaphore" coding of the quality of the indicators has been adopted. The quality of the indicators was assessed for four categories, using several criteria for each category:

- **Relevancy** refers to the closeness of the operational definition of the indicator to the environmental problem to be measured (as formulated by the SAGs), the methodology chosen and the relevancy of the breakdown published.

- **Overall accuracy** represents issues such as comparability of data, reliability of data sources, coverage of the indicator, reliability of the methodology used and whether the results could be validated (e.g. sensitivity analysis; confirmation through other data or approaches).
- **Comparability over time** deals with the completeness of the time series and the consistency of methodology used over time.
- **Comparability over space** relates to the number of Member States that are represented in the indicator, the use of the same or similar methodologies by countries, the geographical coverage and reliability of data within the countries.

For each of the indicators, a quality "semaphore" is presented as below :

Relevancy: Red	Accuracy: Yellow	Comp.Time: Green	Comp.Space: Green
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where Green indicates no major problems with the indicator and Red means there are major reservations about this indicator. These quality criteria serve not only to caution the reader, but also to provide a means for project transparency, describing the present state of the project (data, procedures), and forming the basis for improvement.

11. Over time it is hoped that the quality of all indicators will be improved in terms of coverage and/or sectoral breakdown. For some of the indicators new data sources are presently under development. In many cases this may prove to be a major leap forward. A few indicators, however, require significant data collection efforts and methodological work in the short and medium term, if they are to reflect the real pressure adequately.

V. A short reflection on indicators and their use

11. Although the first TEPI publication forms only a snapshot of work in progress and many improvements still need to be implemented, Eurostat hopes that the indicators presented will open a discussion between data providers and indicator users on priority setting for environmental data collection, leading to a better understanding of the need to invest in better data collection systems, if the policy makers needs are to be met.

12. Statistics measure the real world with the highest possible reliability and sensitivity. Aggregated indicators, as presented in this report, differ from statistics as they serve different purposes (communication, macro-evaluation). In general their sensitivity need not be as high as that of statistics (but should nevertheless be as high as technically and economically feasible). As long as indicators really indicate what they are meant to indicate, they function well.

13. In this respect this project should serve several purposes:

- to fill in gaps of knowledge and insight.
- to provide comparisons between Member States that up to now were not possible.

- to provide the basis for further discussion and methodological developments.
- to provide added value to the results of many research projects.

14. The current debate in academic and scientific circles on methods to produce synthetic indices which would allow the various pressures to be weighted and aggregated into a single index, is being followed with interest. Depending on how this debate develops, a possible further development of this work could be the aggregation of the 60 indicators into 10 indices, one for each policy field, allowing a better comparison with economic indices such as Gross Domestic Product (GDP). The GDP index, even though criticised, is so well known and accepted that it is usually considered simply as an indicator. Building up indices, which then become common indicators, is the dream of many of those dealing with the environment.

15. This work will also provide an important contribution to the development of indicators for measuring the effectiveness of the integration of environmental concerns into different sector policies, (see paper on 'Integration Indicators'). This will require the breakdown of these environmental indicators according to the main economic sectors. This integration process is an essential part of progress towards a more sustainable society, reflected in the Amsterdam Treaty, and taken increasingly into account in European Union actions.

VI. For more information

For a more detailed description of the selection process, please consult the web site set up by the project team:

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16. This site is maintained in close cooperation with Eurostat by the team that produced the TEPI publication and provides a general introduction to the Environmental Pressure Indices project, with background documents and many useful links to related activities e.g. in other Commission DGs and National Statistical Services.

17. A second web site is situated at the European Commission's Joint Research Centre (<http://esl.jrc.it/envind/>). It is closely linked to the previous one, but focuses on the research aspects of the project, such as methodologies of aggregating the sixty indicators to ten Pressure Indices, linkages to economic and social indicators, and the potential to extend the current focus on pressures on the environment to "sustainability" indicators in the wider sense introduced by the United Nations Commission for Sustainable Development (UN CSD).

18. We hope that these web sites will become fora for the exchange of ideas and experiences, thus ensuring that the present work can be continuously improved through the feedback from readers and users.