AGENDA 21 FOR THE BALTIC SEA REGION

Baltic 21 Series No 13/98:

Indicators on Sustainable Development in the Baltic Sea Region

An Initial Set

The publication of this report in the Baltic 21 series does not imply an endorsement by the Senior Officials Group of that report. The responsibility for the content and the opinions expressed in this report lies solely with the authors

Contents

Preamble

The mandate to develop an Agenda 21 for the Baltic Sea Region, with the objective Sustainable Development, stems from the Heads of Government of the region and the meeting of Ministers for Foreign Affairs of the Baltic Sea Region, within the framework of the Council of the Baltic Sea States, including the European Union. Because of this, Baltic 21 comprises all Nordic countries and all other countries around the Baltic Sea. For the Russian Federation only the north-western part is included. The European Union is also a participant in the elaboration of Baltic 21.

Baltic 21 was officially launched by the Ministers of Environment in October 1996 in Saltsjöbaden and the Saltsjöbaden Declaration provides the terms of reference for the Baltic 21 set-up and process. In their back-to back meeting, the Ministers responsible for spatial planning in the BSR also decided to concentrate work on sustainable development, and in particular to integrate relevant activities with the Baltic 21 process.

Baltic 21 is a democratic, open and transparent process. It is steered by the Senior Officials Group (SOG), with members from the Governments of CBSS and the European Commission, NGOs, intergovernmental organisations like HELCOM, VASAB, International Baltic Sea Fisheries Commission (IBSFC), Nordic Council of Ministers and the international development banks (World Bank, EBRD, EIB, NIB, Nefco). All Baltic 21 documentation; back ground documents, SOG meeting reports, workshop reports, draft texts, are published on the Baltic 21 website (http://www.ee/baltic21).

The emphasis of Baltic 21 is on regional co-operation and on the environment and its bearing on economic and social aspects of sustainable development. The work focuses on seven sectors of crucial economic and environmental importance in the region. For each sector, goals and scenarios for sustainable development have been elaborated, as well as a sector action programmes including time frames, actors and financing. The responsibility for the sector work is distributed among the SOG members. The seven sectors and their lead parties are: Agriculture (HELCOM and Sweden), Energy (Denmark and Estonia), Fisheries (IBSFC), Forestry (Finland and Lithuania), Industry (Russia and Sweden), Tourism (Estonia**,** Finland Baltic Sea Tourism Commission) and Transports (Germany and Latvia). Work on the Baltic 21 initiative has involved some 300 persons in the region.

All sectors have presented their work in a sector report. The sector reports, and other working papers produced by i.a. VASAB, IFIs, the European Commission, Baltic Local Agenda 21 Forum and GRID-Arendal constitute the background for the integrated and comprehensive Agenda 21 for the Baltic Sea Region. These reports are however not an integral part of the Agenda 21 for the Baltic Sea Region. The Agenda has been adopted by the Council of the Baltic Sea States and will be reported to the Prime Ministers of the region at their next summit.

The need to develop indicators useful for monitoring progress towards sustainable development in the Baltic Sea Region was early recognised.
Work started in March 1997 and has been organised by the Baltic 21 secretariat with the assistance of a Swedish advisory group consisting of scientists, experts and consultants. A format for an overall reporting structure was developed by a consultant, Stockholm House of Sustainable Economy (Annex 2). The proposal was discussed at a workshop (Annex 3) and put forward to the Senior Officials Group, SOG. In the next step indicators for the sectors were developed by each sector (Annex 5) and for the overall goal by the secretariat. The indicators were analysed against the reporting structure (Annex 4) and a provisional list of common overall indicators was presented to the SOG (Annex 1). In order to acquire a more complete picture of the follow-up structure, the goals are included in Annex 6.

Apart from the "Summary and suggested action" part, this report is a compilation of earlier distributed documents. The objective is limited to substantiate the process and its results and to indicate a monitoring system in order to assist further work. Actual application of sustainable development indicators and reporting system will have to be developed and defined by the Baltic 21 follow-up process.

Ulrika Hagbarth
Baltic 21 secretariat

Summary and suggested action

Monitoring and monitoring systems

There is a need to report on the status of progress towards sustainable development in the Baltic Sea Region. Auditing tools must be found that can inform us whether things are improving or getting worse. This is usually done with a monitoring system.

A monitoring system should answer the question "What has happened?" The objective is to be able to follow the development and to assess the need for corrections and changes. The system must handle both a check of the procedure (actions taken) and the effects gained and will consist of several parts, where different actors can be responsible.

A basic element is to collect and supply data and statistics. To collect data is often a cumbersome and expensive process with low priority when decisions are made. The data are often provided by scientists, designated national/regional/local authorities etc. Often these bodies also compile and aggregate the data and match these compilations with the progress made to reach the goal, implement the activities etc. Another element is to assess the need for reactions and changes. This is often done by other bodies. The final important element is to report and inform about the result. This is a fundamental aspect addressing decision-makers as well as the public.

Indicators

A typical characteristic for useful indicators is that they are able to give information beyond the immediately detectable. Water transparency, as an example, does not only tell us how clear the water is but it is also an indicator on eutrophication. By aggregating data, indicators can also provide and communicate information in a more simple way than complex statistics.

One of the most well-known indicators is perhaps GDP. Changes in economy and human development have already been measured for a long time. Several actors put enormous efforts and resources in compiling this type of information. Examples are the Human Development Index (HDI) compiled by UNDP and the World Development Indicators reported by the World Bank. Big efforts are also made on a national level in order to comply with international requests i.a. data on emissions of CO_2. In the Baltic 21 process it is important to recognise and build on these valuable data-bases and existing experience. At the same time it is obvious that an adjustment of the methodology is necessary in a longer time perspective. As an example, the traditional way of measuring economic growth, GDP, is linked to classification systems of companies, such as the SNI- codes, which correspond poorly to the sector approach and to the way data on environmental effects are presented.

The global Agenda 21 comments specifically on the need for indicators in Chapter 40: "Indicators of sustainable development need to be developed to provide solid bases for decision-making at all levels and to contribute to a self-regulating sustainability of integrated environment and development systems"

Numerous activities can be found with the objective to develop sets of indicators for sustainable development. Several build on a concept developed by OECD concerning indicators on the environment, the so called "Pressure-State-Response" methodology.

This approach has been used and adapted by the European Environment Agency in their reporting of the state of the environment in Europe as well as by the work for the Nordic Council of Ministers. The UN-CSD set of sustainability indicators has been tested in several countries, but assessment and evaluation of the results is still going on.

Another way to approach this can be found at the local level. In Seattle, Strathclyde, Stockholm and many other places indicators on sustainability have been developed by the citizens. Perhaps these efforts today represents the most detailed experience of indicators for sustainable development. Often several of these indicators are of a local character and thereby difficult to apply elsewhere.

Empirically one can conclude that testing and assessing suggested new indicators takes rather long time. In order to have a system that can function on short notice it will therefore be important to select indicators where the systems for collecting data already exists. Since this might not be the "ideal" choice to give information on sustainable development new desirable indicators must also be pointed out.

Indicators and Baltic 21, the need for follow-up

With the Baltic 21 process important steps have been taken towards sustainable development in the region. One such step is that goals have been formulated and agreed to, in the seven sectors as well as in general. In the following process monitoring and follow-up of e.g. those goals is needed. It will be important not only to look forward on what must be done, but also to look backwards and try to answer questions such as: have we achieved what we wanted, have the actions decided been implemented and are we on the right track?

To monitor progress in Baltic 21, means for example to follow-up what happens with the progress towards the goals in a longer time perspective, by using indicators to describe the difference between the desired state defined by the goals and the current situation.

Developing a practical system for monitoring the sustainability goals requires time and effort. Several major elements are however already in place since an overall reporting structure has been suggested for Baltic 21, and since the sectors have selected their own indicators that can be developed further.

A good basis for continued work has thus been laid. The need for further refinement of the concepts and methodologies must however be recognised, and such efforts must not be underestimated. New indicators, better designed to give information on sustainability, must be developed and included. One such example is efficient use of materials, another is net primary production measured as amount of hardened surface.

Focus in this work has been on environmental aspects of sustainable development on regional and national levels. For a more complete system particularly indicators related to social functions such as employment, housing, urban stress, equity etc. must be added. Some other important element are also still missing: a check for data-availability, a more precise definition of each indicator, a decision on who should report what to whom, which time-series and base-years to be used, etc. Finally the

need for resources and long-term financing must be stressed even though the concept is to use already existing data to the highest degree possible.

Suggested action

As a first step, guidelines should be developed for the work described below. Those guidelines should be established in co-operation between sectors and the Baltic 21 follow-up process. After that, the analysis is carried out, and finally a report is presented to the appropriate decision-makers not later than during the year 2000. This means that the monitoring system could be in place by 2001.

Before the suggested monitoring system is operative further refinement and development of some of the chosen indicators is needed e.g. concerning which parameters to use for the key ratios. The methodology also needs some optimising and development of criteria, e.g. to handle that for some indicators there is an optimal and not maximal outcome. One of the most important activities yet to undertake is a data inventory in order to check that the system will work without too much effort needed for data gathering, and to assess the extent to which already existing procedures can be used, such as Dobris +3. Financial and man-power resources must be defined.

Decisions must also be taken on the reporting interval which may differ between and within sectors. Some indicators are reported more frequently than others, some need a longer time-scale to show any changes. This must be correlated to the decision-makers requests for information. Reporting intervals between 2-5 years might be appropriate. A base year must also be established, preferably (but not mandatory) the same year in all sectors and countries, e.g. year 1990 as has been suggested. Time must also be allowed for a short testing period before the whole system is taken in operation.

A few decisions of a more organisational nature are needed, concerning, for example, who is responsible for data collection for each indicator, sector and country and who will compile and assess the material? Would a supportive network of scientists be useful? A reporting hierarchy where e.g. the sector in each country reports to each sector leader who compiles and reports to appropriate decision-makers (SOG?) must also be defined.

Finally, the need to develop new indicators and to include social indicators etc. has to be addressed. This would be an on-going process and thus not possible to conclude before year 2000.

The indicators will give us information on the *effects* of our efforts for sustainable development but it will also be important to gain information on the actual efforts made. The efforts are found in the action programmes and thus another important part of the monitoring concerns the implementation of the action programme. Having a shorter time- perspective, this part will give valuable quick information regarding progress.

The follow-up of the action programmes could be done in a more simplistic and practical way, e.g. to make use of regular reports from each activity containing answers to a set of standardised questions such as: is the action started - ongoing or

fulfilled, which modifications has been made, budgets, actors, results obtained etc. This part of the monitoring system is not elaborated further in the document.

Annex 1

The provisional common indicators

Part 1- The provisional list

The following list of indicators is submitted to the SOG (February 10, 1998) with a view to constitute the core of an initial set of sustainable development indicators for the BSR. SOG is requested to adopt this list as a provisional list of indicators to be used to illustrate the transition to sustainable development in the BSR. Recognising the need for further developments and revisions, the set of indicators in this list should therefore be used for the initial follow-up and monitoring process required by the Saltsjöbaden Declaration. Elaboration and use of Indicators for Sustainable Development in the BSR is a process that will develop over time.

A number of further comments can be made, such as:

1. The indicators selected in this list are chosen from a much larger body of possible indicators, and represent areas where useful data exist or can be brought together with reasonable precision, and which correspond to meaningful descriptions of conditions/changes of importance for SD. More definitions and precision is required in many cases, including defining a base year, and some indicators may require more extensive work than others to develop and put into practice.
2. The indicators here are adjusted to, and grouped after, their correspondence to the structure of the Overall Goal and its "sub-goals", as adopted provisionally by SOG.
3. Indicators should preferably be built up as time-series.
4. The overall system of indicators, as presented in Paper SOG 4/9/2 "Baltic 21 Indicators - A First Outline" is accepted also in this paper.
5. Furthermore, this Paper only deals with Common Indicators, sector indicators are discussed in the sector reports.

Several of the indicators suggested here (but not all) are developed using the concept of sustainable development as a direction and not a state. The presentation of changes and performance of the indicators should be developed in such a way that their positive respective negative impact on sustainability is clearly visualised.

Below is the suggested list of common indicators, listed under their respective "sub-goal" of the Overall Goal. For clarification, some of the indicators are commented upon.

"A safe and healthy life for current and future generations"	
· Human Development Index (HDI)	*Comment:* As annually compiled by UNDP
· Infant mortality rate	
· Children in age group versus asthma incidents in same age group	
· Cities where the air quality meet WHO standards versus all cities	

"A (co-operative and) prosperous economy and a society for all"	
· GNP per capita	*Comment:* As more "sustainability-oriented" variations on the GNP/cap-theme become available and accepted, such as ISEW and other variations of "Green GNP-measures" etc, we assume that those will be introduced as complements.
· World Bank "Development diamond" (GNP/cap, life expectancy, gross primary enrolment, access to safe water)[i]	*Comment:* Composite index, developed and used by the World bank, that can easily be presented graphically.
· World Bank "Economic ratio diamond" (openness of economy, investment, savings, indebtedness)	*Comment:* Composite index, developed and used by the World bank, that can easily be presented graphically.
· Average income of poorest 20% of population versus average income of richest 20% of population	
· Regional trade versus total trade	
· Sale of green-labelled products as percentage of total sales	
· Turnover of companies with environmental management systems versus turnover of all companies	
· Value of green governmental procurement versus total governmental procurement	

"That regional co-operation is based on democracy, openness and participation"	
· Number of twin city arrangements in the region	
· Number of students in regional exchange programmes	
· National electoral participation	
· Internet subscribers	

"That biological and ecosystem diversity and productivity are restored or maintained"	
· Population sizes of threatened top predators in the Baltic Sea (seals, sea eagles, guillemots) versus biologically safe populations	*Comment:* Indicator on ambient pollution levels in the Baltic Sea ecosystem.
· Number of threatened species (mammals, birds, higher plants)	
· Nationally protected areas versus total land area	
· Wetland area	*Comment:* Indicator on i.a. the ecosystem nutrient reduction capacity and on biodiversity.
· Hardened and built-up surface area versus total land area	

"That pollution to the atmosphere, land and water does not exceed the carrying capacity of nature"	
· Load of nitrogen and phosphorus to the Baltic Sea	
· Baltic Sea water transparency	*Comment:* Indicator on eutrophication status of the Baltic Sea
· Land areas where acidifying load is above critical levels	
· Population served by waste water facilities versus total population	
· CO2 emissions per capita versus global per capita mean value	

"Increased efficiency in the use and management of renewable resources, within their regeneration capacity. That materials flow of non-renewable resources are made efficient and cyclic, and that renewable substitutes are created and promoted"	
· GNP versus total energy use	*Comment:* Inversion of the normal energy intensity indicator.
· GNP versus total use of virgin minerals	
· GNP versus CO2, SOx and NOx emissions	
· GNP versus tons of waste generated	
· Energy consumption versus energy production	*Comment:* Indicator on regional self sufficiency.
· Virgin mineral consumption versus mineral exploitation	*Comment:* Indicator on regional self sufficiency.
· Use of renewable energy versus total energy use	
· Public spending on R&D on renewable energy and material substitutes	
· Areas where ground water levels are seriously reduced versus total land area	

Part 2- the framework

This document was submitted to SOG on December 12, 1997.

Introduction

In the perfect case we would like to develop an agreed core set of regional indicators for sustainable development, that could be used to monitor overall progress and indicate whether the region is on the right way or not. Obviously we do not have such a set of indicators, and it will also take some time to develop it. Perhaps this goal is never fully realisable, due to the inherent openness of the Sustainable Development (S.D.) concept. However, this may not necessarily be negative, S.D is and should be a dynamic rather than a static concept!

The general direction of S.D. is however clear - and reasonably agreed on - as can be seen from the formulation of the Provisional Overall Definition of S.D for the BSR. Our task is now to find or develop meaningful measures and indicators to monitor whether or not the development of our region is going in the direction - are we approaching the goal or are we receding from it?

In finding those indicators we can use two basic approaches - one "**ideal**" and one "**practical**". This paper starts a discussion along those two lines and outlines some basic issues and options.

In the **"ideal**" case we would like to establish a limited set of measures that translated the broad and sometimes abstract notions of S.D. for our region into clear and understandable measures. Only a few of those measures are yet possible to identify, and even fewer are yet possible to quantify. Sufficient information is simply not yet available, but will have to be developed. What we can do here is to indicate areas where such indicators would have to be developed. Some information is however already there on many of them, and this is the starting point for the other approach, the **"practical**" one. There, the point of departure is rather to put together what we have got and to do the best with available material.

In the "**ideal**" case, as a starting point for discussion, an indication of some of the areas where indicators would need to be developed is given in Table 1. In addition some "classical" indicators like GNP etc. are also included for completeness. This table thus illustrates some of the challenges that would face the monitoring system to be developed over time in the implementation phase of Baltic 21.

For the "**practical**" case, examples of indicators some of which can be reasonably quickly developed using existing information is given below . Some of those indicators may not always seem self-evident for measuring Sustainable Development, but represent a selection of what is available and could be used obviously many other suggestions are also possible.

Table 1.
Please note that this table is for illustration only! The areas indicated are only examples.

Goal	Possible areas where S.D.-indicators for the BSR may need to be developed	Comments
Overall and general	• Healthy economies • Strength of business communities and • Healthy and well-educated population • Attitudes towards S.D.-related political goals • Human Development Index • etc., etc.	
Economy and growth	• GNP, or variations such as ISEW, "Green GNP" etc. • GNP distribution between groups • environment-related investments • regional trade • regional economic and business co-operation • Environmental and S.D.-related performance by the business sector • etc., etc.	
Environment	• State of the Baltic Sea • state of the atmosphere, freshwater and soils • emissions from activities, to be reported by sector • CO2 emissions • use of CFC etc. • other pollutants • etc., etc.	
Natural resources	• Land use • Biodiversity, threatened species • State and use of renewable resources • Ditto for critical non-renewable resources • Recycling, waste dumping • etc., etc.	
Social considerations	• Life-styles and values • Build up of democratic institutions • Activities of S.D. related NGO's • state of S.D.-related legislation • harmonisation of relevant regulations • environmental education and research at different levels • etc., etc.	
Other	• Number of quantitative goals for S.D agreed upon in the BSR • relation to relevant EU-measures • etc., etc.	

A common structure

Indicators are empirical data or physical observations that translate and represent abstract notions and relationships. Indicators are helpful devices for monitoring change and for providing us with a base for evaluating whether the direction of changes occurring will lead to sustainability, given the goals that have been established.

The paper discusses tentative areas of indicators for monitoring ecologically sustainable development in the Baltic Sea Region (BSR). The emphasis is on the environmental perspective which means that indicators for health, economy and co-operation are chosen with this delimitation. For a "true" sustainable development , however, environmental aspect have to be inter-linked with social and economic aspects. Furthermore, many of the proposed areas for indicators needs to be more

investigated and developed before they are operative. The indicators must also be collected, analysed and evaluated and a system for this needs to be elaborated. Finally, this is a process where a constant review is necessary.

Several sets of indicators for sustainable development have been developed in different international fora such as OECD, UNEP-CSD, EEA (partly), World Bank (partly) etc. When reviewing these efforts it has become clear that most of them are not yet in an operational phase. In the process of creating an Agenda 21 for the BSR it will be necessary to use indicators both at a more general level, such as access to health care, as well as more specific in the sector(s), such as exposure of pesticides.

In the Baltic 21 process a workshop on indicators was held June 3-4 1997, where a framework for defining indicators was presented to the participants. After some discussion the workshop agreed that a number of different indicators could be used depending on the goals for sustainable development. Some goals may be qualitative and indicators may primarily be used to indicate changes or direction of change. In other cases goals might be expressed in absolute terms, such as no exceedence of critical loads or critical levels in the environment or concerning health. In such cases appropriate indicators should be used reflecting progress in meeting such sustainability limits. Similarly the sectors should develop sets of indicators relevant to the goals used in the respective sector some of them being, of course, sector-specific.

A proposed format for the indicators can be found in "Use of indicators in an Agenda 21 reporting system for the Baltic Region. A preliminary outline." This paper and a report from the meeting can be found on the Baltic 21 homepage.

In this first step in the process areas of indicators are presented below. These areas will be used as an input to the cluster-approach to be elaborated later. The clusters will primarily be based on the indicators proposed from the sectors. A comprehensive monitoring system consist of indicators, but also of other elements such as data collection, data reporting, data analysis, reporting periods, financing etc. If requested, these elements can be developed in a second step.

It is necessary to handle sustainable development indicators for the Baltic Sea Region in a systematic way. The system now proposed has the following properties:

* The system should have a gross information approach which means that a wide variation in the data collected is accepted and without ambitions to find standard measurements procedures. Different parts and sectors of the region are not expected to deliver exactly the same kinds of data, but the set of data chosen should be consistent over time.

* To handle this substantive variation, an overall standard of format is needed, which says that indicators are built to show positive trends with rising curves and negative trends with decreasing curves. With such a system it is easy to spot warnings signals. The basic information unit in the reports will be key ratios.

* Indicators for common goals will be of different types, one type showing the direction or change and one type showing hard data, either as "stand-alone" or in

relation to other data. As an example, if we choose life expectancy as indicator of a direction we would agree that a change towards longer life times is desirable but that there is less need to compare the actual figures between the different countries and that we don't know the actual goal, for how many years is it desirable to live. An indicator on acidification is an example of the other type and would show exceedance of critical load or emissions, i.e. "hard data".

*It will probably be difficult to obtain data for many of the goals and where such data exist they may not be comparable or show "exactly" what is asked for. It is therefore suggested that the Baltic 21 process use clusters. In this context a cluster consists of several or many indicators with various degrees of relevance and various qualities from a measurement point of view but chosen in such a way that they together give a broad indication of the trends over time.

* Indicators will, wherever possible, be selected where data are already or could soon be made available from other sources in order to avoid additional requirements.

*A base year must also be established, but it can be different for different indicators and different countries.

…and possible areas of indicators

In order to start the monitoring process of following up the common goal, indicators are needed. The agreed working definition of the common goal include six sub-paragraphs which are referred to below. The two last sub-paragraphs concerning "efficiency in use and maintenance of renewable resources", and "materials flow of non-renewable resources "will be referred to jointly. It must be emphasised that possible indicators for the three first areas, health, economy and co-operation are chosen from an environmental perspective. Economic development aspects can i.a. be described with classical but "non-innovative" data such as GDP and Human Development Index or with another "greener" approach such as ISEW or with indicators from the survey "Nordic Business Barometer"(in Sweden performed by Gothenburg Research Institute). This survey can give indicators on Company Management values and attitudes in large companies as well as indicators on company environmental activities. The lack of social indicators (concerning i.a. employment, housing, urban stress, equity, etc.)must be addressed in a next step. In addition, some of the suggested indicators do not obviously fit in the overall goal but are still found to be valuable for monitoring sustainable development. Finally, it is sometimes difficult to refrain from using more sector-specific indicators at this common level.

Following are areas where it might be possible to find useful indicators and also indicators that are possible to evaluate further. Some might need to be correlated to certain weather conditions (e.g. inflow of BOD, P,N to water bodies), some lack sufficient data today but will be developed in the future (e.g. recycling of material) but for other examples the lack of time or competence have been the restraint for further development.

In the work to develop the areas of indicators now introduced some concepts have been discussed that are very interesting from a sustainability perspective but where more development is needed. One example is a sustainable balance between urban

systems and surrounding ecosystems. In a sustainable balance the urban systems do not use resources or create waste etc. that cannot be integrated in the surrounding eco-systems. Another example is the use of biological primary production (mostly photosynthesis). Land area available for primary production can be measured by the amount of hardened surface (roads, buildings etc.) which can be estimated through satellite monitoring.

List of possible areas for indicators for Baltic 21

Health

Life expectancy at birth
Number of asthma incidences in children
Mortality rates by infants, youth, middle-aged and old
Lower respiratory infections
Radiation from radon
non-ionised radiation
(air pollution by WHO statistics)
Percentage of people with access to drinkable freshwater vs total population
Regionally produced food vs imported
Percentage of food for sale that meet the requirements for non-toxic contaminants in the food
Percentage of lakes with eatable fish
Amount of people not exposed for unhealthy levels of noise indoors
Percentage of population not exposed to health hazardous levels of air pollutants
Percentage of population with access to health services
Concentrations of Pb, Cd and Hg in humans
Percentage of population that has lakes or seas with hygienic conditions that allows swimming within walking distance.
Number of days with smog in cities
etc.

Economy

Price-relation between green-labelled products and equivalent products not labelled
Non-compliance with environmental regulations handed over to prosecutor
Indicators from the survey "Nordic Business Barometer"
Number of economic incentives that affect the producer and with a notable effect on the environment
Sale of green-labelled products as percentage of total sale
Percentage of companies with environmental management systems

Co-operation

Numbers of programs/projects internationally or bilaterally financed and implemented jointly by ministries in more than one country
Access to information - connections with Internet
Number of common databases for research, monitoring and public environmental management
Representation of major groups in national councils for SD
Number of organisations active in local Agenda 21-work
(Percentage of ratified global (environmental) agreements incorporated into BSR national legislation.)
Public spending on education in sustainable development
Number of twin cities
Students in exchange programs
Number of networks covering more than one sector
IT-projects between more than two countries

The Ecosystems

Number of seals, sea eagles and Guillemots in the Baltic Sea
Water transparency
Deposition of acidifying substances

Ground water levels
Percentage of protected areas
Changes in wetland areas
Number of restored threatened species, terrestrial and aquatic
Number of Baltic Sea fish-species above biological safe levels (spawning stocks)
Number of rivers where Baltic salmon can spawn
Emissions of SOx, NOx, CO2, CH4, VOC, Pb, Hg, Cd, PCB
Exceedance of critical load for SO2, NOx
Toxic blue-green algal blooms
Load of antropogenic organic compounds (pesticides, etc.)
Inflow of BOD, N, P, in water bodies
Reduction in the use of ozone depleting substances
Length of rivers not regulated vs total length
Km exploited/natural coastline
Number of permissions for peat-mining
Nitrate in groundwater
Land use
Area with old forests vs total forest area per river drainage areas
Deposition of Hg, Cd, Pb etc.
Population served by waste water treatment plant

Efficiency in the use of resources
Percentage of governmental procurement that is environmentally friendly
Public (company?)spending on research and technology development on renewable substitutes
Waste management vs GDP
Share of energy-use from renewable resources
Share of environmentally certified forest production area vs total
Percentage of agricultural land where ecological methods are applied
Percentage of renewable resources that are recovered and/or recycled (paper, sewage sludge, manure, household waste etc.)
Amount of waste generated in households
Reduction in amount of fertilisers used
Change in waste amounts and composition
Percentage of non renewable resources that are recycled (metals, glass, plastics etc.) vs total use.
Recycling of selected metals (Fe, Al etc.)
Use of P and heavy metals from new exploited and imported sources

Annex 2

A reporting system for the Baltic Sea region
- A preliminary outline

Stockholm House of Sustainable Economy May 23 1997
Professor Sören Bergström

Executive summary

A systematic way to handle sustainable development indicators for the Baltic region is outlined. The system should have the following properties:

- Sustainable development is captured as an economical logic
- The basic questions to be answered are about performance and results
- All parts and sectors of the region should not be forced to deliver exactly the same kinds of data. Questions asked may be answered in different ways.
- The basic information units in reports are key ratios.
- The system is kept together by stringent and systematic formal handling. Claims on formal rigor is put on data processing, key ratio definitions as well as reporting formats.
- Reports on parts and sectors, and the whole region should be consistent.

FIRST PART: GENERAL PRINCIPLES

1. Sustainable development is about housekeeping

There is a vast literature on the *sustainable development* concept. Common to most definitions is a split between the two words: *development* is an intention and to be *sustainable* is a restriction. From a sustainability point of view any development is problematic since the intentions at hand may guide behavior to override the sustainability restrictions. Add to that how seldom the restrictions are known and understood, and the historical fact that even well known restrictions get overridden because other (typically short run) criteria have priority. Agenda 21 is indeed a complex program.

1.1 Analysis of economical issues

The indicated structure of sustainable development as a problem to solve is by all means well known both in theory and in practice. All analysis of economical issues is done within the format *getting something attractive, given certain restrictions*. This is not tied to any specific measurement unit, such as monetary measures (which is the most wide-spread application). The economical structure of the problem at hand is the same irrespective of the goal (”something attractive”) and of how the restrictions are spelled out. In the case of sustainable development one should expect ”other kinds of measurement units” to be of profound importance. To be economical is to be good at housekeeping, which is true irrespective of the goals and the restrictions at hand.

If this interpretation of sustainable development is accepted, *sustainable* should be understood as a general structure in the restrictions at hand: resources should be used without being used up. *Development* is a matter of subjective judgment: A value basis is needed to clarify what is a good intention (”something attractive”, see above). Thus we have a neat economical model as our conceptual framework when operationalising sustainable development. This will show to be most useful.

In figure 1 the argument is summarized in a most generalised form. Sustainable development is modeled as conditions around an activity (”social system” in the figure). These conditions are possible to describe and they may be monitored by an Agenda21 reporting system using indicators.

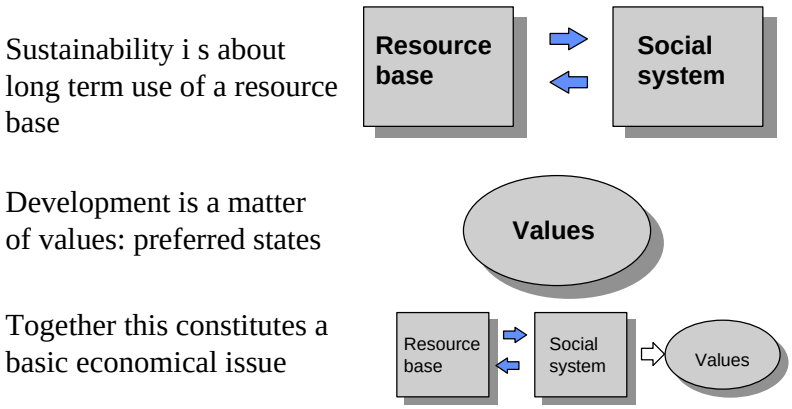


Figure 1: Sustainable development as housekeeping.

1.2 An economical logic

Now it has been shown - or at least claimed - that it is reasonable to handle sustainable development as an economical problem and, thus, to map the development situation in the Baltic region in an economical model (”as housekeeping”). We will make use of this when designing an Agenda21 reporting system. Such a system should, from an Agenda21 point of view, identify result aspects of structures and processes within the region.

Identifying result aspects is exactly the backbone of an economical logic. From a practical point of view ”economical” is to handle three challenges, which can be identified in any context and at any systems level, as long as one has an economical model in the outset. The challenges are:

- To move in the right direction, to be effective or frugal.
- To use as little resources as possible, to be thrifty or efficient.
- To watch sustainability, to have margins and security.

In figure 2 the three challenges are articulated as the kind of questions an Agenda21 reporting system should answer. It is also shown how these question relate to the economical model in figure 1.

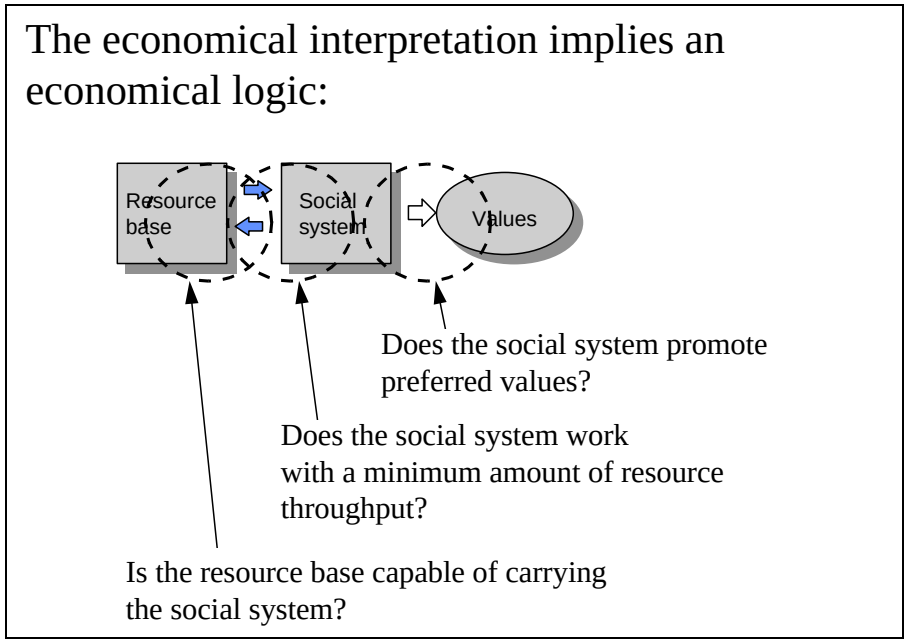


Figure 2: The economical logic spelled out as three questions. These questions can easily be derived[1] from the model of sustainable development as an economical problem.

The economical logic is the basis for order and formal rigor in the Agenda21 reporting system. It will be applied in comprehensive structuring and analysis as well as in the notion of details. In that way the system will gain certain qualities:

- The system will integrate information about various parts of the region, various sectors etc.,
- it will make it easy to comprehend large amounts of key ratios,
- it will support qualifying analysis of performance patterns, and
- it will be flexible enough to use all kinds of data within the region.

These points will be elaborated in more detail further down in this paper.

2. It is a heterogeneous region

The practical understanding of what sustainable development means varies within the Baltic region. Foundations in nature varies, population density varies and the historical situation is unique everywhere and indeed different between parts of the region. This implies that an Agenda21 reporting system must be capable to handle very diverse indicators. Still it should be coherent and integrated around well identified Agenda 21 issues. Questions, which are derived from those issues, should be put in all parts of the regions and to all sectors and action programs. The reporting system must, consequently, be flexible enough to accept different ways to answer the questions from different parts of the region and from different programs.

[1] In a later section of the paper this is shown technically. In figure 2 the relations are only hinted at.

2.1 Integration by way of unified format

What is said implies such a wide variation in the information content of the reporting system that it seems hard to identify any stable patterns or any organized way to interpret a comprehensive picture. The important thing, to avoid such trouble, is to relax any ambitions to find standard measurement procedures all over the region. Reports must be built on kinds of data which are actually available. Any practically working system must, as said above, accept differences in this respect. To be able to handle this substantive variation the requirement on *formal rigor* must be strict. By processing and presenting any ”piece of information” within a simple and unified format both interpretation, analysis and intelligible patterns will be accessible. In figure 3 this is summarized as an argument for ”gross” information over ”net” information.

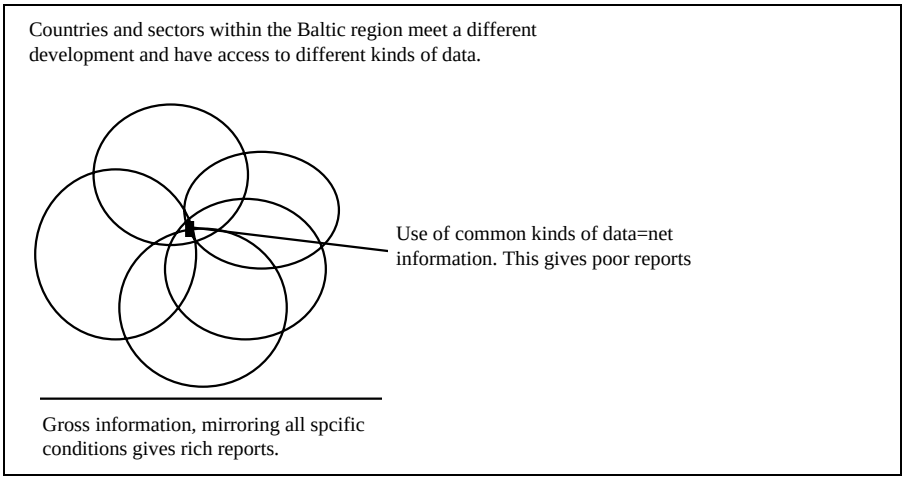


Figure 3: By using a rigorous format it is possible to handle gross information

From a process point of view this ”gross information approach” may show to be valuable too. Since development issues involves , first, a huge variation in the outset (as mentioned above) and, second, an uncountable number of stake holders, it seems close to impossible to come up to a decision about what the ”net information” should be. On top of that the gross information approach will invite anyone to use indicators which suits his own needs and (since others do the same) get a lot more information, primarily demanded by others. Nobody will have to fight over what measures should be handled as ”the objective” indicators of the Baltic region.

What is formal rigor , then, in this context? -It is to make things simple and easy to recognize. The point is illustrated in stylized way in figure 4, which shows 12 graphs on a page in a report. In a corresponding real case every graph has some technical information about scales, measurement units etc. along with it. The page with the graphs is typically used as a control panel, signaling important events. The question is: Which ones of the graphs are worthy closer examination?

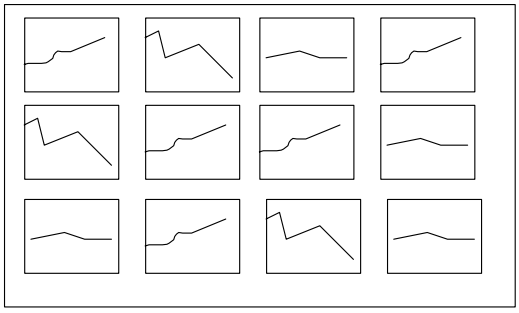


Figure 4

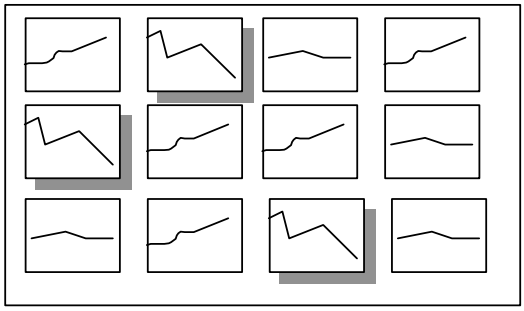


Figure 5

Since there is no specific formal system at hand, a reader must go down to the technical details to find out what might be signs of warning. This is laborsome and claims expertise in several fields. If, on the other hand a standard is set, which says that all measures are built to show positive trends with rising curves (and the other way around) it is easy to spot the three warning signals which are delivered in figure 4. In figure 5 they are marked with a shade.

It is in this case possible to go further in simplification of the subject matter: Since the function of the report page is to deliver signals about significant changes, and thus to set aside information which is within the expected range (or otherwise trivial), the above graphs can be represented by simple ”traffic light” symbols (red-yellow-green) or by mathematical signs as in figure 6

+	-	**0**	+
-	+	+	**0**
0	+	-	**0**

Figure 6: Explicit representation of the signals given in figure 5.

In this way an Agenda21 reporting system can be made open to flexible use of available indicators and thus build up ”gross information”, as discussed above.

2.2 Reporting levels

The argument for the gross information approach is not only based on consideration of actual differences within the region; it has its exact parallel in the monitoring of results from various sectorial programs within the Baltic 21 project. Any program should be assessed both in relation to the general Agenda 21 questions (see above) and in relation to the specific reasons behind the program. The formal requirements will be the same as when assessing the general state of the region and parts of it.[2]

[2] This remark points at an exact parallel to company group management: Companies within a group may differ from each other in any respect. Still the group management may have strategies enforced on all subsidiary companies and it may also have a comprehensive reporting about the group.

2.3 Key ratios to monitor change

As said earlier, the region consists of countries with very diverse historical conditions. Up till now the discourse in this section of the paper has been about the need for a gross information approach following from the variation. Here another point will be made: there is in practice little use of direct comparisons between countries (or programs) on the basis of absolute data. Poland is so much more densely populated than Sweden and the Polish population is so much bigger, that comparisons of population-related aspects (such as, for example garbage volumes) are completely irrelevant unless they are tied to population numbers. Such quotas will in the rest of this paper be referred to as *key ratios.*

If we stay with the Sweden/Poland example the argument may go a bit further: The Swedish representatives may feel more comfortable to relate their garbage volumes to land areas (since Sweden has a lot of land area) while it probably would please the Polish to make comparisons with the population as the reference. In this example it is obvious that data are available on both land area and number of inhabitants, implying that both kinds of key ratios easily can be reported as long as there are numbers on garbage volumes. The point is, however, that -to some extent- it does not matter which of the two key ratios one will have in the reports. They are equally good at indicating *change*. And since there is a fundamental lack of knowledge about which ”garbage level” -if measured the Polish or the Swedish way- that is compatible with a sustainable development[3], the interesting thing is the direction and pace of change.

To summarize: An Agenda21 reporting system for the Baltic region should use key ratios, indicating outcomes of relevance for a sustainable development. The system should benefit from a gross information approach and it should not enforce comparisons based on absolute measures.

[3] There is probably no such relation. The issue is much more complicated and other parts of it have to be indicated too.

SECOND PART: TECHNICAL OUTLINE AND EXAMPLES

3. Agenda 21 reporting

Baltic 21 needs reporting relating to both the entire region and to parts of it as well as relating to development within sectors. See figure 7. This second part of the paper is focusing at this as an integrated system.

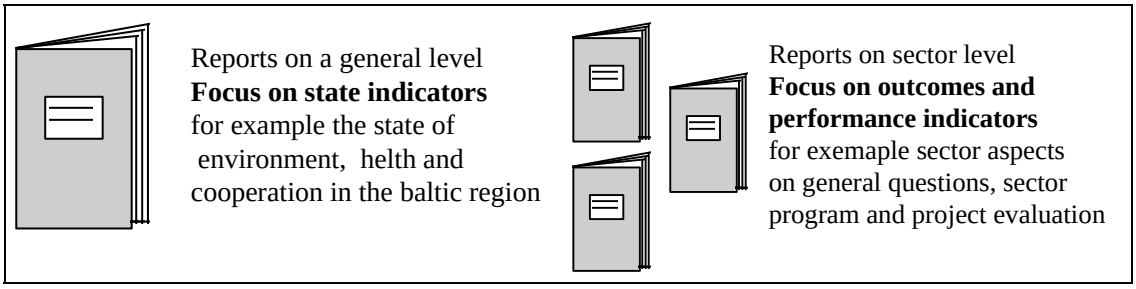


Figure 7.

3.1 Great effort or valuable outcome?

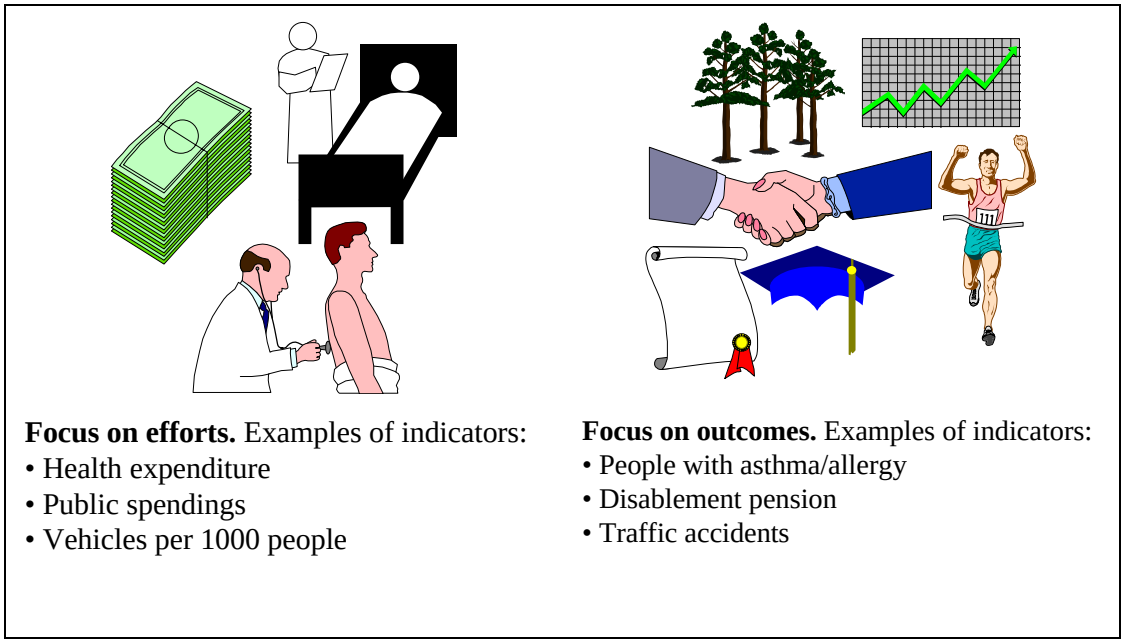


Figure 8: Health service efforts and health outcomes.

When reflecting on performance measurement it is of some importance to be precise about the performance concept. In figure 8 a quick illustration of the point is given. It is not uncommon to mix up ideas about result indicators with ideas about various kinds of resource input. Such a mixture come up easily since - especially in public administration - input amounts and output quality often are considered to be the same thing: More teachers per pupil in schools, more doctors per patient in hospitals etc.

The typical problem following such a way of thinking is effort maximization as the operative strategy. -Which always is expensive.

With the school and the hospital as illustrative reference, we may claim that focus on results would be to indicate whether the pupils did gain knowledge and whether the patient got cured. The indicators may also be put further away from the teaching/curing processes and focus on (for example) if the pupil have had any personal gain from mastering the new knowledge or if the curing rate at the hospital is matching the medical needs in the surrounding society. When expanding the argument this way the link to the initial process (teaching/curing) become both vague and conditional. Performance concepts are always open to dispute.

Exactly this ”openness” in performance concepts is a reason behind the widespread use of technical documentation as a surrogate for result measurement. In industry standards like the ISO 9000 for quality management and the ISO 14000, BS 7750 and EMAS for environmental management proves the case. ”Performance” is then captured as a description of technical procedures but little is said about the actual outcome.

A basic quality in Agenda21 reporting is thus a *result orientation* in all parts of the reporting system. Whenever possible the system should monitor outcomes and avoid reading input efforts as signs of results. Performance reporting is often used to guide decisions on the proper effort level. This is important but rather trivial. The much more problematic use of performance reports is when signs of misguided efforts and needs for completely different action programs come to the fore.

3.2 Quantitative historical records

Performance reporting should be kept separate from the design of programs, or - put more generally - from problem solving. It is often tempting, when trying to develop a good performance assessment, to focus on action instead. That is positive and constructive. ”Let us look ahead...!” The sole ambition in this paper is to build a proper foundation for good quantitative historical records related to the Baltic 21 project. Data in reports should indicate whether there is a sustainable development going on within the Baltic region or not. The argument so far is summarized in figure 9.

	Looking ahead	Looking backwards
Design orientation	Problem solving	Technical documentation
Result orientation	Scenarios etc.	Performance reporting

Figure 9. This paper is focusing the lower right corner in this matrix. A good performance reporting is a condition for any qualified problem solving.

3.3 Agenda 21 criteria

Life expectancy at birth as an indicator of good health, as used in the World Development Indicators system, is easy to agree upon. See the following table. But which level is good enough?

Life expectancy at birth:

	Males, years		Females, years	
Country	1970	1995	1970	1995
Denmark	71	72	76	78
Estonia	66	65	74	76
Finland	66	73	74	80
Germany	67	73	74	79
Latvia	66	63	74	75
Lithuania	67	63	75	75
Poland	67	67	74	76
Russian Fed.	n.a.	58	n.a.	72
Sweden	72	76	77	81

Source: World Development Indicators 1997, The World Bank

Agenda21 reporting implies scales of values, i.e. a possibility to identify degrees of success. Consequently one must decide on what is good and what is bad. Reports would not be intelligible if there were no indication of which direction is the right one. There may also be a demand for statements of minimum requirements and the like.

Generally one should expect that within a very centralized and hierarchical organization, the central management decide on both what aspects are relevant to consider as performance criteria (the scales) and how much should be claimed as accepted outcome (the goals). This is true, but it is not the actual conditions in the Baltic 21 project.

3.4 Performance requirements should not be built into the system

In the Baltic 21 context performance indicators can, and probably will, be clarified half way within the reporting system. Most of the relevant scales can be decided upon. It is fair to claim that a longer expected individual life is better than a shorter and that lower unemployment rate is better than higher etc. But if the system also includes formally set level requirements one should expect (at least) two fatal problems:

- Countries/regions/sectors where actual performance is far below the minimum level will not accept the relevance of the measure. This will undermine the legitimacy of the scale and eventually of the whole reporting system.

- Countries/regions/sectors where actual performance is far above the minimum level will lose interest in the whole matter, which will have similar consequences.

From this one should conclude that, to the extent it is practically possible, claims and conclusions should be left to the users of the reporting system. It is up to the political body (etc.) to decide whether to be content and satisfied with actual outcomes or to consider the state of things as an argument for inducing changes.

4. Design of key ratios

4.1 All key ratios are economical

Economical measures typically have the property of showing something worth having. Key ratios are then designed with something attractive in the numerator and a sacrifice in the denominator. Numerically such key ratios get a higher number when things go better; in a times series representation a growing curve is showing a favorable development.

If this principle (to build key ratios economically) is followed strictly one gets the kind of comprehensive reports which were discussed in section 2.1, above. A reader (”a layperson”) does not need specific technical knowledge about measurement procedures (etc.) to understand what is interesting. Awareness is sharpened when established patterns get broken and especially when things go worse.

4.2 Key ratios display the economical logic

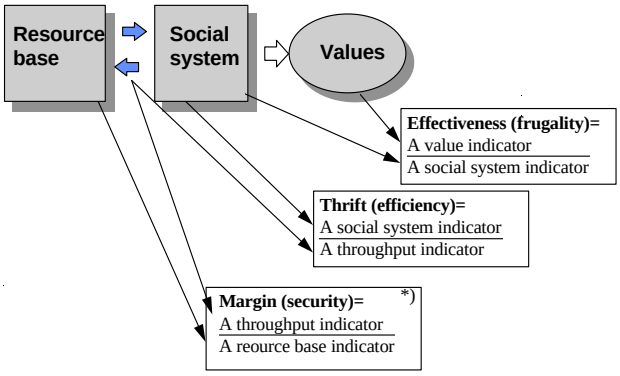
In section 1.2 it was shown that the economical logic for practical reasons can be identified as three kinds of challenges (see figure 2, above):

- To move in the right direction, to be effective or frugal.
- To use as little resources as possible, to be thrifty or efficient.
- To watch ones integrity, to have margins and security.

The three challenges are aspects of being economical, and thus aspects of an Agenda 21. They are technically related to the model of sustainable development as housekeeping (figure 1, above) in the following manner:

First, relevant properties of the Baltic region should be indicated by statistical measures. That is indicators on values, indicators on the focal social system, indicators on the resource throughput, and indicators on the resource base.

Second, key ratios are built up as shown in figures10 and 11. In section 4.3 the key ratio types are briefly discussed and illustrated.



*) This is one case out of many. Due to different structures in various resource bases, margin key ratios get different technical definitions

Figure 10: Formal definitions of key ratio types, as related to the basic economical model of sustainable development.

Economical aspect:	Formal definition:	Examples:
Effectiveness	$\frac{\text{A value indicator}}{\text{A social system indicator}}$	$\frac{\text{Employed people}}{\text{Working force available}}$ $\frac{\text{Inhabitans in cities able to reach city green areas within 15 min walk}}{\text{Inhabitans in cities}}$
Thrift	$\frac{\text{A social system indicator}}{\text{A throughtput indicator}}$	$\frac{\text{All inhabitans in the Baltic region}}{\text{Water consumption}}$ $\frac{\text{All inhabitans in the Baltic region}}{\text{Emissions of lead}}$
Margin*	$\frac{\text{A throughtput indicator}}{\text{A resourse base indicator}}$	$\frac{\text{People without asthma/allergy}}{\text{All inhabitans in the Baltic region}}$ $\frac{\text{People with access to safe water}}{\text{All inhabitans in the Baltic region}}$

* In practical use the margin indicator can be defined in other ways due to data available. In this examples we use the definition ”resourse quality”, see also below

Figure 11: The key ratio types. General format and some illustrative examples

4.3 Key ratios are read in clusters

An array of key ratios which illuminates a specific question is called a *key ratio cluster*. Within such a cluster the key ratios may represent various degrees of relevance and various qualities from a measurement point of view. The general lack of data, indicating ”exactly” what was asked for, demands this method. The cluster

method is also a pre-requisite for the kind of openness and flexibility which was discussed in section 2, above.

Figures 12 and 13 show clusters of (environmentally related) effectiveness and thrift key ratios in a Swedish municipality[4]. We have chosen these examples only of illustrative purposes. We have not been able to collect data from the entire Baltic region in this phase. The principles are the same but details have less relevance.

Key ratio name:	Trend at Municipality level	Trend at Northern part	Trend at Southern part	Trend at Eastern part
Public transports	**0**	**0**	**0**	**0**
Public service supply	**-**	**0**	**-**	**0**
Compost share	+	+	+	+
Waste sorting	+	+	+	+
Waste collection	-	-	-	-
Market share, environmental labeled products	+	+	+	+
Environmental education level	+	+	+	+

Figure 12: Environmentally related effectiveness key ratios in a municipality . **+ , 0** and **-** in the table indicates whether the trend is positve, neutral or negative. The left column shows the trend for the whole municipality. The three other columns show the corresponding trends in three geographical parts of the same municipality.

Key ratio name:	Trend at Municipality level	Trend at Northern part	Trend at Southern part	Trend at Eastern part
Waste thrift	+	+	+	+
Emission thrift, P	+	+	+	+
Emission thrift, N	+	+	+	+
Emission thrift, BOD7	**0**	**0**	+	**0**
Emission thrift, COD	**0**	**0**	+	**0**
Gasoline thrift	+	+	+	+
Diesel oil thrift	-	-	-	-

Figure 13: Thrift key ratios and outcomes in a similar cluster as that in figure 12.

Margin key ratios should always illuminate (if not answer) questions concerning the sustainability of the resource base; if the resource base in one way or another seems to be vulnerable, unreliable or unstable. Ecological qualities, carrying capacities and

[4] Clusters may get organised around economical aspects (as in the municipality examples), around strategical targets, responsibilities, certain resources, geographical areas, etc. One way to organise clusters does not exclude any other. In this way the basic indicators may appear in several contexts.

finiteness are typically demonstrated by margin key ratios. Since the eventual un-sustainability may have various origins the technical construction of margin key ratios differ too.[5] Figure 14 shows a few examples of margin key ratios from the same municipality.

Key ratio name:	Trend at Municipality level	Trend at Northern part	Trend at Southern part	Trend at Eastern part
Biofuel share 1	+	+	**0**	**0**
Biofuel share 2	+	+	**0**	**0**
Recycling share	+	+	+	**0**
Forest margin 1	-	-	-	-
Forest margin 2	-	-	-	-
Wetland share	**0**	**0**	**0**	**0**

Figure 14: Margin key ratios and outcomes put together as in figure12 and 13.

4.4 Key ratios describe a system

In the illustrations above trends were shown in several accounting units , i.e. a municipality and three administrative parts thereof.[6] To comprehend sustainable development in a practical and manageable way the accounting unit issue is important. The actin body, about which performance is reported, must be acknowledged. This necessity does not come out of interest in comparisons, negotiations or responsibilities, but out of the basic issue: *sustainable development is always about a specific social system*. That system may be extremely unrestricted (”humanity”) or abstract (”urban systems”, ”electronic solutions”, etc.), but it should still be acknowledged.

Within the Baltic 21 project several accounting units are of interest, sorted as regional levels and sorted according to sector concepts and subdivisions thereof.

5. How to benefit from being systematic

5.1 Integration of sectors

If questions are posed about resource efficiency within, for example, the transport and the energy sectors, it is most probable to get partly similar and partly dissimilar

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[5] Technically, there is *Resource base resilience* (To what extent is the resource base unaffected by the throughput?), *Social system exposure* (To what extent is the actual throughput part of a problem?), *Resource quality* (Which proportion of a resource comply to a standard?), *Resource balance* (Which is the relation between extraction /etc./ and regeneration?), *Resource time frame* (For how long can a certain throughput rate go on?), and *Limit margin* (How far are the carrying capacity limits?).

[6] In order to use this kind of signal system you have to decide upon certain parameters, such as time frame for recognising a trend and the sensitivity interval. Technicalities of this kind are not further commented upon here.

indicators from the sectors as answers. Each sector would create a key indicator cluster at its own premises to answer the question.

In what sense, then, is it possible to integrate information on resource efficiency from the two sectors? -In practice the information can be put together only in a rather trivial, but important, way: changes over time in one cluster is comparable to changes over time in the other. And the clusters can be read together as a comprehensive cluster over the joint transport and energy sectors.

That is all. It is seldom intelligible to compare absolute outcome levels on key ratios between sectors. After some years, when experience of actual levels is gained, ideas about what level to expect may emerge.

5.2 Comprehensiveness *and* variation

The rigorous (”economical”) format and time series as the primary signal to read, is a prerequisite for using simple tables with colour codes or +/0/- , as in the examples above. If the primary signals indicate problems the normal thing for the reader is to dig deeper, which is to investigate what is behind the signals. There are computerised applications of this kind of reports. If such software is used it is easy to ”trace signals backwards” when needed.

The ease by which a lot of information can be processed in this way gives room for a general generosity concerning any demand for using specific indicators in a field or otherwise for departing from other’s standards. As long as key ratios are kept together in clusters and those clusters are well founded in the Agenda21 for the Baltic region, no variation is really a problem.

5.3 Analysis of patterns

The economical logic, as presented in the introduction of this paper, points at several temporal perspectives. The three dotted circles in figure 2, when read from left to right points at, first, long term aspects of ”the household” and then aspects, which are relevant in successively shorter terms. In a report this is a basis for quick first hand analysis: If effectiveness key ratios show a favorable development while thrift and margin ratios are getting worse, the pattern can normally be interpreted as a sign of short-sighted ”cash-in” processes. If it is the other way around with a better development in margin ratios than in the others the interpretation points at a costly investment, where old habits are in the process of being abandoned.

In this way the reading of reports may be qualified and the key ratio language shows to be an analytical tool.

As a set of key ratios is used over some reporting periods it may - as mentioned above - be used normatively: responsible agents can express their satisfaction or dissatisfaction with current affairs by claiming outcome levels on certain key ratios, which are lower, equal or higher than the latest recorded level. In a similar way comparisons between accounting units may come about, as long as the same indicators are used.

To conclude: comparisons get a certain pattern from the economical logic. This is the general basis for analysis. Three kinds of comparisons are possible: with the same

unit at an earlier point in time, with normatively set goals (or outcome claims) or, when definitions are standardized, with other units.

Annex 3

Report from a workshop on scenarios and indicators

The workshop was held June 3-4 in Stockholm as a part of the ongoing work to develop an Agenda 21 for the Baltic Sea Region, Baltic 21. The meeting was focused on building up a system of indicators for measuring the change to a sustainable society. Scenarios as a tool was also discussed during the workshop, as well as criteria.

Conclusions from the meeting

In order to move towards sustainability in the Baltic Sea Region, a number of definitions of sustainable development need to be developed. One task for the seven sector groups in Baltic 21 is therefore to produce such definitions for each sector, in order to be able to make up criteria for such development. Definitions that are common for the whole region are to be taken care of by the Baltic 21 secretariat.

Also criteria for reaching a sustainable society must be set up. The work is divided the same way as for the definitions. Sector groups are responsible for their own fields and the secretariat takes care of the common ones.

A framework for defining indicators was presented to the participants. After some discussion the workshop agreed that a number of different indicators could be used depending on the criteria for sustainable development. Some criteria may be qualitative and indicators may primarily be used to indicate changes or direction of change. In other cases criteria might be expressed in absolute terms, like no exceedence of critical loads or critical levels in the environment or concerning health. In such cases appropriate indicators should be used reflecting progress in meeting such sustainability limits. The sectors should develop a set of indicators relevant to the criteria used in the respective sector. The secretariat should be responsible for developing common indicators.

All this work should be completed before the next SOG-meeting on 24-25 September.

Additional issues, highlighted during the workshop:
It is important to make clear what the different sectors define as their field. The forests group and the industry group must for example decide under whose responsibility the forest industry lies. The secretariat therefore requests each sector group to produce a short paper before summer on what they include in their sector.

In order to get started with the work on scenarios with the Polestar database, it is also crucial that all countries and sectors sends in the data asked for in the Polestar progress report 1.

Developing indicators on sustainability

Mr Sören Bergström from Stockholm House of Sustainable Economy made a presentation on creating systems of indicators.

Quality of the system lies in the questions, according to Mr Bergström. The report must answer the right questions in order to be useful. After the questions are posed, the rest of the work is mere technical. But before questions can be asked, decisions on what they should answer must be taken. Therefore the Baltic 21 process must start work on defining which parts of the society that are important to measure.

Mr Bergström stressed that the indicators needed in the work for Baltic 21 should mainly detect changes, to tell if the work is developing in the right direction.
He pointed out that it is not a problem that information could be difficult to compare, resulting from the fact that countries in the Baltic Sea region differs in size and rate of development. Dealing with only comparable data would give a meager result. Questions must be allowed to be answered in different ways in different countries and sectors.

Because of those differences the use of key ratios is relevant. Data is only valuable if compared to something. i.e. garbage volumes per capita or available land. Which sort of unit different sectors and countries uses is not that important, since it is the change that indicators should detect in first hand.

Neither is old data a problem. In new fields, as the development of a sustainable society, there are almost always hard to find good data. Even lack of data should not be worried about. As long as you have many indicators all these problems are possible to handle in a satisfactory way. Mr Bergström explained that clusters of indicators makes you less dependent on the quality of each single indicator. It is however important to be able to trace the data backwards, in order to understand any errors that may occur.

Another significant aspect concerning the indicators is how they are presented. Mr Bergström proposed an economic way of displaying the data collected with indicators. They should be constructed in a manner, so that all positive changes are shown in the same direction. In doing so the development is easy to understand, also for non-experts.

Due to the short time until the action plan should be prepared, the indicator system must build on work done by others. There are already a number of indicator systems, created by OECD, United Nations, European Environmental Agency, the World Bank and others. Work has been done trying to adapt these systems to work also in the case of sustainability. For example, the forest sector has already developed sustainability indicators in a pan-European framework

Many of the participants wondered about the amount of indicators needed. Mr Bergström gave examples, where some 30-40 indicators were used. Between 20 and 100 seems to be a reasonable amount for each sector. But he also stressed that the number of indicators ”per se” was not proportional to the degree of precision achieved.

Scenarios- a tool for making the right decisions

Lars Kristoferson from the Baltic 21-secretariat presented Polestar. the database meant to produce scenarios for the Baltic Sea region. It is what Mr Kristoferson described as a sustainability calculator.

Polestar is to produce reference scenarios for all countries in the Baltic Sea region, as well as for the region itself in the year 2030. The Scenarios show possible future development and provide help in finding the right policies to meet the goals of sustainability. Threshold levels of accepted environmental pressure are specifies externally and Polestar can then show how sectors and countries are developing compared to them. The database from which the scenarios are produced is now being prepared, based on data from 1995. The first reference scenarios will be finished in September and the full scenarios will be prepared in November.

In order to be able to develop these scenarios, the perspective of the development has to be narrowed down. Agenda 21 concerns not only environmental issues, but also the economical and social parts of the society. Polestar is not able to handle social and non-calculable issues and it is therefore stressed that the database is only a tool to investigate the effects of possible policies.

When the action plan for Baltic 21 is ready, the work will widen again as the implementation starts. At this stage both economical and social issues will have to be introduced, to complement and provide a framework for the environmental perspective.

The application of the Polestar system to Baltic 21 is still preliminary and additions have to be made. In the progress report from Polestar, there is a request to everybody to get in touch and provide additional data and criteria. Please contact Paul Raskin on fax + 1 617 266 8303 or e-mail: praskin@tellus.com

Work in the sector groups

The five sector groups present at the workshop reported on how their work advanced. Depending on how much had been done in their fields in advance, the sectors are at different stages.

Transport: The group is preparing criteria and goals for a sustainable transport sector. A workshop will be held in Berlin during the summer, where the goals and scenarios will be developed. A second workshop will take place in January 1998. Indicators in the transport sector will probably be connected with air pollution, noise and energy consumption. Also fuel quality, Public transportation and incentive policies i.e. taxes will be measured.

Forests: In the forest sector much work has already been done on a pan-European level. Key objectives and criteria for a sustainable development in the sector have already been set up. A draft of the sector report is planned to be finished in August and a workshop will be held in October.
There are six criteria for sustainable forestry concerning resources, ecosystems, forestry products, biodiversity, forests protection, socio-economic and cultural functions. The number of indicators used to monitor forestry varies between different countries.

Energy: The group will have their first workshop in June. Work is being done to get a picture of the present situation. From that scenarios will be built. As for now the following scenarios are planned: development without changes, a case with the effects of countries energy plans and a sustainable scenario. Two more workshops will be held in September and December.
Indicators on energy are currently focusing on consumption, but the energy supply issue will be included.

Agriculture: A workshop for the agricultural sector will be held in September, when scenarios will be finished. Collaboration with Swedish University of Agricultural Sciences will then have resulted in a progress report. The report includes definitions of sustainable development, scenarios and indicators. It will help the sector group decide how to reach its goals.
The agricultural indicators deal with the farming itself, i.e. usage of nitrogen and phosphorous. Institutional indicators might be added.

Industry: The group have two workshops planned, one in June and one in November. At the first workshop goals, criteria and indicators will be developed.
Indicators are divided into three groups, to analyse production, products and resources. Pollution and waste are measured, as well as recycling and usage of renewable resources.

Introductory presentations

To give a historical background Mr. Arne Jernelöw from Swedish Council of planning and coordination of research, made a presentation on the sustainable development concept and of the use of scenarios. He first stated that we do not know what a sustainable society looks like. We can only tell what is not a sustainable development.

Several attempts have been made to describe how sustainable a society is. Back in 1970 the bottleneck appeared to be lack of food and non-renewable resources. With the ”green revolution” it become possible to feed more people and the ideas had to be revised.

One problem with making scenarios is to avoid having a static view. Not even a low developed society as the one in the Bronze age was sustainable. It would survive for long time. but eventually its resources would also run out. But the Bronze-age people did survive, by developing in the Iron age. Today, as well as then, technology is maybe the key to a sustainable society.

Our society has few real threats. Since a nuclear war is less presumable today, it is the problem with climate change that is considered to be a major danger to human survival. Mr Jernelöw stated that sorting out which criteria that are essential to the survival, the hard ones, is important. The other criteria, the soft ones, are such which do not effect survival. They are only measures of what we mean with a good society.

The issues concerning implementation of a sustainable society vision was highlighted by Mr Dan Frendin, a consultant working with education and Agenda 21 in companies and municipalities. Indicators are good tools for finding the strategic path

between the present situation and the vision of a sustainable future. But he also stressed that common people must understand the indicators, in order to get them engaged in the work.

Mr Frendin also pointed out the importance of using a bottom-up perspective already in setting up the vision for a sustainable society.Implementation of the vision should be made at lower levels in society and it’s also important to start where the driving force is, in the concerns of people.

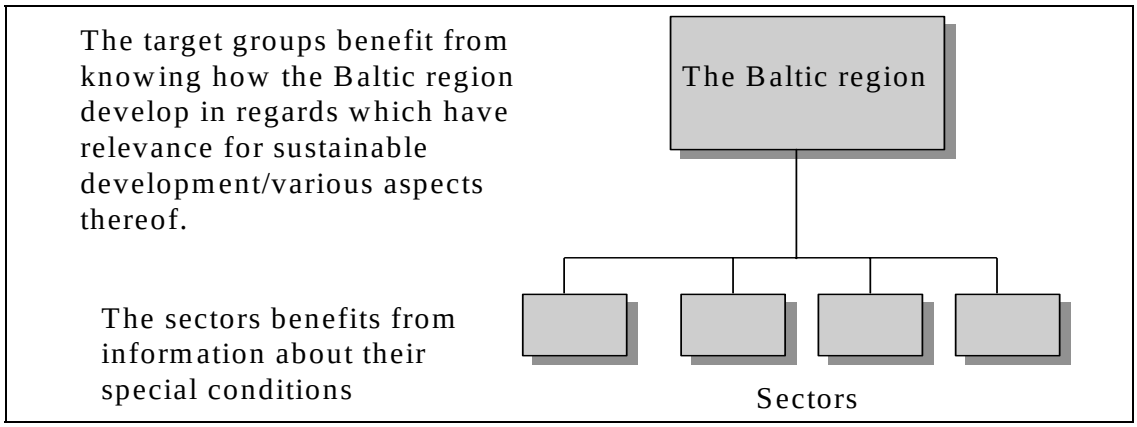
Mr Frendin concluded that the vision of sustainable society must be clear and easy to understand for non-experts. Otherwise it will be difficult to engage common people in the work afterwards.

Annex 4

Analysis of the system

By Sören Bergström, Martin Block and Jim Nilsson
Stockholm House of Sustainable Economy, January 26, 1998.

In the Baltic 21 project several goals for/aspects of sustainable development are identified. It is necessary to divide the concept sustainable development into smaller parts (aspects, sub-goals) to make it operational. If these goals are formulated as questions which target groups for the reports need answers on, the report system will communicate. It will also give a formal structure to the reports.



A primary concern when developing a reporting system is the identification of target groups. It is not solely in this phase of the development of the report system this is an important issue. A pedagogical and understandable graphical presentation is also essential to the final quality of the report. It is then important to identify the target groups and to analyse the their points of reference when interpreting numbers and figures.

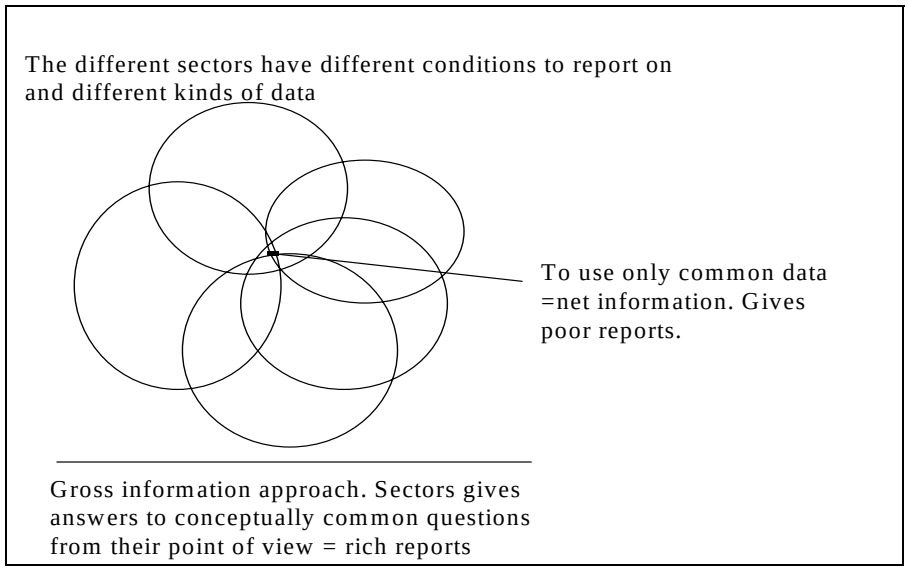
We have identified following groups and their possible needs that as the potential targets for this reporting system:

Target group:	**Needs/claims:**
Politicians (e.g. ministers)	Overview, trends, early warning signals, patterns and proposed actions.
The general public and the media	Concrete, understandable language, trends, metaphors, geographical representation.
Experts in various countries and	Scientifically correct, overall (total)

authorities	impression, distinct sources, conclusions, problem discussion and objective.

The target group "experts" calls for some comments in this case. The report system which is under development is addressing the concept of sustainable development, incorporating a wide field of expertise. That makes it necessary for each expert group to accept influence also from the other expert groups. It is hard to be an expert on all aspects incorporated in sustainable development.

This clarifies some of the problems with designing reporting systems for handling complex issues. Those readers who want to have an overview are dependent upon clear concepts and uniformity in the use of symbols. At the same time it is obvious that the sectors need other kinds of answers to make reports interesting and meaningful to themselves.



The problems which we address here are common to most of the national and corporate reporting systems and most often they are solved by narrowing data down to financial figures (GNP, turnover, profit figures etc.). The need for a gross information approach can also be motivated out of reading the common goals for sustainable development of the Baltic Sea Region:

Working Definition of the Common Goal - Revised version in accordance with the decisions made at the SOG4 meeting

Submitted by the Secretariat

Required action: For consideration

Sustainable Development of the Baltic Sea Region.

"The essential objective of Baltic Sea Region co-operation is the constant improvement of the living and working conditions of their peoples within the framework of sustainable development, sustainable development of natural resources, and protection of the environment." Sustainable development includes three mutually interdependent dimensions – economic, social and environmental.

This means for the region:

- a safe and healthy life for current and future generations
- a co-operative and prosperous economy and a society for all
- that regional co-operation is based on democracy, openness and participation
- that biological and ecosystem diversity and productivity are restored or maintained that pollution to the atmosphere, land and water does not exceed the carrying capacity of nature
- increased efficiency in the use and management of renewable resources, within their regeneration capacity
- that materials flow of non-renewable resources are made efficient and cyclic, and that renewable substitutes are created and promoted

The Baltic Sea region recognises its interdependence with other parts of the world and makes its contribution to the fulfilment of sustainable development goals at the global and European level. The BSR also recognises that all world citizens have the right to use an equal amount of natural resources and to emit an equal amount of pollution.

In Bergströms paper "Use of indicators in an Agenda 21 reporting system for the Baltic region. A preliminary outline" he gives a proposal to how this problems can be solved. The emphasis is on being very clear about which questions reports should address and being strictly systematic in showing in what respect the questions get answered in each sector. Each question (about health, economy etc., see above) has a corresponding *cluster* of key ratios as the answer. Clusters are thus conceptually well defined while the key ratios will vary between sectors. The systemic quality of the system relies on key ratios being defined in the same way and clusters are formulated straight from the goals. This methodology leaves us with a lot of interesting and relevant information and still the benefit of a good overview in reports. By scanning a lot of information which is presented in a unified format one is quickly able to sort out the good and bad sides of the outcome. The key ratios gives signals about the development, but it is important to notify that every outcome has to be carefully anlysed before any conclusions are made.

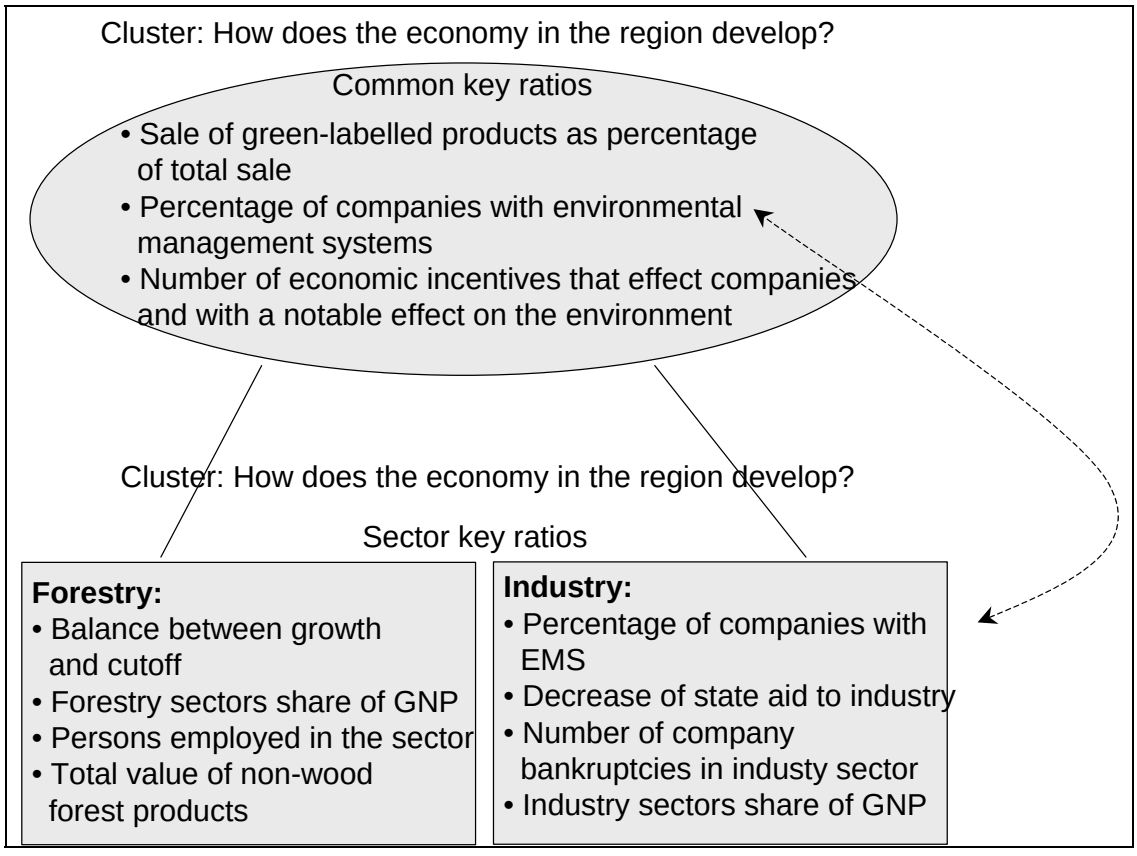
This discussion leads us to formulate the clusters for the Agenda 21.

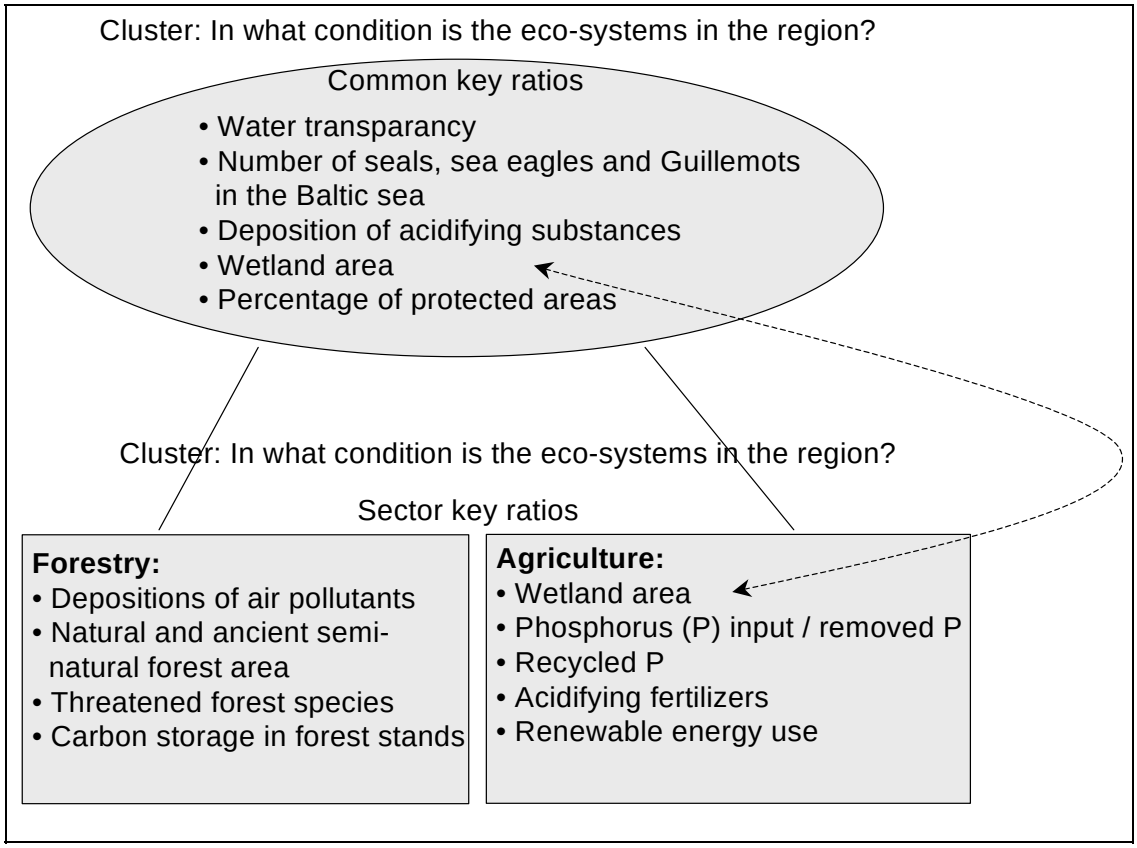
Clusters for Baltic 21 reporting system

There is a set of key ratios to monitor the overall development which is developed by the Baltic 21 Secretariat in Stockholm (see "Common indicators for sustainable development in the BSR"). In the future the intention is to also have selections of key ratios from the sectors as parts of the overall key ratio assortment. Each cluster correlates to one or two of the subgoals now under development.

1. Is health improving in the region?
2. How does the economy in the region develop?
3. Is the co-operation between countries in the region increasing?
4. In what condition is the eco-systems in the region and under which pressure is land, water and atmosphere from pollution?
5. Is the efficiency in the use of resources improving in the region and are renewable substitutes created, promoted and used?

This structure of the report system can be exemplified in the following schematic figures:





Note: examples of key ratios are provided by the groups responsible for developing key ratios in the sectors.

Screening of key ratios developed in the Baltic 21 project

Following is a screening of the key ratios developed by the Baltic 21 Secretariat and the different sectors. We have made a sorting and short analysis of the key ratios. The screening of the key ratios are made from four points of view.

1. Key ratios should fit into one or more of the clusters presented in the previous section. If they don't fit they will be put into a non-specified cluster named "Other" (=O). We have, to some extent, forced putting every key ratio into one of the five defined clusters, resulting in, in some cases, a need to suggest several options.

2. Key ratios should answer one of the following questions
   a. Does the society promote preferred goals? = Effectiveness (A) Such as incentives, regulations and goal accomplishment.
   b. Does the society function with a minimum amount of resource throughput? = Thrift (B). Such as use of energy and materials.
   c. Is the resource base and the eco-systems capable of carrying the society? = Margin (C). Such as use of renewable resources and biodiversity.

3. All measures (key ratios) should be built to show positive trends with rising curves (and the other way around).

4. All key ratios should be understandable and show conditions that are possible for anybody to relate to. (see earlier discussion about target groups).

The outcomes should communicate with a "layman" with a minimum of explanations.

The screening and classification of the key ratios are subjective and made exclusively from our opinions. This affects especially the classification in the table column "understandable".

A short analysis

In our suggestions and classifications of the key ratios obtained from the sectors all key ratios are built to show positive trends with rising curves (and the other way around). In reports other signals as colours and symbols can be used to make it easier for reader to interpret different key ratios. Most of the change suggestions we have made here are in the form of inverting numerators and denominators. Some alternative forms for key ratios are also suggested.

If we, then, sum up the screening[7], where key ratios are classified according to

a) six clusters (including the non-specified "other")

b) three theoretically defined types (effectiveness, thrift, margin)

c) Three levels of transparency or ease to get the point (clear, borderline case, difficult)

We now comment on the distribution within these classifications/typologies.

Distribution between clusters

Cluster #	Number of key ratios
1	35
2	41
3	7
4	68
5	47
Other	7
?	16
Sum:	**221**

From this we conclude that, except for cluster number 3 (*Is the co-operation between countries in the region increasing?*), the distribution is fairly even. At this gross level the selection of key indicators seem to be workable: If data availability is restricted in some respects, enough options should still be in place.

b) Distribution between economical types

Type of key ratio

[7] Our analysis is in some respects tentative, due to lack of time for exact classification of each key ratio. A refinement can easily be done if given due priority. Because of this the numbers in the following text may differ somewhat from "true" numbers.

Cluster #	Number of key ratios	**A**	**B**	**C**
1	35	6	12	17
2	41	20	6	15
3	7	7	0	0
4	68	2	10	56
5	47	1	25	21
Other	7	3	0	4
?	16	--	--	--
Sum:	**220**	**38**	**53**	**113**

As could be expected the effectiveness part is the most vulnerable if the number of key indicators get restricted. The Agenda 21 discourse is currently focused on environmental issues, which typically raise thrift (*Are resources efficiently used?*) and margin (*Are resources available?*) questions.

In the third cluster the pattern is reversed, and it should be: The co-operation issue is raised as a matter of effectiveness. In a later, and hopefully more mature stage of the Baltic co-operation the margin aspect will probably be pushed to the fore.

c) Ease of showing the point

All key ratios should be understandable and show conditions which are possible for anyone to relate to. We have classified the key ratios in three categories:

Clear = Understandable with some text for explaining the key ratio.

Borderline case = Hard to tell how difficult it is to understand the key ratio.

Difficult = The key ratio is definitely hard for a lay person to understand

The outcome was as follows:

Clear =	106
Borderline case =	51
Difficult =	25
? =	16 is not included

Once again we may conclude that the selection of key ratios seem to be workable. A closer examination may show if certain sectors or certain cluster have a larger part of the communicative problems.

Screening of common indicators as suggested by the Baltic 21 Secretariat

Key ratio as suggested by the Baltic 21 Secretariat	Suggested format to fit in reporting system	Type of key ratio	Under-standable	Sub-goal / Clu-ster
Infant mortality rate	Infant survival rate	C	Clear	1
Number of asthma incidences in children	Children in age group / asthma incidences same age group	C	Clear	1
GNP/Energy use	OK	B	Clear	5
GNP/CO2	OK	B	Clear	5
GNP/capita	OK	A	Clear	2
Sale of green-labelled products as percentage of total sale	OK	A	Clear	2
Percentage of companies with environmental management systems and their share of total turnover	OK	A	Clear	2
Number of twin cities	OK	A	Clear	3
Number of students in exchange programs	OK	A	Clear	3
Number of seals, sea eagles and Guillemots in the Baltic Sea	OK	C	Clear	4
Water transparency	OK	C	Clear	4
Deposition of acidifying substances	Limit value SO2 and NOx / measured value SO2 and Nox or/and Preferred pH in ground/measured pH	C C	Difficult Borderline case	4 4
Ground water levels	OK	C	Clear	4
Percentage of protected areas	OK	A or C	Clear	4
Wetland area vs. historic value	OK	C	Clear	4
Percentage of governmental procurement that is environmentally friendly	OK	A or C	Clear	5
Waste management vs. GDP	OK	A	Borderline case	5
Share of energy-use from renewable resources	OK	C	Clear	5
Public (company?)spending on research and technology development on renewable substitutes	OK	A or C	Clear	5
Recycled urban P, %	Recycled urban P / total inflow of P to urban areas	C	Borderline case	5
Population served by waste water treatment facilities		A	Clear	O

Screening of sector key ratios as preliminary indicated in sector reports

The fishery and tourism sectors are not included in this screening since no key ratios have been provided by the sectors.

Agriculture

The key ratios for "Economy of the farmer", "Social services in rural areas", "Communication structure", "Structure of population", "Balance between rural and urban areas", "Farmers competence" and "Public awareness" presented in the sector report are not analysed in this paper.

Key ratio as suggested by the sector	Suggested format to fit in reporting system	Type of key ratio	Understandable	Sub-goal / Cluster
Agricultural land/total land	OK	C	Clear	O
Agricultural land use	Fallow fields/total agricult. Land	C	Clear	4
Livestock farms/total farms	OK	C	Borderline case	O
LU/ha	Ha/Lu	B	Borderline case	4, 5
Environmentally certified farms/ total farms	OK	C	Clear	4, 1
Arable farms/total farms	OK	C	Clear	5
Farm number and size distribution	OK			O
Farms > 200 LU	Farms > 200 LU / total farms			O
Crop production MJ /capita	OK	A	Borderline case	2
Actual harvest / country potential	Same form but only for land in use	A	Borderline case	2
	Crop products MJ / human energy subsidies MJ	B	Borderline case	5
Animal production MJ /capita	OK	A	Borderline case	2
	Animal products MJ / human energy subsidies MJ	B	Borderline case	5
Energy crops ha / total arable land ha	OK	A	Clear	5
Industrial crops ha / total arable land ha	OK	A	Clear	2
Cd input / output	?	?	?	?
Cd, hg, Pb, Cu in top soil	Limit value for Cd, hg, Pb, Cu in top soil / Measured value	C	Borderline case	4
Use of low Cd fertilizers	Use of low Cd fertilizers / total use	C	Clear	4
Acidifying fertilizers	Non-acidifying fertilizers / total use	C	Clear	4
Soil pH	OK	C	Clear	4

Key ratio as suggested by the sector	Suggested format to fit in reporting system	Type of key ratio	Under-standable	Sub-goal / Clu-ster
Lime, kg / ha	?	?	?	?
Total P input / removed P	?	?	?	?
P in top soil	OK	C	Clear	4
Root depth	OK	C	Borderline case	4
Soil-mapping of P, K, pH	Soil-mapping of P, K, pH ha / total arable land	A	Clear	4
Recirculation of P	OK	C	Clear	5
Pesticide input / harvest unit	Harvest / pesticide input	B	Clear	4
Bio-activity in top soil	OK	C	Clear	4
Atm. deposition of S, N, heavy metals and toxic organics	Limit value / measured value	C	Difficult	4
Cd, ppm in W.wheat	Limit value / measured value	C	Borderline case	1, 4
Organic matter, %	OK	C	Borderline case	4
Grazing area /total agric. land	OK	C	Clear	4
Pastures and wooded pastures, ha	OK	C	Clear	4
Organic farming, %	Organic farming, ha/ total ha	C	Clear	4
Habitat alteration and natural land conversion	?	?	?	?
Threatened or endangered species	Threatened or endangered species year 1990 / Threatened or endangered species present year	C	Clear	4
Natural wetlands	Natural wetlands / total land	C	Borderline case	4
Natural wetlands, size of connected arable land	Natural wetlands connected to arable land/ arable land	C	Borderline case	4
Created wetlands	Created wetlands / total land	C	Borderline case	4
Buffer zones	Buffer zones / total possible zones	C	Borderline case	4
Water abstraction-irrigation	?	?	?	?
Total N input / removed N	Removed N / total N input	B	Difficult	5
Regulation on manure storage and handling	?	?	?	?
Nitrate leakage /arable land, ha	Arable land, ha / Nitrate leakage or Limit value / measured value	B	Difficult	4, 5
Restriction of substances	Restriction of substances / Restriction of	A	Clear	1, 3

Key ratio as suggested by the sector	Suggested format to fit in reporting system	Type of key ratio	Under-standable	Sub-goal / Clu-ster
	substances in EU			
Consumption of N fertilizers	Ha / consumption of N fertilizers	B	Borderline case	5
Consumption of P fertilizers	Ha / consumption of P fertilizers	B	Borderline case	5
P losses / arable land, ha	Arable land, ha / P losses	B	Borderline case	5
Disposal of pest. residues	?	?	?	?
Pesticide residues in water	Water / Pesticide residues in water or Limit value for pesticides in water / measured value	B C	Borderline case	4, 1
Protected water supplies	Protected water supplies (number of or production) / total water supplies	C	Clear	1, 4
Nitrate in drinking water	Limit value / measured value	C	Clear	1
Wastewater treatment coverage	Wastewater treatment coverage (people) in urban areas / total population in urban areas	A, (C)	Clear	1, (4)
Winter green cover, %	Winter green cover / total	C	Clear	4
NH3 emissions	Ha / NH3 emissions or Limit value / measured value	B	Borderline case	4
Covered storage, %	OK	C	Clear	4, 5
CH4 emissions	Ha / CH4 emissions or Limit value / measured value	B	Borderline case	4
Spreading & animal density regulations	?	A	?	2
Fossil energy, kWh/unit	Production (ton or ha)/ Fossil energy, kWh	B	Borderline case	5
Renewable / total energy used	OK	C	Clear	5
Recycled urban P, %	Recycled urban P / total inflow of P to urban areas	C	Borderline case	5
Amount of chemicals in use	Ha (or number of farms) / amount of chemicals in use	B	Borderline case	1
Environmental safety of chemicals in use	?	?	?	1
Cases of respiratory diseases/ total	Total farmers and farm workers / cases of respiratory diseases	B	Clear	1
Indoor climate of animal housing and farm buildings	Acceptable indoor climate of animal housing and farm buildings / total farms	C	Clear	1
Cases of muscular-skeletal diseases / total	Total farmers and farm workers / cases of muscular-skeletal diseases	B	Clear	1

Key ratio as suggested by the sector	Suggested format to fit in reporting system	Type of key ratio	Under-standable	Sub-goal / Clu-ster
Reduced degree of specialisation	Increased degree of diversification	C	Borderline case	1
Cases of infective diseases/ total	Total farmers and farm workers / cases of infective diseases	B	Clear	1
Consumption of growth promoters and veterinary antibiotics/LU	LU / consumption of growth promoters and veterinary antibiotics	B	Clear	1
Pathological abnormalities, %	LU / pathological abnormalities	B	Clear	1

Energy

Key ratio as suggested by the sector	Suggested format to fit in reporting system	Type of key ratio	Under-standable	Sub-goal / Clu-ster
GDP/Capita	OK	A	Borderline case	2
Average income of poorest 20% of population in relation to weighted price of energy for main services	OK	A	Borderline case	2
Actual emissions of NOx and SO2 in relation to local limit values (IIASA)	Local limit values (IIASA) / actual emissions of NOx (same for SO2)	C	Borderline case	4
Actual emissions of CO2 in the countries and the region	Energy supply in country (or region) / actual emissions of CO2 and Capita / actual emissions of CO2	B	Borderline case	4, 5
Regional and global average reduction goal in relation to IPCC global recommendations	OK	A	Difficult	3
Actual, annual use of resources seen in relation to regional reserve/50 divided by 50	(Regional reserves/50) / annual use of resources	C	Difficult	5
Nuclear power/former nuclear power	1995 nuclear power, TWh / nuclear power this year, TWh	C	Difficult	1,2,4
Net. Energy/pop	Capita / net. Energy	B	Clear	5
Net. Energy/Final energy	?	?	?	?
TPES/TFC	OK TPES=Total primary energy supply TFC=total fossil carbon and None fossil carbon / total carbon	B C	Difficult	5
CHP as % of electricity	OK CHP=combination heat and power	B	Clear	5

Key ratio as suggested by the sector	Suggested format to fit in reporting system	Type of key ratio	Under-standable	Sub-goal / Clu-ster
CHP as percent of heat	CHP-heat / total heat supply	C	Borderline case	5
EV's as percentage of total car stock.	OK	A	Clear	1, 2
RE/TPES	OK	C	Clear	5
RE/RE-potential	Renewable energy potential / Renewable energy	C	Clear	5
SO2/GJ input	GJ input / SO2	B	Borderline case	5
NOx/GJ input	GJ input / Nox	B	Borderline case	5

Forestry

Key ratio as suggested by the sector	Suggested format to fit in reporting system	Type of key ratio	Under-standable	Sub-goal / Clu-ster
Area of forest and other wooded land	Forest and wooded land / total land	C	Clear	4
Total volume of the growing stock	OK	C	Clear	2, 4
Mean volume of the growing stock on forest land (classified, if appropriate, according to different vegetation zones or site classes)	(Several ratios needed)	C	Clear	2, 4
Age structure or appropriate diameter distribution classes	(Several ratios needed)	C	Clear	2, 4
Total carbon storage and, changes in the storage in forest stands	Carbon storage forest stands	C	Difficult	4
Total amount of and, changes over the past 5 years in depositions of air pollutants (assessed in permanent plots	Limit value e.g. N / measured value (in permanent plots) and Ha / Total extent of pollution	C B	Difficult	4
Changes in serious defoliation of forests using the UN/ECE and EU defoliation classification (classes 2, 3, and 4) over the past 5 years	Ha forest classed in the best class / total ha	C	Difficult	4
Severe damage caused by insects and diseases with a measurement of seriousness of the damage as a function of (mortality or) loss of growth	Ha / severe damage caused by insects and diseases with a measurement of seriousness of the damage as a function of (mortality or) loss of growth	B	Borderline case	2
Annual area of burnt forest and other wooded land	OK	C	Borderline case	4
Annual area affected by storm damage and volume harvested from these areas	?	?	?	?

Key ratio as suggested by the sector	Suggested format to fit in reporting system	Type of key ratio	Under-standable	Sub-goal / Clu-ster
Proportion of regeneration area seriously damaged by game and other animals or by grazing	Ha / proportion of regeneration area seriously damaged by game and other animals or by grazing	B	Borderline case	2
Changes in nutrient balance and acidity over the past 10 years (pH and CEC); level of saturation of CEC on the plots of the European network or of an equivalent national network	Several ratios needed e.g. Soil pH and Measured P-level in top soil	C	Borderline case	4
Balance between growth and removals of wood over the past 10 years	Growth / removal	C	Clear	2, 4
Percentage of forest area managed according to a management plan or management guidelines.	OK	A	Clear	2
Total amount of and changes in the value and/or quantity of non-wood forest products (e.g., hunting and game, cork, berries, mushrooms, etc.)	Several ratios needed e.g. Turnover of industrial berries	A	Borderline case	2
Natural and ancient seminatural forest types	Natural and ancient seminatural forest types / total forest land	C	Clear	4
Strictly protected forest reserves	Strictly protected forest reserves / total forest land	C	Clear	4
Forests protected by special management regime	Forests protected by special management regime / total forest land	C	Clear	4
Changes in the number and percentage of threatened species in relation to total number of forest species (using reference lists e.g., IUCN, Council of Europe or the EU Habitat Directive)	Number of non-threatened species / total number of forest species (using reference lists e.g., IUCN, Council of Europe or the EU Habitat Directive)	C	Clear	4
Changes in the proportions of stands managed for the conservation and utilisation of forest genetic resources (gene reserve forests, seed collection stands, etc.); differentiation between indigenous and introduced species	Number of stands managed for the conservation and utilisation of forest genetic resources (gene reserve forests, seed collection stands, etc.); differentiation between indigenous and introduced species / total stands	C	Clear	4
Changes in the proportions of mixed stands of 2-3 tree species	Number of mixed stands of 2-3 tree species / total stands	C	Clear	4
In relation to total area regenerated, proportions of annual area of natural regeneration	Natural regeneration / total area generated	C	Clear	4
Proportion of forest area managed primarily for soil protection	OK	C	Clear	4
Proportion of forest area managed primarily for water protection	OK	C	Clear	4

Key ratio as suggested by the sector	Suggested format to fit in reporting system	Type of key ratio	Under-standable	Sub-goal / Clu-ster
Share of the forest sector from the gross national product	OK	A	Clear	2
The part of wood as energy source in the power balance	OK	C	Clear	5
Provision of recreation: area of forest with access per inhabitant, % of total forest area	OK	A	Clear	1, 2
Changes in the rate of employment in forestry, notably in rural areas (persons employed in forestry, logging, forest industry)	Employment in forestry / total employment	A	Clear	2
Forest sector share in the state export	OK	A	Clear	2
The level of unemployment in the forest management and timber industry	Employment in forest and management and timber industry / unemployment in the forest management and timber industry	B	Borderline case	2, 1
Training of forest specialists	Employed forest specialists / employment in forest and management and timber industry	A	Borderline case	2
The number of researchers	Researchers / employment in forest and management and timber industry	A	Borderline case	2
forest research financing and funds	Forest research financing and funds / turnover in forestry	C	Borderline case	2
The number and area of national parks	Area of national parks / total forest area and The number of national parks	C	Clear	1, 2, 4
Visitor number in the national parks	Visitor number in the national parks / inhabitants	A	Clear	1, 2
The number of archaeological, historical and cultural objects in the forests	The number of archaeological, historical and cultural objects in the forests / forests land, ha	A	Borderline case	O

Industry

Key ratio as suggested by the sector	Suggested format to fit in reporting system	Type of key ratio	Under-standable	Sub-goal / Clu-ster
Countries in the BSR having signed and ratified existing and new or revised conventions/agreements.	Countries in the BSR having signed and ratified existing and new or revised conventions/agreements / total countries	A	Clear	3
Number of firms using "eco-efficiency" in their operations, provided that this concept in the near future has been defined (standardised) and elaborated	?	?	?	?

Key ratio as suggested by the sector	Suggested format to fit in reporting system	Type of key ratio	Under-standable	Sub-goal / Clu-ster
to an operative tool in different industries				
The frequency of using EMAS (Eco Management and Audit Scheme); number of firms using this scheme and their share of industrial production.	EMAS firms / total firms and Turnover of EMAS firms / total turnover of all firms	C	Clear	2
Publications of Environmental Statements	Number of firms with Environmental Statement / total firms	C	Clear	2
The frequency of using different standards in the ISO series of standards; number of firms certified in accordance with ISO14001 and their share of production.	Firms certified in accordance with ISO14001 / total firms and Turnover of ISO14001 firms / total turnover of all firms	C	Clear	2
Number of firms publishing environmental reports and their share of production	Number of firms publishing environmental reports / total firms and Turnover of firms publishing environmental reports / total turnover of all firms	C	Clear	2
The extent of financial reporting explicitly taking into account and disclosing environmentally related costs and investments, incl. the impact on profit; number of firms and their share of the 700 biggest companies in BSR (listed companies on stock exchanges).	?	?	?	?
Number of companies requiring environmental performance of their subcontractors with respect to the use of EMAS, ISO14001 or other environmental management system in the business.	(see EMAS / ISO above)	C	Clear	2
Reduction of the material intensity (coal, oil and other relevant material) of goods and services	Several ratios in the form of: Value of goods and services produced / total use of relevant material	B	Difficult	5
Reduction of energy intensity (i.a. electric power) of goods and services	Value of goods and services produced / total use of primary energy	B	Borderline case	5
Sustainable use of renewable resources (for example, timber and crops for industrial use)	?	?	?	?
Countries having harmonised their legislation in the fields of competition, state aid, environment and trade; countries having harmonised with other	Countries with harmonised legislation for competition / total number of countries (same for state aid, environment and trade)	A	Clear	3

Key ratio as suggested by the sector	Suggested format to fit in reporting system	Type of key ratio	Under-standable	Sub-goal / Clu-ster
countries' legislation in BSR or complying with EU Directives in the mentioned fields.				
Decrease of distortive state aid in different industries	?	?	?	?
Countries having established a competition authority and a board for working environment and industrial safety	Countries having established a competition authority and a board for working environment and industrial safety / total number of countries	A	Clear	1, 2
The growth of industrial production in companies applying eco-efficiency and Environmental Management Systems (EMS)	(see above EMAS / ISO)	C	Clear	2
The change of productivity in sheltered sectors and in sectors being under pressure of international competition.	Turnover in sheltered sectors / employees in sectors and Turnover in sectors being under pressure of international competition / employees in sectors	B	Borderline case	2, 5
The change of productivity in companies applying eco-efficiency and EMS	Turnover in companies applying EMS / employees in companies	B	Borderline case	2, 5
The amount of R&D resources used in the industrial sector	The amount of R&D resources used in the industrial sector / turnover in the industrial sector	C	Clear	2
The change of the average length of life for the industrial workforce	OK	C	Clear	1
Health conditions in the enterprises of the industrial sector in terms of the amount and change of industrial injuries and occupational diseases	Workforce / industrial injuries and occupational diseases	B	Clear	1
The extent of training/education in the industrial sector	Training/education cost in the industrial sector / turnover or Workdays in training/education / total workdays	A	Clear	2
Releases, charges and losses of hazardous substances (HELCOM)	Further work needed	?	?	?
Emissions of substances giving rise to exceedance of the critical load for acidification, eutrophication and tropospheric ozone	Further work needed	?	?	?
Emissions to air complying with WHO-standards for air quality	WHO-standards for air quality / measured value	C	Borderline case	1, 4

Key ratio as suggested by the sector	Suggested format to fit in reporting system	Type of key ratio	Under-standable	Sub-goal / Clu-ster
	(same for all emissions)			

Transport

Key ratio as suggested by the sector	Suggested format to fit in reporting system	Type of key ratio	Under-standable	Sub-goal / Clu-ster
Length of public transport net (rail and buses)	Length of public transport net (rail and buses) / inhabitants (or urban population)	C	Clear	5
Number of food shops in a certain area	Number of food shops / inhabitants	C	Clear	5
NOx emission by total sector and by road, rail, air and sea transport	Transport work (person km) / Nox emission fr. transport sector and Transport work (ton km) / NOx emission from transport sector (same for road, rail, air, sea)	B	Difficult	5
(Mean) annual NO2 concentration in central urban areas	Limit mean annual value for NO2 in central urban area / measured mean annual value	C	Clear	1
Average deposition of nitrogen per hectare	Ha / deposition of nitrogen or Limit value / measured value	B C	Difficult	4
Hour average concentration of ozone in suburban areas	Limit value / measured hour average concentration of ozone in suburban areas	C	Clear	1
(Mean) annual concentration of benzene in central urban areas	Limit value / measured (mean) annual concentration of benzene in central urban areas	C	Clear	1
Mean annual concentration of particles in central urban areas	Limit value / measured mean annual concentration of particles in central urban areas	C	Clear	1
Emission of fossil CO2 by total transport sector and by road, rail, air and sea transport.	Transport work (person km) / fossil CO2 emission from transport sector and Transport work (ton km) / fossil CO2 emission from transport sector (same for road, rail, air, sea)	B B	Difficult	5
Length of railways and main roads	Length of railways / inhabitants and Length of main roads???	C ?	Clear	5
Share of areas larger 100 qkm not separated by motorways	Total size of areas larger 100 km^2 not separated by motorways / total land area	C	Clear	4
Day- and night-time noise value in residential, mixed and industrial areas	Number of inhabitants living in residential areas where noise values are	C	Clear	1

Key ratio as suggested by the sector	Suggested format to fit in reporting system	Type of key ratio	Under-standable	Sub-goal / Clu-ster
	acceptable / Number of inhabitants in residential areas (same for mixed and industrial areas)			
Percentage of reused or recycled part of different types of end of life vehicles.	Reused or recycled part of vehicles, ton / total deregistered vehicles	C	Borderline case	5
Final energy consumption by road, rail, air and water transport and fuel type	Transport work (person km) / transport sector and Transport work (ton km) / fossil energy use in the transport sector (same for road, rail, air, sea) and Renewable energy / total energy use in the transport sector (same for road, rail, air, sea)	B B C	Difficult Borderline case	5
Number of fatalities and injuries per year in transport	Transport work (person km) / number of fatalities and injuries per year in transport and Inhabitants / number of fatalities and injuries per year in transport	B	Clear	1
Number of cases of serious pollution or health effects	Transport work (ton km) / number of cases of serious pollution or health effects	B	Clear	1, 4

Further work

We emphasise four kinds of refinement of the system as the next step in the development:

1. During the screening process we came across a number of key ratios where there is an optimal outcome. An outcome above the optimal level is then not desirable. Examples of this pattern can be found in the agricultural sector:

    Agricultural land/total land
    Fallow fields/total agricult. land
    Soil pH

Given a certain time and place context this will in the normal case not cause any interpretation problems, since it should be known at which side of the optimum the actual states will be found. But in longer time series and in cross comparisons there may be problems. If such problems are expected by the experts the key ratios should be split up in two, showing each side of the issue.

2. As mentioned in a footnote above, the screening process would gain from a second round with a special focus on developing criteria for classifying ambiguous cases. A dialogue with experts will be needed then.

3. The fishery and tourism sectors are not included in this analysis since no key ratios have been provided by the sectors.

4. The list of key ratios above has to be completed with a data inventory. This is an extensive task but it has to be done to check if the report system can be implemented without too much work with data gathering. The data inventory will most probably cause a revision of the key ratio list.

Annex 5

Indicators from the sectors

The reports from the sectors contain text and/or lists on indicators. Those parts are presented below.

1. Agriculture

Selection criteria for agri-environmental indicators
There are potentially a large number of indicators that could be developed to help quantify the various components and linkages in the DSR framework. Each indicator should be examined against four general criteria:

- policy relevance
- analytical soundness
- measurability
- level of aggregation.

Some indicators shown below are indicating the status of several criteria. Other indicators can be regarded as efficiency indicators. Examples are ratio-indicators such as input of nutrients versus output via nutrients removed and similar ratios for the use of pesticides and energy.

Generally it can be argued that historical time-series are of great value for interpreting the degree of sustainability of a given system. Such data-sets will also give valuable references to future trend analysis. Indicators will to a great extent be used for analysing changes in **driving forces**, state and implementation of more sustainable methods and techniques. There is in fact little use of direct comparisons between countries on the basis of absolute data.

1.1 NATIONAL INDICATORS OF PRODUCTION

Only criteria and indicators with relevance for evaluating sustainability are selected (Table 1).

Concerning ”**land use**” it is most urgent to get information about the usage of the land. The risks of nutrient losses and the need for usage of pesticides in the production of crops are greatly influenced by the proportion of land used for perennial and other winter green crops. Other factors of importance are the amount of agricultural land, crop production, animal production, wetlands and buffer-zones. For maintaining biodiversity the amounts of permanent pastures and meadows are of special importance.

Regarding ”**livestock**” different environmental consequences are related to ruminants versus pigs and poultry. Access to grazing animals are a prerequisite for maintaining biodiversity in pastures and meadows. On the other hand, ammonia emissions in relation to production are larger from grazing ruminants in comparison to pig and poultry production.

The average livestock (animal) density of a country is one useful indicator but the distribution pattern e.g. the degree of integration between crop and animal production is more important for sustainability. One alternative can be to state the proportion of

farms by hectare and number and types of animals. A well integrated crop and animal production promotes minimised transportation and an efficient recycling of animal and human wastes. Another interesting indicator is also the amount of animal farms without any arable land, as well as the number of combined and purely crop farms.

The degree of domestic production of the national **food supply** consisting of the national food consumption and production can be expressed in MJ per capita. Nutrient losses are differing depending on the production methods used and the type of products produced.

Finally, there is also a need for some sort of **intensity indicators**. Use of fertilisers, pesticides and imported feeds related to crop yields are such examples, as well as yield levels by themselves. On the other hand, data on actual harvests versus a calculated national production potential would further indicate the degree of intensity in the use of natural resources, as well as figures on hectares of set-aside land.

1.2 INDICATORS OF NATURAL RESOURCES

There are a lot of possible indicators that can be used to describe natural resources and especially concerning their ”state” according to OECD (1993). In table 2 we have compiled a set of indicators, that according to our opinion give a good view of the degree of sustainability of a system. The indicators are primarily selected for the purpose of giving a good coverage of the identified criteria and to a lesser degree with respect to the actual data available for the Baltic region. This is discussed in chapters 6.4.6 and 6.5.

There is generally little regard for the **quality of arable soils**, which also can be noticed in the fact that they are usually investigated to a lesser extent. This is true especially with respect to soil contaminants and soil compaction etc. In certain areas soil acidification, due to usage of acidifying fertilisers, acid rain and insufficient liming, depresses the crop yields and can exaggerate the heavy metal uptake. Soil acidification, can thus also affect nutrient uptake and leaching.

Meadows and pastures are the most valuable habitat for maintaining the wild flora and fauna in the agricultural landscape. Not only the amount of such land but also the quality of the **grazing areas** determine the biological response. Sufficient grazing is normally the most appropriate way to preserve the quality. Due to an intensive drainage of natural wetlands over decades, there is a shortage of open water in many landscapes. Therefore creating new wetlands becomes an urgent measure. There also exists a common idea that organic farming can be more favourable in promoting biodiversity than conventional farming using fertilisers and pesticides. It can also be in place to mention agro-diversity as well, as it is just as important to maintain the genetic resource base within agriculture and also to mention agriculture’s positive effects on the landscape.

Despite the fact that the Baltic Sea region is situated in a humid climatic region, there may locally be a need for irrigation, which can lead to conflicts among different water user interests. Water quality refers to the quality of drinking, ground and surface water. However, changes in **water quality** and subsequent problems are definitely the main issue for concern. Indicators for monitoring and assessment of water quality can be found on all three levels: driving force, state and response. The usage of inputs, e.g. manure, fertilisers and pesticides, can be considered to be core indicators for the long time perspective. Furthermore, nutrient leakage very much depends on the

amount of animals in livestock units per hectare, LU/ha, of a certain farm or catchment area. Among the response indicators, the storage capacity for manure, will determine when in the year the manure is to be spread and affect the risk of nutrient leaching and run-off. In a humid region the ground coverage by crops and also what types of crops are also important factors affecting nutrient losses, as well as the occurrence of bufferzones. The quality of the soil layer is also important for water quality as e.g. leaching occurs only to a minor degree on heavy clay soils in comparison to light soils, where leaching dominates and the pH of the soil can also affect water quality. Even the type of drainage system and maintenance can be of importance.

Within agriculture, little attention has up to now been paid to the usage of **fossil energy** and **phosphorus** from **finite deposits**. This is necessary for the future, depending on the greenhouse effect and in solicitude for future generations. The solution regarding phosphorus will be described by the term **recirculation** of nutrients in food and human effluents being returned to farming areas.

1.3 INDICATORS OF HUMAN AND ANIMAL HEALTH

A farming system is not sustainable if the farming methods and inputs used cause negative health effects to the farmer, other farm workers and consumers. Such possible health effects must be included in our work and are presented in table 3.

The question of animal care has recently been debated in some countries. An important goal must be to have healthy animals. The use of growth promoters and especially the use of antibiotics has been argued to cause bacterial resistance with a future likely impact on mankind. Furthermore, how we treat our animals in housing will be of increased consumer's concern in the future. Consequently, even these new issues deserve identification and development of useful indicators.

1.4 INDICATORS ON ECONOMY AND SOCIAL ISSUES

1.4.1 Economy

Farming is not sustainable if the farmers can not make their living from the farm. A fair standard of living for the agricultural community is a prerequisite to sustainable agriculture. An attempt to list different economical indicators showing the economy of the farmer is presented in table 4. The possibility of earning ones income from different types of production from different sectors, such as is common in the Nordic countries with agriculture and forestry, or in the vicinity to urban settlements with part-time employment outside the farm, can also be different solutions to the economy of a farm. However, to be able to improve their economy, farmers must, just as other groups, adapt to new situations. Otherwise, in the worst case looking back historically, if sufficient employment and incomes can not be earned in rural areas, a migration to the cities has taken place. Furthermore, the farmers must **take consideration to the consumers preferences as well as to market prices** when producing food and other agricultural services.

1.4.2 Social

The social prerequisites for agriculture are many. If the farmers and their families do not have access to social services such as: schools, medical care, communication, culture, shops, libraries, public transport e t c they will eventually stop being farmers and move to urban areas in the long perspective. This can be shown as different indicators on infrastructure as in table 4. Another factor of importance is the structure of population, which the age distribution of a population shows (table 4).

It has also been discussed **how important agriculture is for a living rural landscape**. This varies depending upon how close to urban settlements the rural area is located. In the near vicinity of urban settlements, other employment outside agriculture can be found and agricultural land has other alternative values beside the production of food. The possibility of rearing, for example horses, can keep the landscape open in the future, by the production of fodder and grazing. No food production will be necessary in these areas. If the agricultural area is far from urban areas, farming is increasingly important. A paradox lies within this, as the large market for food exists in the urban areas and production of food in their vicinity would reduce transports and handling and could with proper measures taken, in the long run, lead to a production of higher quality at a lower price.

Another aspect which must be included for sustainable agriculture, is the necessary **recirculation of nutrients between urban settlements and rural areas**. This recirculation regards all nutrients from society that usually end in sewage sludge, sewage and garbage and must be returned to the production of food. This is, as already mentioned, most important for phosphorus, as the phosphorus deposits are limited. The consumers must be involved in the process of recirculation to ensure ”clean, not contaminated, high quality waste”. The consumers must learn how to use their drain, sewer and garbage disposal and to realise how important recirculation is for sustainable food production. In this report we have chosen to use two criteria for indicators within this area, the education of consumers (table 4) and non-renewable resources (table 2).

In planning for the society of the future with sustainable development, consideration must be taken to the **distribution of rural areas and urban settlements**, as well as the protection of arable land for food production. Careful **spatial planning** is necessary. Areas for recreation and cultural and historical values must be preserved. In this case suitable indicators can be the age distribution of the rural community or the general economy or amount of unemployment or social service within a rural area compared to an urban area (table 4).

1.5 INDICATORS ON COMPETENCE

Competence is a precondition for sustainable development. **Good agricultural practice** concerns the **farmers** management skill and knowledge and takes into account measures to prevent negative effects on the environment from agriculture. Education makes it possible to improve the results of the farm, at the same time it often improves health and well-being. As mentioned above, it is just as important to educate the **consumers** as the farmers. The consumers must also be well informed, to be able to make the ”right” sustainable choice and not only the cheapest choice when

purchasing food and other agricultural services. Indicators can show the level of education or the type of education, such as agricultural or environmental education (table 4).

1.6 COMMENTS ON CORE INDICATORS

The idea behind the presentation of a rather extensive set of indicators is to make it possible to analyse the degree of sustainability from the data that is available in the different countries. At present, we have to use the kind of information that exists in the individual countries and in the meanwhile develop common monitoring programmes on core indicators for the future. The analysis of sustainability will from the start be carried out in the form of a **cluster analysis** of preferably key ratios. An array of key ratios which illuminate a specific question is called a key ratio cluster (Bergström, 1997).

An attempt to list ten **core indicators** based on the gross presentation of indicators given in table 1 to 3, is presented in table 6. Such a list should be produced from identified core values and non-sustainable issues.

Agriculture substantially contributes to the eutrofication of the Baltic Sea. The use of indicators focusing both indirectly and directly on **nutrient losses** are urgent. Nitrate pollution of ground water often restricts the use for drinking purposes and has to be monitored. Similarly, the use of **plant protection products** might be connected with environmental and health hazards.

The general agricultural structure determines the farms ability to adjust to sustainable agriculture. An inappropriate livestock density and integration between crop and animal production within a country makes it difficult to establish an efficient recirculation of all kinds of animal wastes.

Biodiversity is no doubt, in many places, severely threatened and needs efficient indicators and immediate counter measures. As already mentioned, grazed permanent or old meadows and pastures are the most valuable habitats and thus chosen as one of the core areas for monitoring biodiversity. Also the amount of threatened or endangered species, both of animals and plants, are of importance.

In the future the use of **phosphorus and fossil energy** has to decrease and consequently indicators are needed both on the overall use and on the progress of phosphorus recirculation.

Finally, the consumption of **growth promoters and veterinary antibiotics in animal production** has been discussed as one of the core areas to be analysed.

1.7 Data availability and monitoring

”State indicators” collected within appropriate monitoring systems aiming at environmental quality aspects are scarce. Few soil monitoring programmes are in operation and water quality is similarly not studied frequently enough. Easier available are statistics on inputs, land use patterns and livestock, which can all be used as ”driving force indicators”.

This suggests a need for common efforts aiming at efficient monitoring systems, to be able to follow the path towards increased sustainability within agriculture in the future.

Table 1. National indicators of production

Criteria	**Indicators**		
Food supply	**Driving force**	**State**	**Response**
Structure of agriculture	Economy Legislation	Agricultural land/total land Agricultural land use Livestock farms, % LU/ha on farm level Arable farms, % Farm number and size distribution Farms > 200 LU*	Environmentally certified farms, % Subsidies
Crop production	Economy Legislation	MJ/capita, Actual harvest/country potential	Subsidies
Animal production	Economy Legislation	MJ/capita Types of animals	Subsidies
Food quality	Economy Legislation	Nutrition, proteins, vitamins Flavour, freshness, pollutants	
Other crops	**Driving force**	**State**	**Response**
Energy crops	Economy	Hectares, %, of total arable land	Subsidies
Industrial crops	Economy	Hectares, %, of total arable land	New products and methods

*LU = Livestock Unit

Table 2. *Indicators of natural resources*

Criteria	**Indicators**		
	Driving force	**State**	**Response**
Arable soil quality	Cd input/output Acidifying fertilisers Total P input/removed P Plant prot.prod. input / harvest unit Cd in fertilisers Atm. Deposition of S, N, heavy metals and toxic organics Erosion Soil compaction, machinery weight	Cd, Hg, Pb, Cu in top soil Soil pH P in top soil, root depth Bio-activity in top soil Cd ,ppm in W. Wheat Organic matter, % Tonnes soil eroded/ha/year	Use of low Cd fertilisers Lime, kg/ha Recirculation Soil-mapping of P, K, pH Crop rotation Green manure Cultivation methods Bufferzones
Landscape and biodiversity	Grazing area/total agric. Land Habitat alteration and natural land conversion Removal of landscape elements	Pastures and wooded pastures, ha Endangered species Natural wetlands, Size of connected arable land Traditional biotopes	Organic farming, % Created wetlands Bufferzones Payments for restoration & maintenance
Water quantity and quality	Water abstraction-irrigation Total N input/removed N Plant prot.prod. input / harvest unit Consumption of N-fertilisers Consumption of P-fertilisers Consumption of plant prot. products LU/ha on farm level Net-import/export of N and P Proportion of drained arable lan	Nitrate leakage/arable land, ha P losses/arable land, ha Pesticide residues in water Nitrate in drinking water	Regulation on manure storage & handling Restriction of substances Disposal of pesticide residues Protected water supplies Wastewater treatment coverage Winter green cover, %
Air quality	LU/ha	NH_3 emissions CH_4 emissions	Covered storage, % Spreading & livestock density regulations
Non-renewable resources	Fossil energy, kwh/unit Fertilizer P, kg/ha	Renewable/total energy used Recycled P/total P used	Recycled urban P, % Environmental taxes

Table 3. *Indicators of human health and animal welfare*

Criteria	**Indicators**		
	Driving force	**State**	**Response**

Health of the farmers and farm workers	Amount of chemicals in use Environmental safety of chemicals in use Indoor climate of animal housing and farm buildings Indoor climate of tractor cabin Number of heavy lifts and dangerous movements	Cases of respiratory diseases/total Cases of muscular-skeletal diseases/total Cases of infective diseases/total	Reduced degree of specialisation Improved ventilation in buildings Preventive medicine & care
Animal welfare	Economy Production methods Consumption of growth promoters and veterinary antibiotics / L.U	Pathological abnormalities, %	New housing, feeding and transportation systems Legislation on drugs

Table 4. *Indicators of economy and social issues*

Criteria	**Indicators**		
	Driving force	**State**	**Response**
Economy of the farmer	Market price Market protection, tolls Agricultural policy Environmental policy Consumers preferences	Average income/farmer Agricultural workers wages Profitability Average income/crop or product Credit system	Subsidy programmes Tolls Increased productivity Complementary incomes Research and extension Processing of products
Social services in rural areas	Population density Burden of disease Political decisions / economy Regional policy	Population in rural areas Availability of medical care, schools, public transport, stores, libraries	Spatial planning Regional and rural policies Establishment of social services Local influence and democracy
Communication structure	Access to communication Price of communication	Distance Quantity and quality of roads Number of cars Public transport	Communication strategy IT*-education IT-projects
Structure of population	Employment /employers Housing Social services Economy of public sector	Age distribution of population(rural areas) Population density Income /family Number of commuters	Diversification programmes Subsidy programmes Establishing social services Education
Balance between rural and urban areas	Economy Employment Social services	Age distribution of population(rural areas) Rural land use e.g. forest, arable land, nature reservation	Spatial planning Exchange of services Recirculation

*IT = Information technology

Table 5. *Indicators of competence issues*

Criteria	**Indicators**		
	Driving force	**State**	**Response**
Farmers competence	Economy Competition Democracy	% farmers with higher education % farmers with agricultural education	Education available Subsidies Training Advice and extension
Public awareness	Economy Information types & sources	% of population with higher education % of population with environmental education	Education available Environmental labelling Consumers choice

Table 6. *Ten selected central core indicators*

Criteria	**Indicator**
Structure of agriculture	LU*/ha on farm level
Arable soil quality	Total P input/removed P

Landscape and biodiversity	Grazing area/total arable land
Water quantity and quality	Nitrate in water
Non-renewable resources	Recycled P/total P used
Health of the farmer and farm worker	Cases of respiratory diseases/total
Animal welfare	Consumption of growth promoters and veterinary antibiotics / L.U.
Economy of the farmer	Average income/farmer
Social services available in rural areas	Availability of rural social services
Competence	% of farmers with agricultural education

*LU = livestock unit

2. Energy

As part of the sustainable energy development process it will be necessary to monitor the region, to realize whether or not development is moving in the right direction. For this purpose the goals must be accompanied with at least one “measurable” indicator.

Aiming points in the 2030 vision	**Indicators**
Level economic differences in the Baltic Sea Region	GDP/capita
Adequate level of energy services for all	Average income of poorest 20% of population in relation to weighted price of energy for main services
Zero acidification	Actual emissions of NOx and SOx in relation to local limit values (IIASA)
Reduction of CO2 by 30% from 1995 to 2030	i) Actual emissions of CO2 in the countries and the region ii) Regional and global average reduction goal in relation to IPCC goal recommendations
Always 50years of fossil fuel resources on a global level	Actual, annual use (not production) of resources seen in relation to global resource divided by 50.
Self sufficiency	Regional production7 regional consumption
Elimination of nuclear hazards	?
Secondary goals	**Indicators**
Goal for average net energy consumption	net energy/pop
Goal for efficiency in energy transformation	i) net energy/final energy by sector ii) TPES7TFC
Goals for regional development of CHP	CHP as % of electricity CHP as % of heat
Goals for use of electric vehicles (EV) in transport sector	EV’s as % of total car stock
Goals regarding total use of renewable energy	Renewable energy/TPES Renewable energy/ Renewable energy potential
Goals regarding specific SO2 and NOx emissions from all combustion plant incl. transport sector	SO2/GJ input NOx/GJ input

3. Fishery

Indicators

The following indicators are intended to highlight the trends in biological systems, and the economies of the fishery dependent communities around the Baltic. The indicators will be provided by the coastal states.

Biological Indicators

- Spawning Stock Biomass (SSB): The part of the biomass of cod, herring and sprat, taking part in the reproduction process, in tonnes. This is an important indicator of the biological health of a given stock. Scientific information is only available for the most important commercial stocks in the Baltic Sea.
- Fishing mortality: the proportion of the average population removed annually by fishing
- Recruitment: the number of fish reaching the age where they enter the fisheries

Economic indicators

- Landings per country: total amount of landings in tonnes of cod, salmon, herring, sprat;
- Number of fishing vessels per country operating in the Baltic Sea
- Average engine power per country: total Kilowatt of the fleet, divided by the number of vessels
- Fish consumption per capita per country

Social indicators

- Number of full time fishermen engaged in the Baltic Sea Region, per country.

4. Forestry

EUROPEAN CRITERIA AND INDICATORS FOR SUSTAINABLE FOREST MANAGEMENT. Adopted by the expert level follow-up meetings of the Helsinki conference in Geneva, June 24, 1994 and in Antalya, January 23, 1995

CRITERION 1: MAINTENANCE AND APPROPRIATE ENHANCEMENT OF FOREST RESOURCES AND THEIR CONTRIBUTION TO GLOBAL CARBON CYCLES

CONCEPT AREA: GENERAL CAPACITY

Descriptive indicators (examples):

1 Existence of a legal / regulatory framework, and the extent to which it:
- provides an overall policy framework for conservation and sustainable management of forests

2 Existence and capacity of an institutional framework to:
- provide guidelines for national plans or programmes

3 Existence of economic policy framework and financial instruments, and the extent to which it:
- permits the flow of capital in and out of the forest sector in response to market signals and public policy decisions

4 Existence of informational means to implement the policy framework, and the capacity to:
- recognise the full range of forest values and potentials with periodic forest-related planning and assessment of national forest resources

CONCEPT AREA: LAND USE AND FOREST AREA

Quantitative indicator:

1.1. Area of forest and other wooded land and changes in area (classified, if appropriate, according to forest and vegetation type, ownership structure, age structure, origin of forest)

Descriptive indicators (examples):

1 Existence of a legal / regulatory framework, and the extent to which it:
- maintains forest resources and prevents forest degradation;
- clarifies property rights and provides for appropriate land tenure arrangements

2 Existence and capacity of an institutional framework to:
- carry out integration between land-use planning and forest management

3 Existence of economic policy framework and financial instruments, and the extent to which it:
- supports mechanisms promoting integration between land-use planning and forest management planning

4 Existence of informational means to implement the policy framework, and the capacity to:
- conduct and apply management guidelines for land-use planning in relation to forest resources
- enhance conversion of agricultural and other treeless land to forest land by afforestation

CONCEPT AREA: GROWING STOCK

Quantitative indicator:

1.2. Changes in:
a. total volume of the growing stock
b. mean volume of the growing stock on forest land (classified, if appropriate, according to different vegetation zones or site classes)
c. age structure or appropriate diameter distribution classes

Descriptive indicators (examples):

1 Existence of a legal / regulatory framework, and the extent to which it:
- supports sustainable management while increasing the growing stock of both merchantable and non-merchantable tree species on forest land available for timber production

2 Existence and capacity of an institutional framework to:
- undertake and develop regular assessment of forest resources

3 Existence of economic policy framework and financial instruments, and the extent to which it:
- provides appropriate incentives to support forest policy aiming at bigger growing stock

4 Existence of informational means to implement the policy framework, and the capacity to:
- improve execution of forest resources assessment by acknowledged research institution or other similar organisations

CONCEPT AREA: CARBON BALANCE

Quantitative indicator:

1.3. Total carbon storage and, changes in the storage in forest stands

Descriptive indicators (examples):

1 Existence of a legal / regulatory framework, and the extent to which it:
- clarifies policies for enhancing the use of forest products for energy

2 Existence and capacity of an institutional framework to:
- develop programmes for enhancing the use of forest products for energy

3 Existence of economic policy framework and financial instruments, and the extent to which it:
- provides subventions for the use of wood for energy

4 Existence of informational means to implement the policy framework, and the capacity to:
- enhance studies on the length of the life cycle of wood products
- enhance effectively organised collection of waste paper

CRITERION 2: MAINTENANCE OF FOREST ECOSYSTEM HEALTH AND VITALITY

Quantitative indicators:

2.1. Total amount of and, changes over the past 5 years in depositions of air pollutants (assessed in permanent plots).

2.2. Changes in serious defoliation of forests using the UN/ECE and EU defoliation classification (classes 2, 3, and 4) over the past 5 years.

2.3. Serious damage caused by biotic or abiotic agents:
a. severe damage caused by insects and diseases with a measurement of seriousness of the damage as a function of (mortality or) loss of growth
b. annual area of burnt forest and other wooded land
c. annual area affected by storm damage and volume harvested from these areas
d. proportion of regeneration area seriously damaged by game and other animals or by grazing

2.4. Changes in nutrient balance and acidity over the past 10 years (pH and CEC); level of saturation of CEC on the plots of the European network or of an equivalent national network

Descriptive indicators (examples):

1 Existence of a legal / regulatory framework, and the extent to which it:
- enforces laws and policies related to maintaining forest health and vitality

2 Existence and capacity of an institutional framework to:
- develop mechanisms for controlling the occurrence of serious damages / damage agents

3 Existence of economic policy framework and financial instruments, and the extent to which it:
- creates appropriate incentives to prevent extreme disruption of ecological processes

4 Existence of informational means to implement the policy framework, and the capacity to:
- strengthen regular field monitoring on forest health status and inventories of soil acidification
- prevent serious damage caused by machinery and forestry operations: compaction of soil, injuries into standing trees, etc.

CRITERION 3: MAINTENANCE AND ENCOURAGEMENT OF PRODUCTIVE FUNCTIONS OF FORESTS (WOOD AND NON-WOOD)

CONCEPT AREA: WOOD PRODUCTION

Quantitative indicators:

3.1. Balance between growth and removals of wood over the past 10 years

3.2. Percentage of forest area managed according to a management plan or management guidelines.

Descriptive indicators (examples):

1 Existence of a legal / regulatory framework, and the extent to which it:
- encourages forest owners to practice environmentally sound forestry based on a forest management plan or equivalent guidelines

2 Existence and capacity of an institutional framework to:
- develop institutions and mechanisms advocating economic, environmental and social factors as essential elements in wood production
- develop and maintain efficient physical infrastructure to facilitate the delivery of forest products and services

3 Existence of economic policy framework and financial instruments, and the extent to which it:

- supports investment and taxation policies which recognise the long-term nature of investments in forestry
- supports non-discriminatory trade policies for forest products

4 Existence of informational means to implement the policy framework, and the capacity to:

- improve technologies and plans based on proper forest inventories

CONCEPT AREA: NON-WOOD PRODUCTS

Quantitative indicator:

3.3. Total amount of and changes in the value and/or quantity of non-wood forest products (e.g., hunting and game, cork, berries, mushrooms, etc.)

Descriptive indicators (examples):

1 Existence of a legal / regulatory framework, and the extent to which it:

- provides legal instruments to regulate forest management practices for recreation and the harvesting of important non-wood forest products

2 Existence and capacity of an institutional framework to:

- support appropriate organisations for extension services on non-wood benefits

3 Existence of economic policy framework and financial instruments, and the extent to which it:

- enables the implementation of guidelines for management of non-wood benefits

4 Existence of informational means to implement the policy framework, and the capacity to:

- develop management plans for non-wood benefits

CRITERION 4: MAINTENANCE, CONSERVATION AND APPROPRIATE ENHANCEMENT OF BIOLOGICAL DIVERSITY IN FOREST ECOSYSTEMS

CONCEPT AREA: GENERAL CONDITIONS

Descriptive indicators (examples):

1 Existence of a legal / regulatory framework, and the extent to which it:

- clarifies the concept of management, conservation and sustainable development of forest
- provides for national adherence to international legal instruments

2 Existence and capacity of an institutional framework to:

- maintain, conserve and appropriately enhance biological diversity at the ecosystem, species and genetic levels
- identify economic value in forests whose management is adjusted in favour of maintaining biological diversity

3 Existence of economic policy framework and financial instruments, and the extent to which it:
- creates new resources and incentives to enhance the mechanisms for predicting impacts of human interventions on forests
- supports economic value in forests whose management is adjusted in favour of maintaining biological diversity

4 Existence of informational means to implement the policy framework, and the capacity to:
- develop new inventories and ecological impact assessments on biological diversity
- develop tools to assess the effects of forest management on biological diversity

CONCEPT AREA: <u>REPRESENTATIVE, RARE AND VULNERABLE FOREST ECOSYSTEMS</u>

Quantitative indicator:

4.1. Changes in the area of:
a. natural and ancient seminatural forest types
b. strictly protected forest reserves
c. forests protected by special management regime

Descriptive indicators (examples):

1 Existence of a legal / regulatory framework, and the extent to which it:
- provides for legal instruments to protect representative, rare or vulnerable forest ecosystems

2 Existence and capacity of an institutional framework to:
- develop and maintain institutional capacity and distribution of responsibilities related to protected areas
- maintain degree of implementation of confirmed national forest conservation programmes

3 Existence of economic policy framework and financial instruments, and the extent to which it:
- supports the representativeness of protected forests in relation to ecological and regional distribution

4 Existence of informational means to implement the policy framework, and the capacity to:
- enhance measures to re-establish the endemic biological diversity in forests managed for production
- apply measures for rehabilitation of degraded forest areas

CONCEPT AREA: THREATENED SPECIES

Quantitative indicator:

4.2. Changes in the number and percentage of threatened species in relation to total number of forest species (using reference lists e.g., IUCN, Council of Europe or the EU Habitat Directive)

Descriptive indicators (examples):

1 Existence of a legal / regulatory framework, and the extent to which it:
- provides for legal instruments to protect threatened species

2 Existence and capacity of an institutional framework to:
- develop and maintain institutional instruments to protect threatened species

3 Existence of economic policy framework and financial instruments, and the extent to which it:
- supports implementation of management guidelines to take into account threatened species

4 Existence of informational means to implement the policy framework, and the capacity to:
- construct periodically reviewed lists of threatened forest species
- enhance level of knowledge on threatened species / assessments, inventories or research on threatened species

CONCEPT AREA: BIOLOGICAL DIVERSITY IN PRODUCTION FORESTS

Quantitative indicators:

4.3. Changes in the proportions of stands managed for the conservation and utilisation of forest genetic resources (gene reserve forests, seed collection stands, etc.); differentiation between indigenous and introduced species

4.4. Changes in the proportions of mixed stands of 2-3 tree species

4.5. In relation to total area regenerated, proportions of annual area of natural regeneration

Descriptive indicators (examples):

1 Existence of a legal / regulatory framework, and the extent to which it:
- provides for legal instruments to ensure regeneration of managed forests

2 Existence and capacity of an institutional framework to:

- develop and maintain institutional instruments to ensure regeneration of managed forests
- conduct inventories on proportion of area covered by trees significantly older than the acceptable age of exploitation currently used

3 Existence of economic policy framework and financial instruments, and the extent to which it:
- provides for economic incentives for taking account of environmental issues in management planning
- conducts inventories / assessments on bioindicators

4 Existence of informational means to implement the policy framework, and the capacity to:
- take measures to maintain or to re-establish biological diversity in old forests
- monitor changes in the proportions of afforested or reforested areas covered by indigenous and introduced species, conifer and deciduous species

CRITERION 5: MAINTENANCE AND APPROPRIATE ENHANCEMENT OF PROTECTIVE FUNCTIONS IN FOREST MANAGEMENT (NOTABLY SOIL AND WATER)

CONCEPT AREA: GENERAL PROTECTION

Descriptive indicators (examples):

1 Existence of a legal / regulatory framework, and the extent to which it:
- provides for legal instruments to regulate or limit forest management practices in forests protected for infrastructure / protection forests

2 Existence and capacity of an institutional framework to:
- develop and maintain institutional instruments to regulate or limit forest management practices in forests protected for infrastructure / protection forests

3 Existence of economic policy framework and financial instruments, and the extent to which it:
- supports the preparation of management guidelines for infrastructure and protection forests

4 Existence of informational means to implement the policy framework, and the capacity to:

- conduct research on infrastructure and protection forests in relation to land use practices / forest management

CONCEPT AREA: SOIL EROSION

Quantitative indicator:

5.1. Proportion of forest area managed primarily for soil protection

Descriptive indicators (examples):

1 Existence of a legal / regulatory framework, and the extent to which it:

- provides for legal instruments to regulate or limit forest management practices in areas with vulnerable soils

2 Existence and capacity of an institutional framework to:

- strengthen institutional instruments to regulate or limit forest management practices in areas with vulnerable soils

3 Existence of economic policy framework and financial instruments, and the extent to which it:

- supports the preparation of management guidelines for areas with vulnerable soils

4 Existence of informational means to implement the policy framework, and the capacity to:

- conduct inventories and research on soil erosion

CONCEPT AREA: WATER CONSERVATION IN FORESTS

Quantitative indicator:

5.2. Proportion of forest area managed primarily for water protection
Descriptive indicators (examples):

1 Existence of a legal / regulatory framework, and the extent to which it:

- provides for legal instruments to regulate or limit forest management practices in favour of water conservation or protection of water resources

2 Existence and capacity of an institutional framework to:

- develop and maintain institutional instruments to regulate or limit forest management practices in favour of water conservation or protection of water resources

3 Existence of economic policy framework and financial instruments, and the extent to which it:

- supports the preparation of management guidelines for taking into consideration water conservation in forest management practices

4 Existence of informational means to implement the policy framework, and the capacity to:
- conduct inventories and research on water quality and flow characteristics in relation to land use practices / forest management

CRITERION 6: MAINTENANCE OF OTHER SOCIO-ECONOMIC FUNCTIONS AND CONDITIONS

CONCEPT AREA: SIGNIFICANCE OF THE FOREST SECTOR

Quantitative indicator:

6.1. Share of the forest sector from the gross national product

Descriptive indicators (examples):

1 Existence of a legal / regulatory framework, and the extent to which it:
- provides for legal instruments to ensure development of the forest sector

2 Existence and capacity of an institutional framework to:
- develop and maintain efficient physical infrastructure to facilitate the supply of forest products

3 Existence of economic policy framework and financial instruments, and the extent to which it:
- ensures new investments in the forest sector to meet future demands

4 Existence of informational means to implement the policy framework, and the capacity to:
- develop and put into practice new improved technology
- conduct market analysis to better fulfil the needs of society

CONCEPT AREA: RECREATIONAL SERVICES

Quantitative indicator:

6.2. Provision of recreation: area of forest with access per inhabitant, % of total forest area

Descriptive indicators (examples):

1 Existence of a legal / regulatory framework, and the extent to which it:
- recognises customary and traditional rights of indigenous people, and provides means of resolving access disputes

2 Existence and capacity of an institutional framework to:
- undertake planning and assessment in recreational services on forestry

3 Existence of economic policy framework and financial instruments, and the extent to which it:
- supports forestry constituencies to conserve special environmental, cultural, social and scientific values in relation to recreational services

4 Existence of informational means to implement the policy framework, and the capacity to:
- conduct assessment on recreation

CONCEPT AREA: <u>PROVISION OF EMPLOYMENT</u>

Quantitative indicator:

6.3. Changes in the rate of employment in forestry, notably in rural areas (persons employed in forestry, logging, forest industry)

Descriptive indicators (examples):

1 Existence of a legal / regulatory framework, and the extent to which it:
- provides for legal instruments for securing income levels in forest sector

2 Existence and capacity of an institutional framework to:
- develop and maintain human resource skills in all relevant tasks

3 Existence of economic policy framework and financial instruments, and the extent to which it:
- supports programmes to ensure employment in rural areas in relation to forestry

4 Existence of informational means to implement the policy framework, and the capacity to:
- secure a fair share of income from non-wood products coming from rural sources of income

CONCEPT AREA: RESEARCH AND PROFESSIONAL EDUCATION

Descriptive indicators (examples):

1 Existence of a legal / regulatory framework, and the extent to which it:
- provides for national programmes for research and professional education

2 Existence and capacity of an institutional framework to:
- develop and maintain institutional instruments to enhance forest related research and education

3 Existence of economic policy framework and financial instruments, and the extent to which it:
- provides public and private funding for research, educational and extension programmes

4 Existence of informational means to implement the policy framework, and the capacity to:
- guarantee a sufficient number of people educated at different levels of forestry and cross-cutting field of education

CONCEPT AREA: PUBLIC AWARENESS

Descriptive indicators (examples):

1 Existence of a legal / regulatory framework, and the extent to which it:
- provides opportunities for public access to information

2 Existence and capacity of an institutional framework to:
- strengthen organisations to provide extension services for general public

3 Existence of economic policy framework and financial instruments, and the extent to which it:
- guarantees that part of forest revenues are reinvested in informing the public about forests

4 Existence of informational means to implement the policy framework, and the capacity to:
- support teaching and informing of environmental issues and other forestry related subjects

CONCEPT AREA: PUBLIC PARTICIPATION

Descriptive indicators (examples):

1 Existence of a legal / regulatory framework, and the extent to which it:
- provides opportunities for public participation in public policy and decision making on forests

2 Existence and capacity of an institutional framework to:
- enforce institutional mechanisms for the involvement of local people and NGOs in decision-making

3 Existence of economic policy framework and financial instruments, and the extent to which it:
- attracts public outreach and preparatory planning

4 Existence of informational means to implement the policy framework, and the capacity to:
- enhance public participation in decision-making processes related to implementation of forest policy

CONCEPT AREA: CULTURAL VALUES

Descriptive indicators (examples):

1 Existence of a legal / regulatory framework, and the extent to which it:
- provides for programmes and management guidelines which recognise cultural heritage in relation to forestry

2 Existence and capacity of an institutional framework to:
- develop and maintain programmes to conserve culturally valuable sites and landscapes

3 Existence of economic policy framework and financial instruments, and the extent to which it:
- provides for sufficient financial incentives for acknowledgement of cultural values in forest management planning

4 Existence of informational means to implement the policy framework, and the capacity to:
- conduct studies on proportion of culturally valuable sites and sites with special visual value

5. Industry

Subgoal 1

Implementation of the conventions/agreements relevant to the BSR, inter alia, those mentioned in the Saltsjöbaden Declaration, the Kalmar Meeting and its Action Programme[8].

Indicators

- Countries in the BSR having signed and ratified existing (see Annex 2 and 3) and new or revised conventions/agreements.
- Countries in the BSR having enacted legislation in conformity with signed and ratified conventions/agreements

Subgoal 2

Harmonisation and enhancement of legislation and practices regarding state aid, competition, establishment, trade and environment (incl. working environment and industrial safety) as pertaining to industry

Indicators:

- Countries having harmonised their legislation in the fields of competition, state aid, trade, establishment and environment (incl. working environment and industrial safety) with other countries´ legislation in the BSR or complying with EU Directives in the mentioned fields[9].
- Decrease of distortive state aid in different industries
- Countries having established a competition authority and an agency for working environment and industrial safety

Subgoal 3

Implement a sustainable performance in industry that combines competitive production with reduction of detrimental ecological impacts and resource intensity (eco-efficiency)

Indicators:[10]

- Number of firms using ”eco-efficiency” in their operations and their share of production.
- Number of firms using or being certified according to different kinds of Environmental Management Systems (EMS) and their share of production. EMS stands for ISO 14001, EMAS (Eco Management and Audit Scheme) or other similar kinds of system. The recording should be made separately for large and small (SMEs) firms.

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[8] Besides the international conventions/agreements mentioned in these documents, it deserves to be mentioned that the environment ministers in the Satltsjöbaden Declaration noted the commitment in the Action Programme that ”discharges, emissions and losses of hazardous substances will be reduced, towards the target of the cessation within one generation (25 years)”.

[9] As part of the accession process to EU, there will – as the approximation of laws proceeds – be a recording of legislation in different fields that is in accordance with EU Directives and other EU law. Information on state aid will probably also be gathered in this context.

[10] The collection of data will – as regards the degree of implementation of the different standards – be facilitated by the registration of certified companies kept by the certification bodies.

- Number of firms certified in accordance with other ISO standards (ISO 9000[11] and ISO 14000 except for ISO 14001) and their share of production.
- Number of companies (and their share of production) requiring environmental performance of their subcontractors with respect to the use of EMAS, ISO 14001 or other environmental management system in the business.
- Number of companies (and their share of production) requiring quality performance of their subcontractors with respect to the use ISO 9000.
- Countries having set up certification bodies for ISO 14000, EMAS and ISO 9000.
- Number of firms publishing environmental statements or reports and their share of production'
- Number of firms having introduced Environmental Cost Management
- The extent of financial reporting explicitly taking into account and disclosing environmentally related costs and investments, incl. the impact on profit and the R&D-expenses in the field of environment; number of firms and their share of the 700 biggest companies in the BSR (listed companies on stock exchanges).
- Number of companies (and their share of production) applying producer responsibility in terms of reuse and recycling of products delivered.
- Reduction of the material intensity of goods and services
- Reduction of energy intensity of goods and services
- Sustainable use of renewable resources[12]
- Number of companies (and their share of production) using water processes that are closed and minimised.

Monitoring and effects

In the third category of goals, two subgoals are grouped that catch up the monitoring aspects or the effects on environment, social conditions and industrial competitiveness in certain respects. The first two categories of subgoals have an impact on the subgoals in the third category; for example, if there is a great progress in harmonisation of legislation and implementation of conventions (subgoal 1 and 2) at the same time as eco-efficiency will have a vast application in industry (subgoal 3) that development would result in less detrimental environmental impact (subgoal 5) and probably in better performance in social and industrial respects (subgoal 4).

[11] ISO 9000 is an international quality standard.

[12] This indicator is not yet an operative indicator – at least not in all industries – but this will hopefully be the case when action II (i.a. development of standards for environmental reports) and action V (i.a. development of indicators for sustainable development) are carried out (see Chapter 7),

6. Tourism

Monitoring is done by collecting data for indicators at all relevant levels e.g. from enterprise level to BSR. Monitoring methods should be developed at the same time as more useful and reliable indicators are developed.

Four levels will be sufficient:

1. Enterprise
2. Local (subregional) and regional
3. National
4. Baltic Sea Region

BSR level data is collected by clearing house system using existing organisations e.g. HELCOM and National Tourist Boards. Local and regional authorities gather data and monitor at their own level. By using the clearing house data can also be spread back to national, regional and local level. All data should be in open use and public. Using NGOs as monitoring partners is useful.

Systems for monitoring must be built into all processes and linked to the use of all other management tools. Monitoring must be a key part of the policy process and of plan making.

The ultimate purpose of indicators is that they measure environmental conditions and trends thereby allowing an assessment of the effectiveness in policy. If the indicators are not continuously monitored, they serve no useful purpose.

The elements in a monitoring system will be determined by the type of indicators that is being measured. Environmental quality indicators can be monitored through an on-going process of state of the environment reporting. Environmental performance indicators will be monitored through an on-going environmental management process. To be useful, the results of the monitoring will need to be communicated. This require the integration of the monitoring system with a management system such as EMS.

7. Transports

Indicator Concept

The ideal regional indicators for sustainable transportation support the monitoring of progress and indicate whether the region is on the ”right way” or not, since they are derived from agreed on goals or desired trends. The ideal indicator set

- covers all three dimensions of sustainability: environment, economy and social aspects,
- is based on available data and is comparable in time and among countries or regions and,
- can easily be understood not only by experts.

The ”right way” can be characterised by effective and efficient measures (process oriented indicators or ”response” indicators) or by their results (outcome oriented indicators). While the outcome is directly linked to agreed on goals, the choice of adequate measures and policy instruments is under intensive discussion and depends on the particular political, cultural and economical situation of each country. Thus indication of measures is important to the assessment of trends, however it does not provide unequivocal information regarding progress made in meeting the sustainability goals. The proposed indicator set in section 3 is therefore based on outcome oriented indicators linked to goals. The measures considered to be important in the Baltic Sea Region are mentioned as well in section 3, but indicators have not been defined due to the reasons mentioned above.

Since we talk about pathways towards sustainable transportation rather than to characterise the ”right way” by agreed on aiming points (goals and targets in a narrow sense), the indication of trends is more important compared to the absolute figures. Thus, most of the objectives listed in section 3 are not defined by concrete target values.

Aims and Strategies for Sustainable Transport in the Baltic Sea Region

Access to people, places, goods, and services is important for the social and economic well- being of communities. Transportation is a key means of ensuring access. It is particularly important for the development of a strong co-operation within the Baltic Sea region.

The overall aim with regard to sustainable transport must have two components: (i) to retain transport’s ability to serve the economic and social development of the Baltic Sea region; and (ii) to protect the environment and in particular the sensitive ecosystems of the region, including those of forests and lakes and of the Baltic Sea itself.

The Baltic Sea is a shipping way and the basis for tourism. It is also a barrier to linking the densely populated areas of the region by rail and road. The development of efficient, sustainable transport is a challenge for all Baltic nations.

The development of transportation systems in the Baltic Sea region must:

- provide mobility of people and goods, that inter alia allows all individuals to participate in society's life without any social restrictions,
- ensure that the social burdens caused by transport activity are minimised,
- stay within the carrying capacity of the ecosystems at local, regional, and global levels, and
- ensure that non renewable resources are used to the least extent possible.

Attaining these will require significant changes in institutions, policies, and communication styles. The increasing movement of both people and goods could deteriorate the quality of life. This would happen on account of increases in:

- the number and severity of accidents;
- emissions of air pollutants and greenhouse gases, and the amount of noise;
- pollution of the Baltic sea, fragmentation of natural and other landscapes, losses of biodiversity; and
- consumption of fossil fuels without sufficient development of renewable substitutes.

As well as a growing overall demand for transport in the Baltic Sea region, there is a shift towards use of environmentally less favourable modes. These include private cars, road cargo transport, air traffic, and high-speed ferries. Rail transport, conventional water transport, and even public transport can also be a threat to the environment if they are based on outdated technology or use dirty fuels.

The situations of the south-east and north-west Baltic region are different. In the countries of the south east, economic development is associated with rapidly growing traffic volumes for which transport infrastructure must be developed. Progress towards sustainable transport must accommodate traffic growth and infrastructure development while mitigating their negative effects on the environment. In the countries of the north west, the focus must be on reduction in motorised transport activity and on shifts to more eco-efficient modes.

Table 1: Different Situations in the Countries Bordering the Baltic Sea

	North West Baltic Sea Region	South East Baltic Sea Region
Situation Today	high transport activity	Lower transport activity
	cleaner, but energy consuming vehicles	Polluting , but smaller vehicles
	high density of transport infrastructure	Lower density of infrastructure
	good shape of road, rail and harbours	Bad shape of road, rail and harbours
Current Trends	growing activity especially regarding air transport and fast ferries	Very rapid increase of activity and number of road vehicles
	Transportation activity grows faster than technical improvement	Technical improvement is slowed down due to import of old vehicles
Envisaged Solutions	reduce demand for transportation	Allow but control increase of activity
	shift of transport modes to rail and public transport	Stabilise rail and public transport modes
	improve traffic management	Improve traffic management
	improve vehicle and system technology	Improve vehicle and system technology
	maintain the existing infrastructure	Repair and improve roads, rail, harbours and airports
	Shift modes of passengers and freight transport between the countries bordering the Baltic Sea to the most efficient and environmental sound means of transport.	

The policies selected for implementation must be those that target the driving forces behind the current trends. They will be based on the following strategies:

- Develop the necessary institutional and legal framework to integrate transport and land-use planning so as to reduce or mitigate transport demand in the medium and long term.
- Ensure that sustainable transport supports attainment of sustainable development in other sectors by being efficient and timely.
- Give priority to modes of transport that meet needs in the most ‘eco-effective’ manner.
- Raise public awareness about the environmental, social, economic, and safety-related consequences of excessive motorised transport; provide information and promote public discussion of sustainable transport.
- Apply the polluter-pays principle by internalising external costs so that each transport mode bears its current and future social and environmental costs.
- Promote the use of cleaner and more fuel-efficient transportation technologies by use of fiscal instruments and legal standards.
- Improve the overall operational efficiency of transport systems.

Implementation of these strategies goes far beyond the environment or the transport sector policies. Economical, financial or planning policies are to be involved as well. Each of the sector institutions needs to build the capacity (number of staff and education) to integrate aspects into its own policy which up to now have been considered to be outside the institution’s responsibility. Each sector’s policy must be assessed in the light of its contribution to a sustainable transportation development.

Draft Indicator Set for Sustainable Transportation

The pathway to a sustainable transport systems in the region may be described by the following goals and the indicators based on them.

Table 2: Different Types of Indicators and Related Goals or Measures

1.Indicators with regard to primary goals for sustainable transport	1.1 Provide access to goods, people, locations 1.2 Reduce or mitigate pressures on health and environment 1.3 Reduce or mitigate the use of non renewable resources 1.4 Reduce casualties and environmental impacts by accidents
2. Indicators with regard to institution, instruments and measures	2.1 Integrate environmental concerns into spatial planning 2.2 Apply the principles of sustainability in decision making on investment in infrastructure projects and transport planning 2.3 Strengthen institutional capacity (Gos and NGOs) 2.4 Apply the polluter pays principle 2.5 Implement pollution control requirements
3. Indicators with regard to the transport system and transportation activity	3.1 Observe the development of the transport activities 3.2 Observe its contribution to the overall problems in the Baltic Sea Region

The social benefit with regard to sustainable transport is expressed by the term ”getting access” (1.1) for the time being. The social burdens are characterised by air pollution, noise and casualties in traffic accidents (1.2 - 1.4). The economical dimension has not been addressed by any indicator, since adequate methods to measure the economical benefit of transportation have not yet been identified.

Primary Goals and Indicators for Sustainable Transport

Enable Participation of Individuals in Society’s life without Social Restriction

Objectives	Indicators **
1.The public transport system provides mobility at reasonable quality to all people of a certain region. (The level of mobility is generally different in urban areas compared to rural areas)	1 Length of public transport net (rail and buses) *
2. The basic services and goods are accessible in such distances that do not demand motorised transportation.	2 Number of food shops in a certain area. *

* The net length is only one of the factors that determine the performance of the public transport system. The indicator must be evaluated carefully.
The access to food shops is one example to characterise the settlement structure.

Reduce or Mitigate Pressures on Environment and Health

Objectives	Indicators**
3.Transport related NOx emissions in the Region have been reduced to the extent, that the objectives for ambient NO_2 levels as well as for nitrogen deposition on the terrestrial and marine ecosystems are met.	3a NOx emission by total sector and by road, rail, air and sea transport. 3b (Mean) annual NO2 concentration in central urban areas 3c Average deposition of nitrogen per hectare
4.Emission of VOCs and NOx have been reduced to the extent that excessive ozone levels are avoided and emission of carcinogenic VOCs from all movements of all vehicles have been reduced to meet acceptable risk levels (1 case of cancer among ..... people).	4a Hour average concentration of ozone in suburban areas 4b (Mean) annual concentration of benzene in central urban areas
5.Emissions of particulate matter have been reduced to the extent that harmful ambient air levels are avoided.	5 Mean annual concentration of particles in central urban areas
6. National per capita carbon dioxide emissions from transportation are consistent with the global protection goals for the atmosphere. (Dk)	6 Emission of fossil CO2 by total transport sector and by road, rail, air and sea transport.
7.Frequency and speed of ship movements and the development of harbours in the region are limited such that the objectives for ecosystem protection are met (Gk, AA).	
8.Land surface is used for the movement, maintenance, and storage of motorised vehicles (including public transport) such that the objectives for ecosystem protection are met.	8a Length of railways and main roads 8b Share of areas larger 100 qkm not separated by motorways
9.Noise caused by transportation does not result in outdoor noise levels that present a health concern or serious nuisance.	9 Day- and night-time noise value in residential, mixed and industrial areas

** In order to compare different countries or regions among each other, the length of nets, the number of stocks, the consumption of resources, the emission of pollutants or greenhouse gases can be expressed as tons or km per capita , per km^2 or per GDP (indexed indicators).

Reduce or Mitigate the Consumption of Non Renewable Resources (Fossil Fuels, Metals)

Objectives	Indicators
10 Resource consumption by the **production** of vehicles/ships is reduced or stabilised, for example by reusing or recycling material from end of life vehicles/ships at a level consistent with such goal. (Dk)	10 Percentage of reused or recycled part of different types of end of life vehicles.
11 Resource consumption by building and construction of transport infrastructure is reduced or stabilised. (Dk)	
12 The consumption of fossil fuels by the transport sector has been stabilised or reduced to an extent that it is consistent with the global goals for the protection of the atmosphere (AA).	12 Final energy consumption by road, rail, air and water transport and fuel type

Improve Transport Safety

Objectives	Indicators
13 Number of casualties is reduced by ..... % until	13 Number of fatalities and injuries per year in transport.
14 The rate of large oil or chemicals spills on the Baltic Sea, at the harbours, on roads and rail is reduced by ..... % until	14 Number of cases of serious pollution or health effects

Indicators with regard to Institutions, Instruments and Measures (DK)

Integration of Environmental Concerns into Spatial Planning (Dk)

Measures	Indicators
Spatial and urban planning gives high priority to the development of structures avoiding excessive demand for transportation.	

Apply the Principles of Sustainability in Decision Making with Regard to Transport Planning and Infrastructure Investment

Measures	Indicators
Criteria for sustainable transportation are applied in the decision- making processes on investments and transport plans.	

Institutional Capacity

Measures	Indicators
The sector policies have been integrated to an extent that it opens the pathway towards sustainable transportation. This includes the ability of institutions to act flexible.	
The lobby promoting means of public and non-motorised transportation has been strengthened to an extend that it is able to influence policy on national, regional and urban level.	
Public awareness and early disclosure of information has resulted in participation.	

Application of the Polluter-Pays-Principle

Measures	Indicators
1.The fuel prices are high enough to 1) cover present and future costs of transport, 2) to shift modes to more eco-efficient transport and 3) to promote the development of energy efficient vehicles.	
2.The price per ton-km in road transport is high enough to cover present and future costs, to prevent long transport distances for goods and to promote a shift of modes to less polluting means of freight transport.	
Alternative: The polluter pays principle is applied and external costs are charged in the transport sector. (Dk)	
3. Public Transport is attractive enough to prevent excessive use of private cars. Alternative: Improve attractiveness of public over private transport. (Dk)	

Implementation and Enforcement of Pollution Control Requirements

Measures	Indicators
1. In ..... years all ships on the Baltic Sea meet at least the .... standard.	
2. In ..... years all aeroplanes in the region meet at least the .. standard.	
3. In ..... years all trains in the region meet at least the .... standard.	
4. In .... years all road vehicles in the region meet at least the ..... standard.	

Observe the Development of the Transport Activities

∑ Length of main (all) roads and rail tracks
∑ Vehicle stock (different kinds)
∑ Traffic volumes from road, rail, air, sea (vehicle kilometres)
∑ Total passenger and cargo turnover by air, ship, road, rail; mode shifts;
∑ Investment and maintenance costs with regard to road, rail, harbour and air infrastructure
∑ Investments dedicated to environmental protection

Transport Sector Contribution to the Overall Regional Problems

∑ Contribution to the overall NOx emission in percent ∑ Contribution to the overall nitrogen input to the Baltic Sea in percent
∑ Contribution to the overall emission of VOC
∑ Contribution to the pollution of the Baltic Sea with hydrocarbons
∑ Contribution to the overall CO_2 emission (greenhouse gas emission)
∑ Contribution to the final energy consumption

Examples for Target Values with Regard to Sustainable Transportation

ISSUE	TARGET	REFERENCE
NOx Emission, total	- ... % (..... - .....)	
Carbon dioxide emission, total	- ... % (1990 - .....)	
urban (suburban) air quality ∑ NO_2 ∑ particulate matter ∑ benzene ∑ 1,3 Butadiene ∑ PAH ∑ ozone (suburban) ∑ noise residential areas	 < 40 µg/m^3 mean annual < 15-20 µg/m^3 mean annual < 2 µg/m^3 mean annual < 0.1 µg/m^3 mean annual < 0.5 µg/m^3 mean annual < 120 µg/m^3 (8-hour average) < 55 dBA (day) < 45 (night)	examples by OECD 95 EST Project
airborne N-Nutrient load to the Baltic Sea	- 50% (1990 – 1995) ?	HELCOM
N-deposition ∑ forests ∑ bogs	 3-15 kg/ha per year 3-5 kg/ha per year	UN ECE critical
Ozone (accumulated hours > 40 ppb in the vegetation period) ∑ forests ∑ crops	 10,000 ppb hours 5,300 ppb hours	UN ECE critical
Traffic Safety Casualties	 - 50%	OECD EST example

Annex 6

Goals towards sustainable development

In the Agenda 21 for the Baltic Sea Region, goals for sustainable development are defined in chapter 4. The chapter is reproduced below;

As shown by the wide acceptance of the definition of sustainable development given by the Brundtland Commission, it is important to set up adequate goals and establish objectives to guide the transition towards sustainable development. The overall goal and the sector goals, as defined below, are mainly qualitative, but imply some quantitative elements for areas where data are available and agreements have been reached. Used in the Baltic 21 context, they indicate a direction rather than a state and should therefore be seen in a dynamic, not a static context.

Keeping within environmental and natural resources limits is a long-term necessity for achieving sustainable development, and an over-riding goal that will influence also the development of the BSR. The need to keep development within the limits of the ecosystems and the resource base is therefore recognised as the long-term overall strategy. The richness of natural resources and a healthy environment in the BSR must prevail as a fundamental basis also for the development aspirations of future generations. The tools to make it possible to reach there are however of an economic and social nature, requiring well-functioning societies, a BSR economy that is competitive in the global context, that new solutions (technological and other) are found that do not contradict sustainable development, that sustainable consumption patterns are identified and applied and that non-sustainable systems and practices are abandoned.

The following overall goal has been adopted as the common basis for Baltic 21:

OVERALL GOAL FOR SUSTAINABLE DEVELOPMENT

"The essential objective of Baltic Sea Region co-operation is the constant improvement of the living and working conditions of their peoples within the framework of sustainable development, sustainable management of natural resources, and protection of the environment." Sustainable development includes three mutually interdependent dimensions - economic, social and environmental.

This means for the region:

- a safe and healthy life for current and future generations
- a co-operative and prosperous economy and a society for all
- that local and regional co-operation is based on democracy, openness and participation
- that biological and ecosystem diversity and productivity are restored or maintained
- that pollution to the atmosphere, land and water does not exceed the carrying capacity of nature
- that renewable resources are efficiently used and managed, within their regeneration capacity
- that materials flow of non-renewable resources are made efficient and cyclic, and that renewable substitutes are created and promoted
- that awareness of the elements and processes leading to sustainability is high among different actors and levels of society.

The Baltic Sea Region recognises its interdependence with other parts of the world and makes its contribution to the fulfilment of sustainable development goals at the global and European level.

The sector goals have been developed by the sectors and further defined by the Senior Officials Group. The goals are related to actual policy formulation. Their use, ultimately, is to guiding the selection of actions proposed to contribute to changing the course of BSR development into a sustainable one. The sector goals all address different aspects of the overall goal, and indicate how the development of the sectors should contribute to the objectives of the overall goal and to sustainable development in the BSR. In addition to the sector goals, a goal concerning spatial planning for sustainable development is also included.

GOAL FOR SUSTAINABLE AGRICULTURE

Agriculture contributes significantly to the society of the future. Sustainable agriculture is the production of high quality food and other agricultural products/services in the long run with consideration taken to economy and social structure, in such a way that the resource base of non-renewable and renewable resources is maintained. Important sub-goals are:

- The farmers income should be sufficient to provide a fair standard of living in the agricultural community.
- The farmers should practise production methods which do not threaten human or animal health or degrade the environment including biodiversity and at the same time minimise our environmental problems that future generations must assume responsibilities for.
- Non-renewable resources have to gradually be replaced by renewable resources and that re-circulation of non-renewable resources is maximised.
- Sustainable agriculture will meet societies needs of food and recreation and preserve the landscape, cultural values and the historical heritage of rural areas and contribute to create stable well developed and secure rural communities.
- The ethical aspects of agricultural production are secured.

GOAL FOR SUSTAINABLE ENERGY

Sustainable energy development requires the process of:

- Setting up goals for the energy sector as regards security of supply, carrying capacity of the environment, resource management, economy and safety.
- Ensuring that decision makers at all levels are inclined to pursue these goals.
- Revise goals and incentives at need, according to increased knowledge and proper monitoring of indicators.

The following primary goals have been set up for 2030:

- Basic energy services must be affordable to the whole population on the basis of modern technology.
- Energy supply must not give rise to pollution exceeding critical loads or levels of acidification, eutrophication, troposheric ozone and global climate change.
- Elimination of hazards related to nuclear waste and nuclear energy production.
- Maintain long-term security of supply by resource management.

To fulfil the primary goals a number of secondary goals must be reached, especially regarding:

- Energy savings
- Increased energy efficiency, including combined heat and power production
- Increased use of renewable energy resources and substitution of high-carbon fossil fuels by low-carbon fossil fuels.

GOAL FOR SUSTAINABLE FISHERY

Sustainable fishery is achieved when a high probability of fish stocks being able to replenish themselves over a long period of time within a sound ecosystem is assured, while offering stable economic and social conditions for all those involved in the fishing activity.

The goal for achieving sustainable development of fisheries in the Baltic Sea area thus means development of economically and socially sustainable, environmentally safe and responsible fisheries by:

- Maintaining biological viable fish stocks, the marine and aquatic environment and associated biodiversity,
- Within these limits, establish maximum fishing possibilities and appropriate selective fishing techniques for harvesting stocks,
- Distribute the direct and indirect benefits of open sea and coastal fishery resources between local communities in an equitable manner.

GOAL FOR SUSTAINABLE FOREST MANAGEMENT

The stewardship and use of forests and forest lands in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfil, now and in the future, relevant ecological, economic and social functions, at local, national, and global levels, and that does not cause damage to other ecosystems. Criteria for sustainable forest management are:

- Maintenance and appropriate enhancement of forest resources and their contribution to global carbon cycles.
- Maintenance of forest ecosystem health and vitality.
- Maintenance and encouragement of productive functions of forests (wood and non-wood).
- Maintenance, conservation and appropriate enhancement of biological diversity in forest ecosystems.
- Maintenance and appropriate enhancement of protective functions in forest management (notably soil and water).
- Maintenance of other socio-economic functions and conditions.

GOAL FOR SUSTAINABLE INDUSTRY

Sustainable development for the industrial sector in the Baltic Sea Region is maintaining continuity of economic, social and environmental improvements. This means for the industrial sector in the region:

- Reaching eco-efficiency by the delivery of competitively priced goods and services that satisfy human and social needs and bring quality of life while progressively reducing ecological impacts and resource intensity throughout the life cycle, to a level at least in line with the estimated carrying capacity of the Baltic Sea Region with respect to biodiversity, ecosystem and use of natural resources.
- Improvement of the working environment and the industrial safety for the workforce.
- Applying sustainable strategies to resources, processes, products and services.

GOAL FOR SUSTAINABLE TOURISM

Sustainable tourism is any form of tourist development or activity which respects the environment, ensures long-term conservation of natural and cultural resources, and is socially and economically acceptable and equitable.

The overall goal is to achieve a common understanding on the requirements of sustainable tourism in the Baltic Sea Region. The objectives of the tourism sector in developing sustainable tourism refer to the three main elements of sustainability, that is environment, economy and people and should be:

- To sustain a sound environment, to safeguard the recreational quality of natural and man-made landscape and to integrate natural, cultural and human environments.
- To promote and sustain the competitive quality and efficiency of the tourism business.
- To create satisfactory social conditions for tourists and the local population.

5.12 GOAL FOR SUSTAINABLE TRANSPORTS
The goal with regard to sustainable transportation in the Baltic Sea region consists of two components:

- To minimise the negative environmental effects, the consumption of non-renewable resources and the use of land for transportation purposes to protect human health and environment in particular the sensitive ecosystems of the region.
- To retain transport's ability to serve the economic and social development of the Baltic Sea region.

GOAL FOR SPATIAL PLANNING FOR SUSTAINABLE DEVELOPMENT
Planning for sustainable development should promote economic and social development while simultaneously ensuring the protection and conservation of the natural environment and cultural heritage. Planning for sustainable development should be carried out through procedures and organisational principles that build on public participation, partnership and subsidiarity. Planning for the sustainable development of the BSR should promote the competitiveness of the entire region in EU and in the world, while simultaneously promoting social and economic cohesion in the region between more or less prosperous areas and between urban and rural areas.

Taken as a whole, the set of Baltic 21 goals submit an unprecedented and positive challenge, and represents a long-term contribution and guide for policy-making and regional co-operation in our region. They also represent a first step towards a common and harmonised regional view of the challenges ahead. The goals give a consistent indication of the nature and direction of the path of sustainable development in the BSR.

Annex 7

Further reading

Approaches to an Earth Audit, UNEP/DEIA/TR.97-5
Environmental Indicators, World Resources Institute, 1995
Environmental Indicators, OECD core set, OECD,1994
Environmental Reporting in Central and Eastern Europe, UNEP/DEIA/TR.97-6
Gröna Nyckeltal, SOU1998:15 Sweden, 1998
Guidelines for Data Collection for The Dobris+3 Report, EEA,1996
Human Development Report 1996, UNDP, 1996
Indicators for sustainable development:Framework and Methodologies, UN,1996
Indicators of the state of the environment in the Nordic Countries, Tema Nord 1997: 537
Intergovernmental seminar on criteria and indicators for sustainable forest management, Ministry of Agriculture and Forestry in Finland, 1996
The Baltic Region, Statistics Sweden, 1993
World Development Indicators, The World Bank, 1997

In the Agenda 21 for the Baltic Sea Region - Baltic 21 - the need to follow up and monitor the progress towards sustainable development is recognised. This report is a documentation of the process leading to a provisional monitoring system and with emphasis on indicators for sustainable development in the Baltic Sea Region.

The Baltic 21 Series contains the following publications:

No 1/98	An Agenda 21 for the Baltic Sea Region
No 2/98	The Baltic Sea Agenda 21 Sector Report – Agriculture[1]
No 3/98	Sustainable Energy Development in the Baltic Sea Region (ISBN: 87-986969-0-4)
No 4/98	Sector Report on Fisheries, Contribution to Baltic 21[2]
No 5/98	Baltic 21 Action Programme for Sustainable Development of the Baltic Sea Region – Sector Report On Forests[3]
No 6/98	Sustainable Development of the Industrial Sector in the Baltic Sea Region
No 7/98	Agenda 21 – Baltic Sea Region Tourism[4]
No 8/98	Baltic 21 Transport Sector Report[5]
No 9/98	Spatial Planning for Sustainable Development in the Baltic Sea Region
No 10/98	Financing the Baltic 21: An Overview
No 11/98	Local Agenda 21 Report
No 12/98	Environmental Citizen Organisation's (ECO's) Vision of an Agenda 21 for the Baltic Sea Region
No 13/98	Indicators on Sustainable Development in the Baltic Sea Region – An Initial Set
No 14/98	Vision of Sustainability in the Baltic Sea Region: Beyond Conventional Development

The reports can be downloaded from the Baltic 21 website (http://www.ee/baltic21/). At the website you can also find information on where you can order the reports.

[1] Also published in the HELCOM Baltic Sea Environmental Proceedings (BSEP).
[2] Also published in the IBSFC Proceedings.
[3] Also included in the Publications of the Finnish Ministry of Agriculture and Forestry.
[4] Also published by the Finnish Ministry of Trade and Industry, Working Papers 6/1998.
[5] Also published by the German Federal Environmental Agency in the TEXTS series.

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