AGENDA 21 FOR THE BALTIC SEA REGION

BALTIC 21

Baltic 21 Series No. 2/2000

Development in the Baltic Sea Region towards the Baltic 21 Goals - an indicator based assessment

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Foreword

The mandate to develop an Agenda 21 for the Baltic Sea Region, with the objective of 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 (CBSS). The geographical scope of Baltic 21 is Denmark, Estonia, Finland, Germany, Iceland, Latvia, Lithuania, Norway, Poland, north-western Russia and Sweden.

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 Baltic Sea Region also decided to concentrate work on sustainable development, and in particular to integrate relevant activities with the Baltic 21 process.

The Agenda was adopted by the Foreign Ministers at the Council of the Baltic Sea States (CBSS) meeting in June 1998.

Baltic 21 is a democratic, open and transparent process. It is steered by the Senior Officials Group (SOG), having as its members the Governments of CBSS, the European Commission, NGOs, intergovernmental organisations like HELCOM, VASAB 2010, 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 is published on the Baltic 21 website (http://www.ee/baltic21).

The emphasis of Baltic 21 is on regional co-operation and on the environment, but Baltic 21 also includes the economic and social aspects of sustainable development. The work focuses on seven sectors of crucial economic and environmental importance in the region, and on spatial planning. For each sector, goals and scenarios for sustainable development have been elaborated, as well as a sector action programme. This work is presented in a series of sector reports, all included in the Baltic 21 Series.

The seven sectors and the present lead parties are: Agriculture (HELCOM and Poland), Energy (Denmark and Estonia), Fisheries (IBSFC), Forests (Finland and Lithuania), Industry (Russia and Sweden), Tourism (there is presently (March 2000) no LP for this sector) and Transport (Germany and Latvia). Lead Party for Spatial Planning is VASAB 2010.

The sector reports, and a number of other reports produced by SOG members, constitute the background for the Agenda 21 for the Baltic Sea Region document.

After the adoption of the Agenda, the work to implement Baltic 21 started. The SOG will report on the progress in implementing Baltic 21 to Sector and Environment Ministers every 2nd or 3rd year, to Prime Ministers approximately every 5th year and to the Ministers of Foreign Affairs when appropriate. The reporting includes the progress in implementing the Baltic 21 action program and the monitoring of the development in the region towards sustainable development.

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Chapter 0

Summary

The first Baltic 21 Biennial Report is presented in the spring of year 2000 (Baltic 21 Series No 1/2000). The report includes the progress in implementing the Baltic 21 action program, and the monitoring of the development in the region towards sustainable development.

The Baltic Sea Region is the first region in the world to adopt common regional goals for sustainable development, including an overall goal, goals for each of the seven sectors and a goal for spatial planning. In order to monitor the development in the region towards the goals, a set of core indicators has been elaborated for each goal. To avoid double work, existing internationally compiled and assessed statistics have been used to the extent possible.

Since the Biennial Report does not contain all the Baltic 21 indicators, this report (Baltic 21 Series No 2/2000) provides a full presentation of the Baltic 21 goals, the indicators and the compiled statistics, together with the assessment of the development during the 1990s. The report also contains a chapter on the mode of work for selecting the indicators and for compiling the necessary statistics for monitoring.

All compiled data are also available at the Baltic 21 website (http://www.ee/baltic21).

It is important to note that this is the first attempt to monitor the Baltic 21 goals and that the Baltic 21 indicators do not cover all aspects of sustainable development. The present set of indicators provide however important information on in which direction the Baltic Sea Region is heading. Hopefully Baltic 21 can also inspire other regions, countries and local communities to set up concrete goals for sustainable development and to start monitoring these goals.

An analysis of the development in the region, based on the selected indicators, shows that several positive trends can be detected during the 1990s, but also that for many parameters no improvement is visible. It is further important to note that for several indicators, the compiled data does not allow for any trend analysis, and it has also not been possible to assess some crucial aspects of sustainable development, such as the dependence on non-renewable material, the degree of reuse and recycling of material, the generation and management of waste in the region, loss of biodiversity and soil degradation.

One of the most negative trends is the unchanging emission levels of CO_2, and the possibility that these emissions might increase with increased economic activities. This is serious, as the emissions of greenhouse gases are a serious threat to sustainable development, and that substantial reductions of emissions are needed to halt global warming. The fact that the forest growing stock is increasing in the region is partly counteracting this negative trend, as growing forests act as a sink for CO_2 emissions.

The situation is much more positive as regards to the problem of acidification. The area of land in the BSR where deposition of acidifying substances is above the critical load is decreasing and steadily approaching the long-term target, as a result of considerable reductions in NO_x and SO_2 emissions, mostly outside the Baltic Sea region. This will have important positive effects on the productivity of the forests and on bio-diversity in the region.

The emission of CO_2, NO_2 and SO_2 from industry and traffic follows the same trends as the total emissions. Despite the reductions of emissions of some pollutants, the large and increasing number of fossil fuel driven motor vehicles is in conflict with the need to reduce the negative impact on human health, mostly in cities, and on the environment. There still is an obvious conflict between the mobility of people and goods, and health and the environmental aspects of sustainable development.

The reduction of the load of nutrients and toxic substances from point sources to the Baltic Sea has been rather successful, while it has proven to be more difficult to reduce the emissions from diffuse sources like agriculture and transport. Nutrient loss in agriculture resulting from the intensive production of food and fodder, from high livestock density and the use of fertilisers and manure leads to negative impacts on the groundwater, lakes, seas and loss of ecosystem productivity and bio-diversity.

Biological diversity is threatened by pollution and intensive land use. The share of threatened forest species is ranging from 40-60%. There is no corresponding figure regarding threatened species available for the agriculture sector, but another important indicator of bio-diversity is the amount of permanent pastures. The amount of permanent pastures is usually larger in the CITs than in the old market economies.

The phasing out of ozone layer depleting substances has been quite successful, specially for those substances that have the largest depleting potential, CFCs and Halons. However, CFCs and Halons are still being consumed in the region, even though the consumption of these substances should have been phased out already during the 1990s. Another positive development is that the use of renewable energy is slowly increasing, also for industrial production. A slight decrease in the energy intensity is also noted. For several indicators, such as life expectancy and GDP per capita, there are considerable differences between the old market economies and the CITs, and the economic gap between the richest and the poorest countries in the region is still even increasing even if some CITs are currently experiencing strong economic growth.

In conclusion, the Baltic Sea Region has entered the road towards but is still far from sustainable development. During the early 90´s, after the downfall of communism, the CITs suffered considerable drops in economic activities, evident by diminishing GDPs and industrial output. This caused to a certain extent reductions in pollution, waste generation and energy consumption. However, now when economic activities are picking up again, the risk of returning to unsustainable production and consumption patterns is substantial. The old market economies on the other hand have managed to control many pollution sources, e.g. industrial point sources, while other, diffuse sources of pollution have proven much more difficult to control. The use of natural resources is also far from being sustainable in any of the Baltic Sea Region countries. These different development paths lead when summarised for the region to that several important positive trends are visible, but a number of fundamental economic, social and environmental criteria for a sustainable society are not met.

Sustainable development in the Baltic Sea Region will remain a difficult but necessary task and challenge for the 21st century.

Chapter 1

Introduction

The first Baltic 21 Biennial Report is presented in the spring of year 2000 (Baltic 21 Series No 1/2000). The report includes the progress in implementing the Baltic 21 action program, and the monitoring of the development in the region towards sustainable development.

The Baltic Sea Region is the first region in the world to adopt common regional goals for sustainable development. These goals include an overall goal, goals for each of the seven Baltic 21 sectors and a goal for spatial planning. In order to monitor the Baltic 21 goals, a set of core indicators has been elaborated for each goal, and statistics have been compiled.

Since the Biennial Report does not contain all the Baltic 21 indicators, this report (Baltic 21 Series No 2/2000) provides a full presentation of the Baltic 21 goals, the selected indicators and the compiled statistics (available on the attached CD-ROM)[1], together with the assessment of the current trends in the region. The report also contains a chapter on the mode of work for selecting the indicators and for compiling the needed statistics. The report has been produced and edited by the Baltic 21 Secretariat, based on input provided by the Baltic 21 Sectors: Agriculture, Energy, Fisheries, Forest, Industry, Tourism and Transport.

The monitoring of the Baltic 21 goals is an important part of the reporting to sector and environmental ministers. The aim is also to inspire other regions, countries and local communities to set up goals for sustainable development and to start monitoring these goals. The target group for the Baltic 21 indicators further includes schools and universities, as well as the general public, hoping that the indicators can serve as a basis for discussions on criteria for sustainable development and what we need to do, on the individual, local, national, regional and global level, to progress towards sustainable development.

It is important to note that this is the first attempt to monitor the Baltic 21 goals and that the Baltic 21 indicators do not cover all aspects of sustainable development. Surely the indicators can be improved. This will be an ongoing process, where also other international indicator initiatives will be of importance. Deficiencies in the indicators and statistics should however not stop us from start assessing the current development in the region in relation to the Baltic 21 goals. Despite many limitations, the present set of indicators does provide important information on the development in the region of a number of important parameters.

[1]All compiled data is also available at the Baltic 21 website (http://www.ee/baltic21).

Chapter 2

Baltic 21 Indicators - mode of work

2.1 General

The Baltic 21 work to establish indicators for sustainable development started already in 1997 when the sector reports and the Agenda 21 for the Baltic Sea Region were elaborated. It was however after the adoption of the Agenda in June 1998, that the work to select a limited number of core indicators to monitor the adopted goals as a part of the reporting to ministers, started.

For selecting indicators, the following criteria were agreed upon:

- The indicators should monitor important aspects of the Baltic 21 goals, and thus be relevant for sustainable development in the Baltic Sea Region.
- The total number of indicators should be limited, focusing on key aspects of sustainable development.
- The indicators should, as far as possible, be selected and formulated so that non-experts can understand the meaning of them, keeping in mind that the target group for the Baltic 21 indicators is very wide.
- Basic statistics should be available for the indicators.
- International statistical data compilations should be used as much as possible to avoid multiple reporting and double work of compiling and assessing the data.

Despite the fact that international data providers have been used to a very large extent, it has not been possible for Baltic 21 to simply take any set of indicators developed by another international body. This since the first and most important criteria is to monitor sustainable development as defined by the Baltic 21 goals. However, the vast majority of the indicators that have been selected, are also used by many others, and are thus recognised as important parameters for sustainable development.

Since available international compilations do not cover all selected indicators, nor all Baltic 21 countries, data have also been compiled directly from national sources. A special case is the Russian Federation for which sub-national level data are required. North-western Russia includes the following oblasts; St. Petersburg, Leningrad Oblast, Kaliningrad Oblast, Novgorod Oblast, Pskov Oblast, Republic of Karelia, Murmansk Oblast and Arkhangelsk Oblast. As a rule, sub-national data are not available from international bodies and therefore north western Russian data were primarily collected from Russian national statistical publications. In those cases when statistics for north-western Russia are not available, Russian data are presented, or north-western Russian data were calculated using an index based on the proportion of the Russian population living in the above mentioned regions.

UNEP/GRID-Arendal has assisted the secretariat and the sectors in compiling the statistics needed for the indicators. The Baltic 21 secretariat has also commissioned the Swedish Institute of Agricultural Engineering to compile statistics for the Agriculture sector indicators, and the Statistics Sweden to fill some final gaps in the statistical material.

UNEP/GRID-Arendal was also given the task to identify a system for future provision of statistics for the indicators, to provide the technical assistance needed to produce this report (as well as the Biennial Report), and to provide an internet presentation of the indicators on the Baltic 21 website (http://www.ee/baltic21).

The Baltic 21 indicator work has been co-ordinated by the Baltic 21 Secretariat, in co-operation with UNEP/GRID-Arendal.

All indicators have been adopted by the Baltic 21 steering group, the Senior Officials Group (SOG). The set of indicators is however open for revision as new indicators are being developed and new data become available.

2.2 Overall indicators

The overall indicators have been elaborated by the Baltic 21 secretariat, drawing upon external expertise, including UNEP/GRID-Arendal, and on indicator work carried out within other international fora. The indicators have been submitted to the SOG and discussed at several SOG meetings during 1998 - 1999.

International data sources have almost exclusively been used for the overall indicators. The data have been easily available, at no cost or for a low fee, in digital format or in hard copies.

2.3 Sector indicators

The sector networks (consisting of representatives of the governments in the Baltic Sea Region, international governmental organisations and non-governmental organisations), headed by the sector Lead Parties, have been responsible for selecting the respective sector indicators, for identifying suitable data sources and for compiling and assessing the needed data. UNEP/GRID-Arendal and the Baltic 21 secretariat have assisted the sectors when needed.

Data for the **Agriculture** sector indicators have been compiled mainly from FAO publications by the Agriculture sector, assisted by UNEP/GRID-Arendal, and the Swedish Institute of Agricultural Engineering, commissioned by the Baltic 21 Secretariat. The Agriculture sector has agreed Denmark the responsible party for the future indicator work within the Baltic 21 Agriculture Sector. The indicators and data that are presented in this report will be revised by the sector for the next Biennial Report in 2002.

The **Energy** sector has been fully responsible for collecting and assessing the data needed for its indicators. Data compiled by the International Energy Agency (IEA) have been used. No data have been compiled for the Russian regions Novgorod and Arkhangelsk for this report.

The **Fisheries** sector has also taken the full responsibility for collecting and assessing the data needed for their indicators. Data have been provided by the International Council for the Exploration of the Sea (ICES), the International Baltic Sea Fishery Commission (IBSFC), and from national sources via national focal points. The Fisheries sector data do not include Iceland and Norway since the focus of this sector is on the Baltic Sea. Further efforts will be made in the future to compile data for the selected social and economic indicators.

The **Forest** sector is using the so called Pan-European criteria and indicators for sustainable forest management, as well as the statistics compiled within this framework. The core set of 6 criteria and 27 most suitable quantitative indicators for sustainable forest management in Europe were adopted in the first expert level follow-up meeting in Geneva in June 1994. The statistics that are presented in this report has been taken from “The International Report on Sustainable Forest Management in Europe”, reported to the Third Ministerial Conference on the Protection of Forests in Europe in 1998. This report does however not contain statistics for all the Pan-European indicators, and does furtheron not include any data for Estonia and North-western Russia. Estonian and North-western Russian data that are presented in this report, have been collected by a questionnaire.

The Pan-European criteria and indicators will be further developed within the Pan-European process and the comparability between national statistics improved. At the moment there are on-going discussions about the possibility to produce data on regular intervals.

Since the **Industry** sector network was not established at the time for elaborating the core indicators, this work has been conducted by the Baltic 21 secretariat, in co-operation with the Russian and Swedish Lead Parties and UNEP/GRID-Arendal. The data for the indicators have been compiled from international data providers (e.g. IEA, OECD, Framework Convention on Climate Change, EMEP), and in some cases via national focal points to fill in gaps. The indicators and data that are presented in this report will be revised by the sector for the next Biennial Report.

The goal for sustainable **Tourism** is perhaps the most difficult to monitor with quantitative indicators. Data for some economic indicators are available, but national statistics on resource use and environmental impact by tourists are lacking, as well as data on the social impact of tourism. Since no international database for the Tourism sector indicators has been found, data have been compiled via a questionnaire distributed to the tourism sector national focal points. No proper assessment of the submitted data have been done, and a comparison between countries is not recommended. Norway has not participated actively in the Baltic 21 Tourism sector work and has not submitted any data for the indicators. It was also not possible to get any data for north-western Russia for this report.

Data on **Transport** were collected by the transport sector in co-operation with UNEP/GRID-Arendal and the Baltic 21 Secretariat, both from international sources and directly from countries. Poland and Russia have not submitted any data, but some gaps for these countries have been filled by the work of Statistics Sweden.

Spatial planning has selected some result-oriented indicators of sustainable development. Since these indicators are of cross-sectoral character, they are incorporated either into the sector or overall indicators. VASAB 2010 is still in the process of defining and selecting some indicators more specific for spatial planning.

2.4 Limitations

The Baltic 21 indicators are designed to reflect the elements of the Baltic 21 goals. The goals emphasise natural resource management and the environmental aspect of sustainable development, while the economic and social goals are less specific. There are many economic and social aspects of sustainable development that are not addressed by the Baltic 21 indicators.

The set of indicators can and should be further improved. The sectors and SOG have agreed that there should be a continuous process of revising the indicators so that they better monitor the adopted goals. Baltic 21 should also review other international indicator processes of relevance for sustainable development.

The fact that the Baltic 21 uses international data providers to a very large extent has some drawbacks. One of these is that international data bases do not contain data for all indicators that were initially selected, nor for all countries. Another drawback is the time delay between data delivery by countries and the publication of the data. Finally, the Baltic 21 cannot control the frequency of data compilation of other international bodies. It would however require considerably more effort and resources to compile data directly from countries and to assess its quality and comparability. It would instead be preferable to co-operate with other organisations to try to influence their work.

Another encountered difficulty is that the Baltic 21 economic sectors are not always defined in the same way in economic and technical data bases. This makes it difficult to present data for indicators that contain both economic and technical data, like e.g. sector energy use versus sector economic output, or sector emissions versus sector economic output. Such intensity indicators are most relevant for sustainable development. This problem is however recognised by the statistical community, and it should therefore be possible in the future to present data for such indicators.

There are also indicators for which data are more or less totally lacking, like the total use of material, waste generation and management, or the changes in bio-diversity. Since efficient use, reuse and recycling of material, renewable and non-renewable, as well as safeguarding of bio-diversity, are crucial for sustainable development, it is very important that relevant statistics for such indicators are defined and generated in the future.

Chapter 3

Development in the Baltic Sea Region towards the Baltic 21 Goals - an indicator based assessment

In this chapter, the development in the Baltic Sea Region towards the adopted Baltic 21 goals is assessed, based on the Baltic 21 core indicators and the compiled statistics.

3.1 Overall Development in the Baltic Sea region

"A safe and healthy life for current and future generations."

A **healthy population** is fundamental for sustainable development. There is no clear change during the 1990s with regard to the general health condition, measured as life expectancy and infant mortality rate. Due to differences in economic, social and

OVERALL GOAL AND CORE INDICATORS

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.*

  Indicators:
  - Life expectancy at birth
  - Infant mortality rate
  - Population ozone exposure.

- *A co-operative and prosperous economy and a society for all.*

  Indicators:
  - Regional GDP/capita, including lowest versus highest GDP/capita in the region
  - Income distribution
  - Unemployment rates
  - Inflation

- *That local and regional co-operation is based on democracy, openness and participation.*

  Indicators:
  - Participation in national and local elections

- *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.*

  Indicators:
  - CO_2 emissions
  - SO_2 emissions
  - NO_x emissions
  - Land area where depositions are above critical loads for acidification and eutrophication
  - Load of nutrients to the Baltic Sea
  - Emission and discharges of metals to the Baltic Sea
  - Consumption of ozone depleting substances
  - Protected areas versus total

- *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.*

  Indicators:
  - Energy intensity (energy supply versus GDP)
  - Renewable energy/total energy supply

- *That awareness of the elements and processes leading to sustainability is high among different actors and levels of society.*

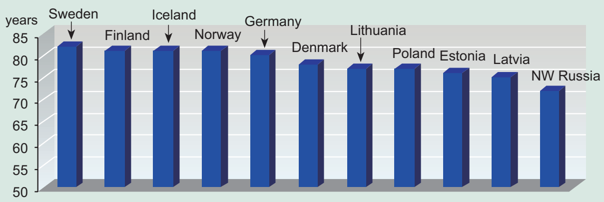
The Baltic Sea Region recognises its interdependence with other parts of the world and makes its contribution to the fulfilment of sustainable development goals at the global and European level.

environmental conditions, there is however a marked difference between these indicators for people living in the CITs and people living in the old democracies (graph 3.1/1 and 3.1/2). The difference in life expectancy is most pronounced for men.

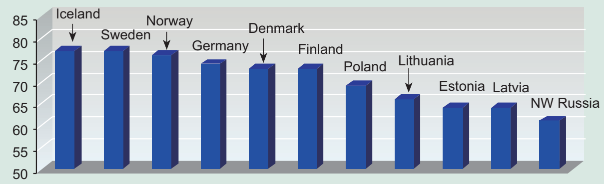
"A co-operative and prosperous economy and a society for all."

The economic situation differs widely between the countries in the Baltic Sea Region. While the regional **GDP per capita** has increased during the 1990s, the economic gap between the CITs and the old market economies was growing (graph 3.1/4). During the 1990s, the **unemployment rates** have increased in many countries, with the highest rates found among the old market economies (graph 3.1/7).

Graph 3.1/1a: Life expectancy at birth - female (1997)

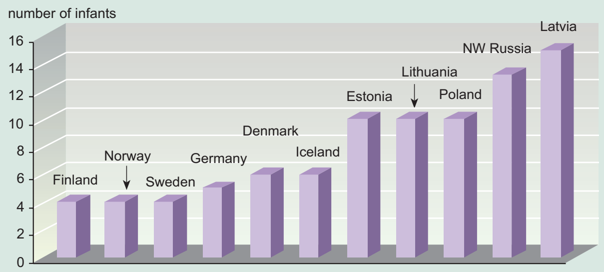


Graph 3.1/1b: Life expectancy at birth - male (1997)



Definition: Life expectancy at birth indicates the number of years a new born infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life.
Data source: World Bank and the Statistical Yearbook of Russian Regions, 1998.
Notes: NW Russian 1990 data (male and female) correspond to data for 1989-1990.

Graph 3.1/2: Infant mortality rate (1997)



Definition: Infant mortality rate is the number of infants who die before reaching one year of age, per 1 000 live births in a given year.
Data source: The World Bank, World Development Indicators, 1999, on CD-ROM. (1990-1997), WHO 1998 and Statistical Yearbook of Russian Regions, 1998.

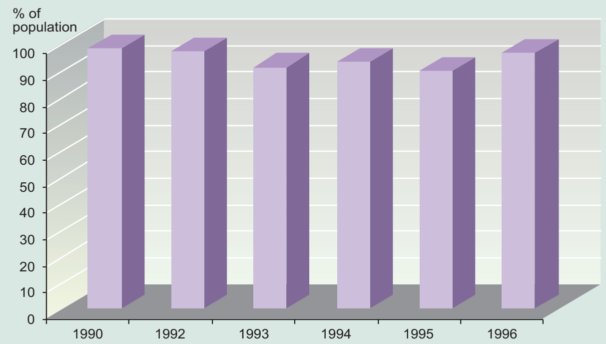
"That local and regional co-operation is based on democracy, openness and participation."

Democracy is another fundament for sustainable development, but also difficult to monitor. One possible indicator is the participation in national and local elections. The present pattern is that the old democracies show a higher level of public involvement in local and national elections compared to the new democracies (graph 3.1/8).

"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."

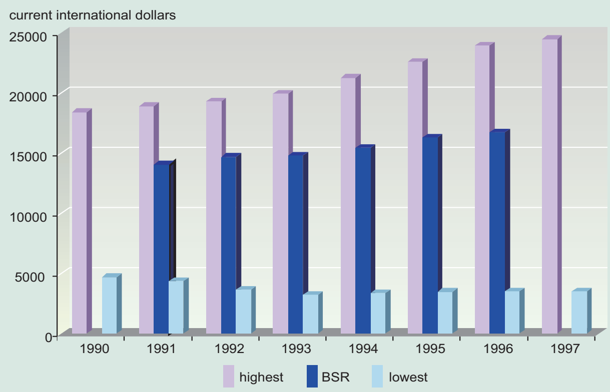
In order to stabilise the atmospheric concentrations of greenhouse gases, and thus to halt the **global**

Graph 3.1/3: Population exposed to ozone above critical levels



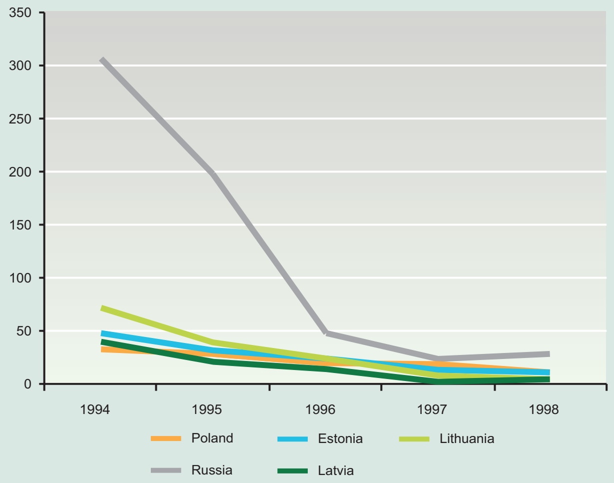
Definition: Critical levels for population: AOT60 (ppm.h), 12&18h, Apr-Sep. The AOT60 is defined as the sum (integral) over a defined period of the (hourly) O3 concentration above a threshold of 60 ppb.1 ppb = 2 micro-g/m3 of O3 or 1 ppm = 2 mg/m3 O3.
Data source: RIVM, Coordination Centre for Effects, Status Report 1999.
Notes: Values for the AOT60 are very uncertain. It is not wise to draw too many conclusions from the data, especially on a year-to-year basis.

Graph 3.1/4: GDP; BSR, lowest and highest

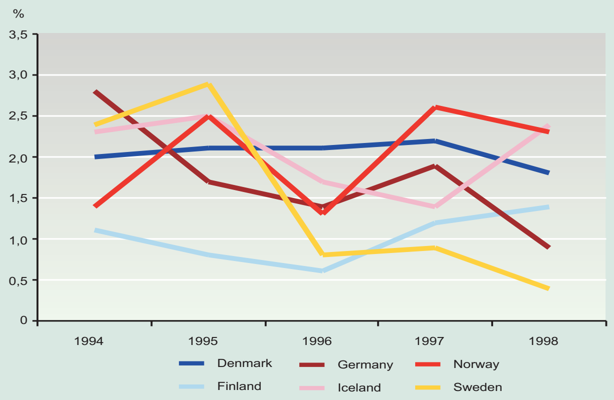


Definition: GDP per capita based on purchasing power parity (PPP). GDP PPP is gross domestic product converted to international dollars using purchasing power parity rates.
Data source: World Bank
Notes: The GDP per capita for NW Russia has been calculated from Russian data (WB data source) using index 0,8. The index (0,8) is the ratio of Russian Region GDP rlb. per capita to Russian Federation GDP rbl per capita in 1994-1996.

Graph 3.1/5: Inflation (excluding Russia)

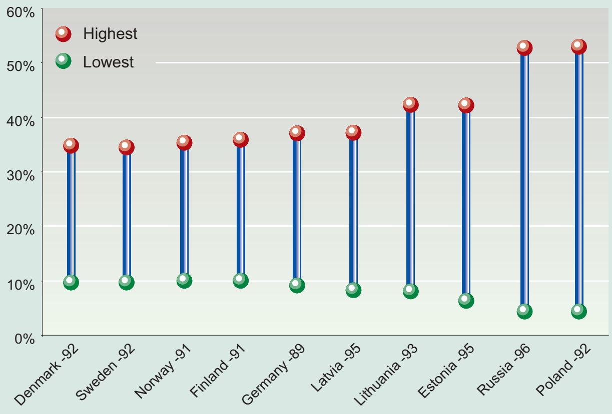


Graph 3.1/5: Inflation (including Russia)



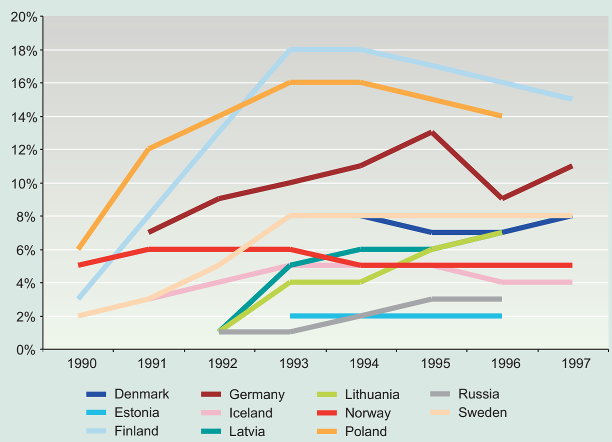
Definition: % change of consumer prises from previous year.
Data source: Estonia, Latvia, Lithuania, Poland (1990-93), Russia: Business Central Europe (http://www.bcemag.com/).
OECD countries: OECD, Economic Outlook (June 1999)

Graph 3.1/6: Income distribution



Definition: Income of the 20% of the population with the lowest and highest income respectively, as a share of the total income.
Data source: World Bank.
Notes: The data presented are for different years.

Graph 3.1/7: Unemployment rates



Definition: Unemployment rate is the share of the labour force that is without work but available for and seeking employment. Definitions of labour force and unemployment differ between countries.
Data source: World Bank

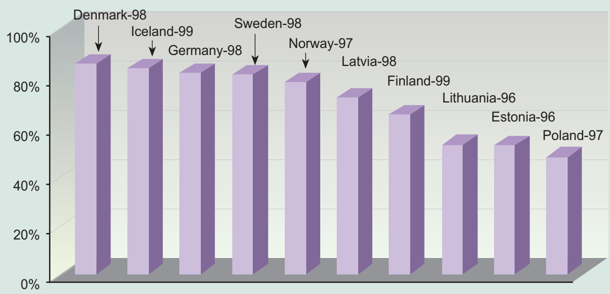
warming, the industrialised countries in the world have agreed under the Kyoto-protocol of the UN Framework Convention on Climate Change, to reduce their aggregate greenhouse gas emissions by approximately 5% below the 1990 level, as an average for the period 2008-2012. The Baltic Sea Region CO_2 emission levels during the 1990s have remained rather stable (graph 3.1/9). It is clear from the analyses of the Intergovernmental Panel on Climate Change, that the global CO_2 emissions will have to be reduced well below current levels in the course of the next century, and that the industrialised countries will have to reduce their emissions drastically, perhaps to levels of the order of 10% of today.

The internationally agreed long-term target for both **acidification of land and water as well as eutrophication of land** is to reach below critical load levels. The emissions to air of acidifying and eutrophying substances are clearly decreasing in the region (graphs 3.1/10 and 3.1/11), and most countries have national targets for 2010 that will lead to further substantial reductions. As a consequence of the reduced emissions, the area of land in the Baltic Sea Region where the deposition of acidifying substances is above critical loads is decreasing, approaching the long-term target. The situation as regards eutrophication of land is also improving, but the decrease is less pronounced (graph 3.1/12).

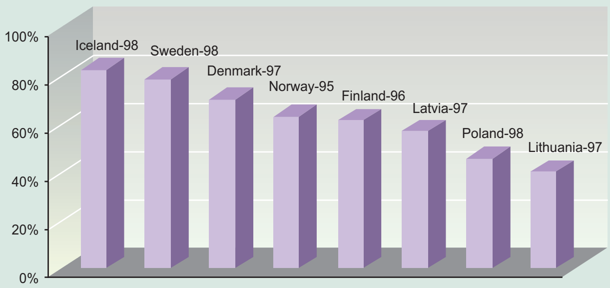
The restoration of the **Baltic Sea environment** is a common responsibility of all the countries bordering the Baltic Sea. The HELCOM contracting parties have agreed to reduce the nutrient load to the Baltic Sea by 50%, compared to the levels in the late 1980s, by the year 2005. HELCOM is presently working to estimate the load of nutrients and hazardous substances in the late 1980s. These estimates will provide the basis for setting absolute targets to be reached by 2005. The long-term target for hazardous substances is to, within one generation, eliminate the emissions and discharges of manmade substances and to reduce the concentrations of naturally occurring substances to near background levels.

It is difficult to assess the impact of the measures undertaken so far. In short, the reduction of nutrients and toxic substances from point sources has been rather successful, while it has proven to be difficult to reduce the discharges from diffuse sources like agriculture and transport.

Graph 3.1/8a: Participation in the latest national election

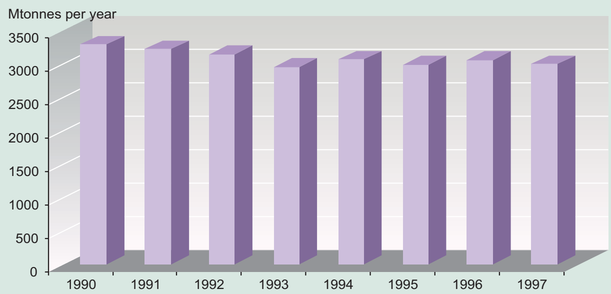


Graph 3.1/8b: Participation in the latest local election



Data source:
Denmark: Statistisk Årsbog 1998, Danmarks Statistik.
Estonia: Estonian Embassy in Stockholm.
Finland: Statistics Finland.
Germany: Federal Statistical Office, Yearbook 1999.
Iceland: Icelandic Embassy in Stockholm.
Lithuania: Lithuanian Embassy in Stockholm.
Norway: Statistics Norway.
Poland: Ministerial Information Centre.
Sweden: Statistics Sweden.

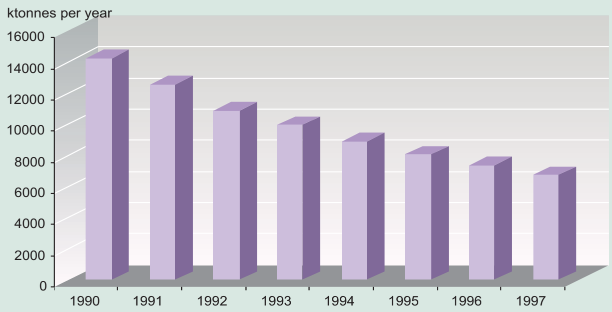
Graph 3.1/9: BSR CO_2 emissions



Data source: International Energy Agency and UNFCCC Green House Gas database.
Notes: The data for north western Russia cover the European part of the EMEP area.

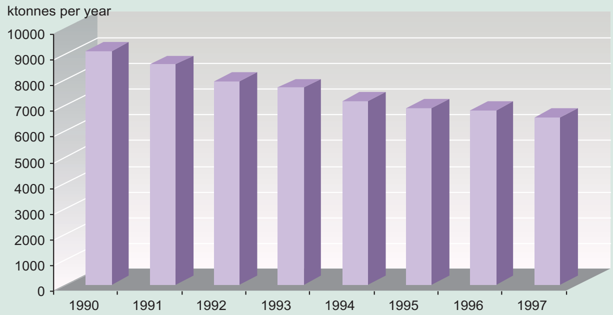
Realising the dangers of **ozone layer depletion**, all CBSS countries have signed the Montreal Protocol on Substances that Deplete the Ozone Layer. The phasing out of ozone layer depleting substances has been quite successful, specially for those substances

Graph 3.1/10: BSR SO_2 emissions



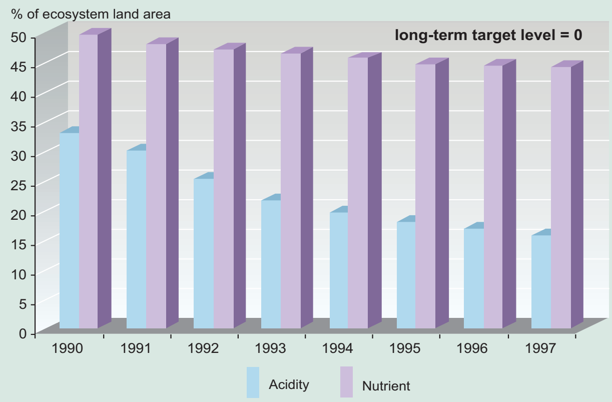
Data source: EMEP. German data are provided by the German Federal Environmental Agency.
Notes: The data for north western Russia cover the European part of the EMEP area. NW Russia figures only include emissions from stationary sources.

Graph 3.1/11: BSR NO_x emissions



Data source: EMEP. German data are provided by the German Federal Environmental Agency.
Notes: The data for north western Russia cover the European part of the EMEP area.

Graph 3.1/12: BSR ecosystem area where acidification and eutrophication exceed critical levels



Data source: RIVM, Coordination Centre for Effects, Status Report 1999.
Notes: Data do not include the entire NW Russia and does not include Iceland.

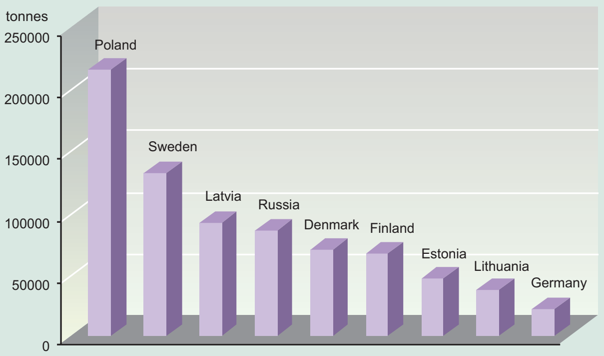
that have the largest depleting potential, CFCs and Halons. However, CFCs and Halons are still being consumed in the region, even though the consumption of these substances should have been phased out already during the 1990s. (graph 3.1/15)

The loss of **bio-diversity** is sometimes a potential threat to ecosystem productivity and thus to the production of food and other goods for human consumption. However, ecosystem productivity might decrease also from other reasons. The main causes of loss of bio-diversity are intensive use of arable and forest land, and pollution. An assessment of this important parameter, based on a selection of relevant indicators, is given in section 3.2 (agriculture) and 3.5 (forests).

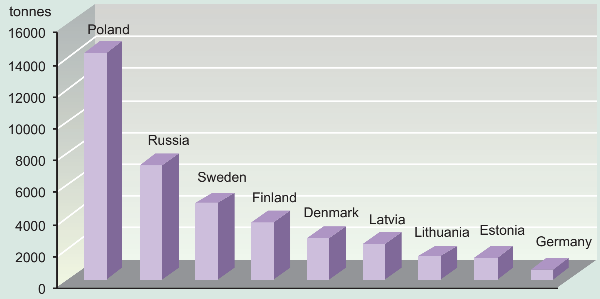
"That renewable resources are efficiently used and managed, within their regeneration capacity. That materials flow of non-renewable resources are made efficient and cyclic, and that renewable substitutes are created and promoted."

A common feature for all countries in the Baltic Sea Region is the high **dependency on non-renewable resources**. As regards energy, there is a trend towards decreased energy intensity (measured as regional energy consumption versus GDP, graph 3.3/6), as well as a possible weak reduction of the energy supply for regional consumption. The share of renewable energy sources is also slowly increasing (graph 3.3/10). It is however difficult to analyse the situation regarding the use of non-renewable material due to lack of statistics, but it is clear that it will require substantial efforts to use both energy and material more efficiently, to increase the share of renewable resources and to reuse and recycle material.

Graph 3.1/13a: Nitrogen riverine inputs and discharge from point sources to the Baltic Sea (1995)

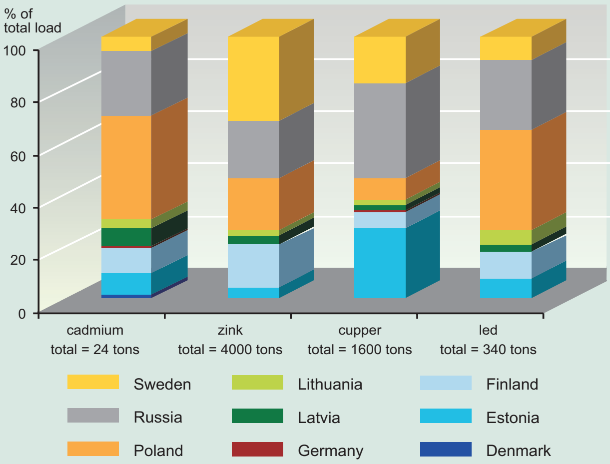


Graph 3.1/13b: Phosphorus riverine inputs and discharge from point sources to the Baltic Sea (1995)



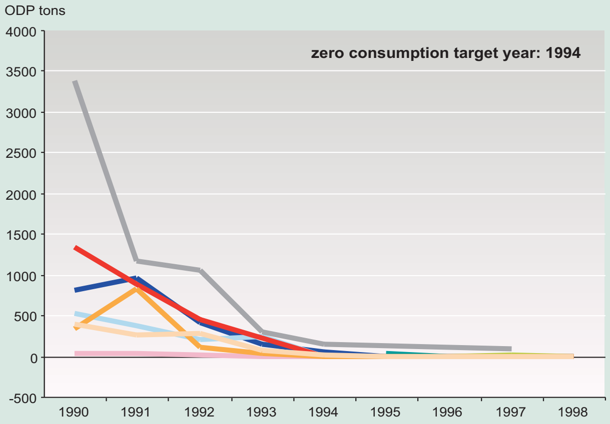
Definition: The load includes diffuse leakage and discharges from point sources up-streams the rivers.
Data source: HELCOM, The third Baltic Sea Pollution Load Compilation (PLC-3), Baltic Marine Environment Protection Commission, 1998.
Notes: Data include only Baltic Sea catchment area. Data are not complete.

Graph 3.1/14: Emission and discharges of metals to the Baltic Sea

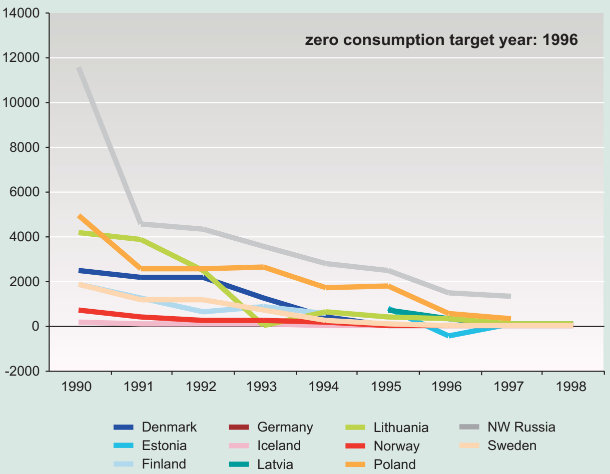


Data source: HELCOM, Baltic Sea Environmental Proceedings No. 70 The Third Baltic Sea Pollution Load Compilation (PLC-3).
Notes: Includes only the Baltic Sea catchment area.
Denmark. Data on heavy metal load from urban environment.
Estonia: Data for heavy metal load in rivers are from 1994.
Germany: Data on heavy metal load from rivers, industry and urban environment.
Latvia and Lithuania: Data on heavy metal load from rivers and urban environment.

Graph 3.1/15a: Consumption of Halons

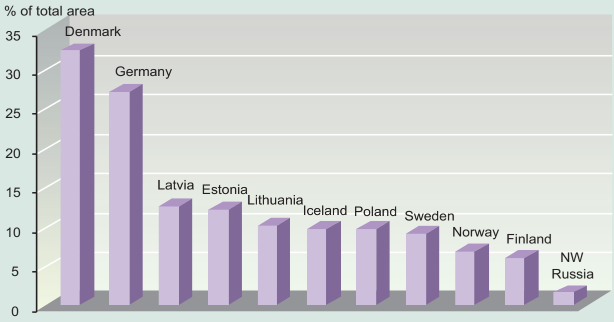


Graph 3.1/15b: Consumption of CFCs



Definition: Consumption includes production, imports and exports of the bulk substances. Substances in products, or reused substances, are not included. Negative values are explained by exports of a substance produced earlier years.
Data sources: Ozone Secretariat. Report of the Secretariat on Data: Production and Consumption of Ozone Depleting Substances (ODSs): 1986-1996; Accessible in the Internet: http://www.unep.org/ozone/reports2.htm.
Denmark and Sweden: Data for 1995 and onwards have been provided from the countries directly.
Notes:
Germany: There are no German statistics on consumption available. The presented zero consumption figures for Halons are derived from zero consumption figures presented by the Ozone Secretariat for the entire EU.
NW Russia: The presented figures have been calculated from data for the entire Russia, using the index 0.117 (share of population living in NW Russia).

Graph 3.1/16: Protected areas versus total area



Definition: Protected Areas by IUCN (World Conservation Union) Categories (I-V). Protection according to IUCN classes. IUCN has defined a series of protected area management categories based on management objective. Definitions of these categories, and examples of each, are provided in Guidelines for Protected Area Management Categories (IUCN, 1994). The six categories are:
CATEGORY Ia: Strict Nature Reserve: protected area managed mainly for science
CATEGORY Ib: Wilderness Area: protected area managed mainly for wilderness protection
CATEGORY II: National Park: protected area managed mainly for ecosystem protection and recreation
CATEGORY III: Natural Monument: protected area managed mainly for conservation of specific natural features
CATEGORY IV: Habitat/Species Management Area: protected area managed mainly for conservation through management intervention
CATEGORY V: Protected Landscape/Seascape: protected area managed mainly for landscape/seascape conservation and recreation
CATEGORY VI: Managed Resource Protected Area: protected area managed mainly for the sustainable use of natural ecosystems.
Data source: WRI, 1998-99 World Resources Database DC-Rom, A guide to the Global Environment , 1999. Statistical Yearbook of Russian Regions, 1998.
Notes: The Danish figure includes Greenland.

3.2 Development in the Agriculture Sector

AGRICULTURE SECTOR GOAL AND CORE INDICATORS

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 the environmental problems that future generations must assume responsibilities for.*

  Indicators:
  - Load of nutrient to the Baltic Sea from arable land (Riverine and direct nitrogen and phosphorous loadings into the Baltic Sea)
  - Nitrogen and phosphorus fertiliser use
  - Livestock units per ha
  - Permanent pasture to total arable land

- *Non-renewable resources have to gradually be replaced by renewable resources and that re-circulation of non-renewable resources is maximised.*

  Indicators:
  - Phosphorus fertiliser use

- *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.*

  Indicators:
  - Crop and milk productivity

- *The ethical aspects of agricultural production are secured.*

”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 the environmental problems that future generations must assume responsibilities for.”

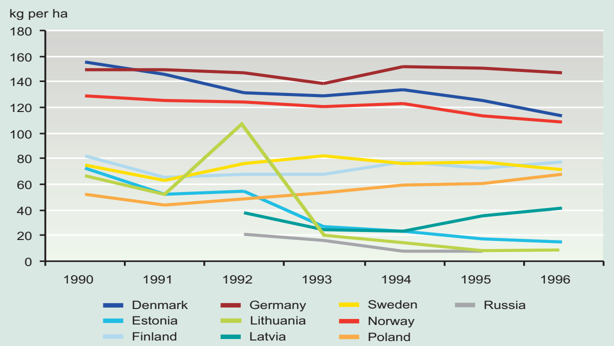
Agriculture is the largest anthropogenic source of nutrient input to the Baltic Sea. On the average, agriculture is estimated to account for 30-35% of the nitrogen load and 10-15% of the phosphorus load. In order to reach the 50% Baltic Sea nutrient reduction target, measures have been directed towards the agricultural sector in all countries. Nitrogen and phosphorus leakage has already decreased locally but it will take considerable time before noticeable reductions are evident.

High nitrogen fertiliser applications were dominant in all countries around the Baltic Sea during the decades since 1960 and have resulted in large nitrogen storage in arable soils. High application of nitrogen fertiliser is still dominant in some western countries, while the CIT:s have reduced their application of nitrogen considerably in the last decade. (graph 3.2/1)

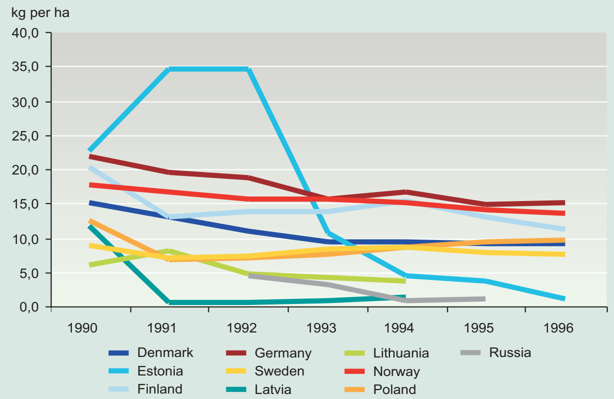
The average livestock (animal) density of a country indicates, besides the application of fertilisers, the nutrient status and risks for nutrient leakage. The livestock density is lower in the CIT and Poland than in the other countries, when measured as numbers of livestock per total arable land in the country as a whole (graph 3.2/2). However, at the local level, large production units are common in these countries, even after the drastic change of production level at the beginning of the 1990s, and are substantial point sources of pollution. The amount of livestock has been greatly reduced in the CIT and Poland since the beginning of the 1990s, as the export market practically disappeared. At the same time the amount of arable land has also decreased so the trend regarding livestock units per hectare arable land has been relatively stable. Germany, Denmark, Sweden and Finland are characterised by family farms, which have become larger and more specialised in either plant production or animal husbandry.

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. An interesting observation is the large areas of permanent pastures that exist in Estonia, Latvia, Poland and Russia (graph 3.2/3).

Graph 3.2/1a: Yearly applied nitrogen fertilisers

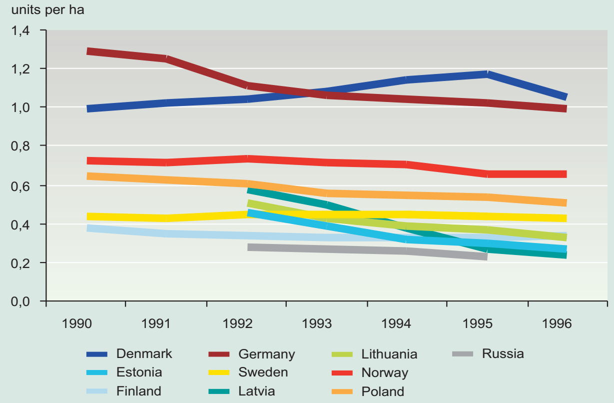


Graph 3.2/1b: Yearly applied phosphorus by mineral fertilisers



Data source: FAO, BEAROP in Lithuania, Interim Report 1997-1998, BEAROP in Estonia, -96 - 97.

Graph 3.2/2: Livestock density



Definition: The livestock density (livestock unit per hectare) is an aggregate measure of the number of animals per hectare of arable land. The livestock unit has been calculated by using conversion factors (presented in Appendix to HELCOM Recommendation 13/17) for different animals.
Data source: Calculations based on FAO statistics.

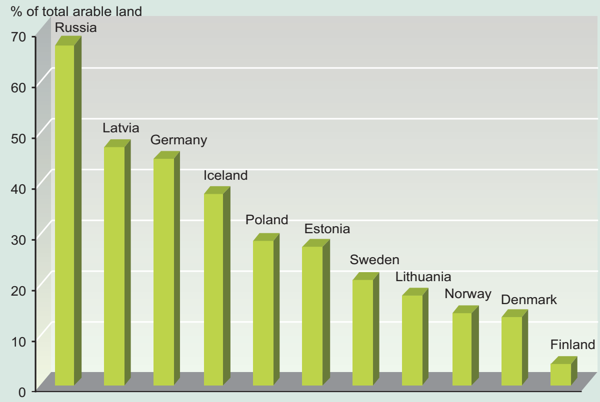
"Non-renewable resources have to gradually be replaced by renewable resources and that re-circulation of non-renewable resources is maximised."

Like nitrogen, leakage of phosphorus causes eutrophication, however mainly in lakes and rivers. Mineral phosphorus in fertilisers is also a non-renewable resource and the deposits are limited. The current trend is that less mineral phosphorus is used, both seen as the total use and as the per hectare application (graph 3.2/1).

"Sustainable agriculture will meet societies needs of food..."

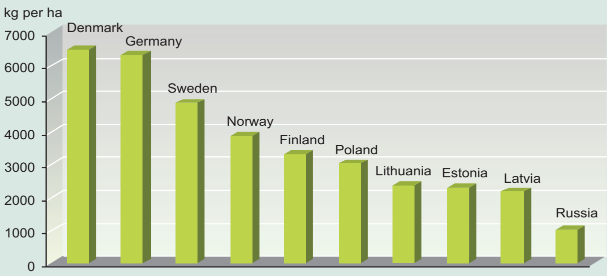
In the EU countries and especially in Denmark, Germany and Sweden, the production of crops (graph 3.2/4), milk (graph 3.2/5) and meat is more than twice the production per hectare in the CITs. In these countries the efficiency is poor regarding the utilisation of fodder for animals.

Graph 3.2/3: Permanent pasture (1994)

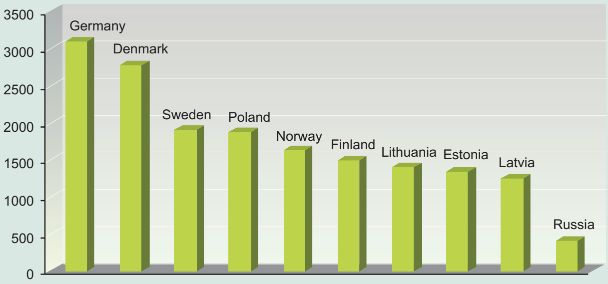


Data source: FAO.

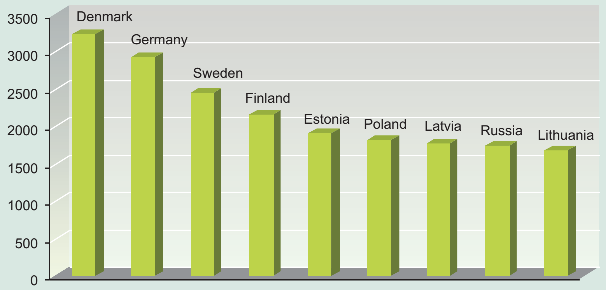
Graph 3.2/4a: Cereals, yield per hectare (1998)



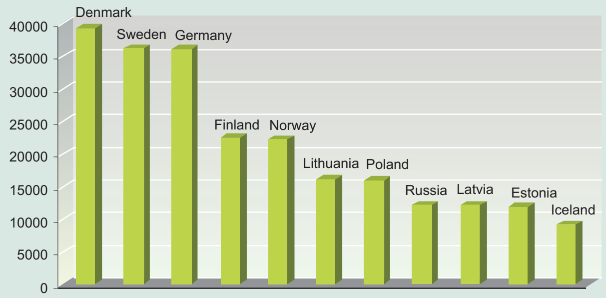
Graph 3.2/4b: Rapeseeds, yield per hectare (1997)



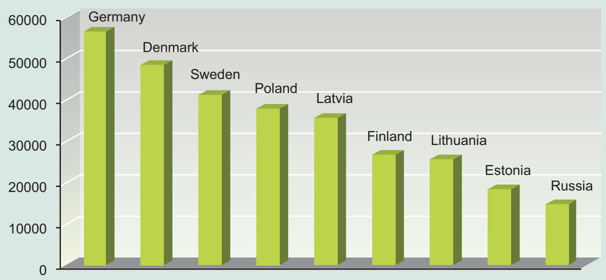
Graph 3.2/4c: Leguminoses, yield per hectare (1997)



Graph 3.2/4d: Potatoes, yield per hectare (1997)



Graph 3.2/4e: Sugarbeets, yield per hectare (1997)

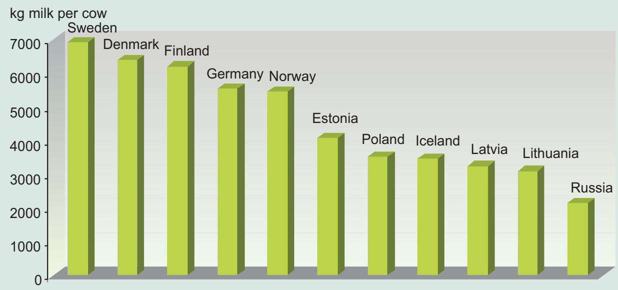


Definition: Kg per hectare
Data source: FAO.

However, a high productivity, through intensive farming, may cause a stress on the environment and on the long-term productivity of land. On the other hand, when high nitrogen applications are followed by large yields of harvest most of the nitrogen is removed by the crop and little is left to run off. In the other case, in extensive farming, there may be excessive nitrogen applications which are not always properly utilised by the crops.

The major challenge for the agricultural sector is to combine the environmental, social and economic dimension to start the transition to sustainable agriculture.

Graph 3.2/5: Milk productivity (1997)



Data source: FAO

3.3 Development in the Energy Sector

ENERGY SECTOR GOALS AND CORE INDICATORS

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.*

  Indicators:
  - Lowest versus highest GDP/capita in the region (ppp)

- *Energy supply must not give rise to pollution exceeding critical loads or levels of acidification, eutrophication, troposheric ozone and global climate change.*

  Indicators:
  - SO_2 emission
  - NO_x emission
  - CO_2 emission

- *Elimination of hazards related to nuclear waste and nuclear energy production.*

- *Maintain long-term security of supply by resource management.*

  Indicators:
  - Energy production
  - Total primary energy supply (TPES)
  - Self sufficiency (energy production per (TPES))

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

- *Energy savings,*

  Indicators:
  - Total Final Consumption (TFC)
  - TFC per capita
  - TPES per GDP

- *Increased energy efficiency, including combined heat and power production,*

  Indicators:
  - Efficiency in central transformation and transmission
  - CHP Efficiency
  - CHP-heat/total heating

- *Increased use of renewable energy resources and substitution of high-carbon fossil fuels by low-carbon fossil fuels.*

  Indicators:
  - Renewable energy per TPES
  - Renewable electricity/total electricity
  - Natural gas per TPES

"Energy supply must not give rise to pollution exceeding critical loads or levels of acidification, eutrophication, troposheric ozone and global climate change."

The use of fossil fuels is the major contributor to acidification, troposheric ozone and eutrophication of land and water. The use of fossil fuels is also the major source of CO_2 leading to global warming. A regional trend assessment of the CO_2, SO_2 and NO_x emissions and their impact on the ecosystems, is given in section 3.1.

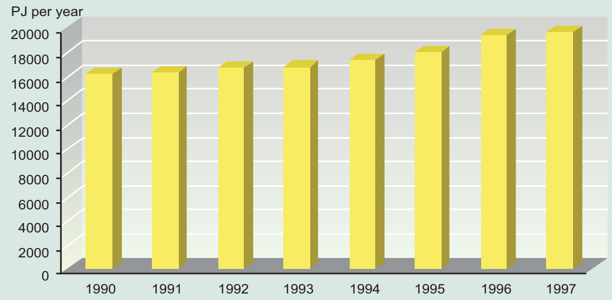
"Maintain long-term security of supply by resource management."

More energy is produced in the region than is needed for the regional energy consumption. The high degree of regional energy self sufficiency (graph 3.3/3) is due to the high net energy export by Norway and north western Russia. The remaining countries are net importers of energy.

"Energy savings."

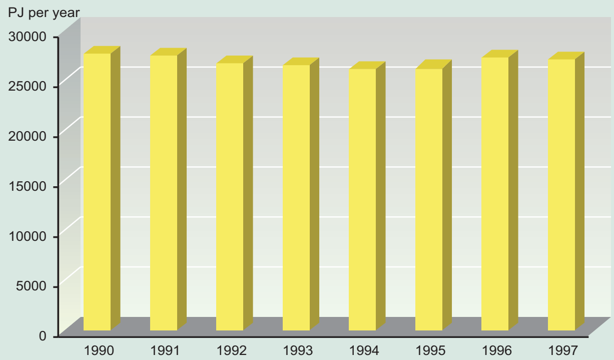
Energy savings is an important measure to decrease the environmental impact and the dependence on non-renewable energy sources. Important savings activities are improved industrial processes and reduction of heat-losses from the building stock. No direct indicator of energy saving has been developed but the energy intensity (measured as regional total primary energy supply versus GDP, graph 3.3/5) has decreased in most parts of the region over the last years. There is also a slight decrease in the energy consumption per capita (graph 3.3/6).

Graph 3.3/1: **BSR energy production**



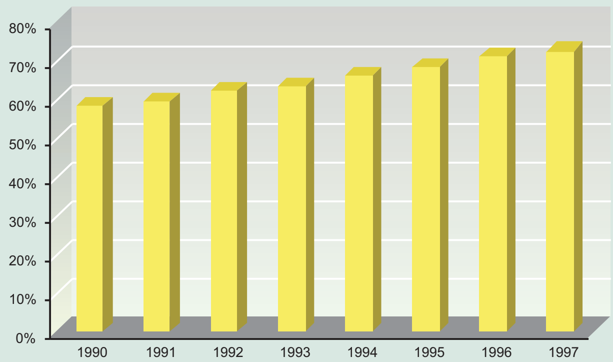
Data source: International Energy Agency.
Notes: The figures for north-western Russia data do not include data for Novgorod and Arkhangelsk. The 1990 and 1991 statistics for Estonia, Latvia, Lithuania and NW Russia are in some degree based on linear regression from the ex-USSR statistics. This is based on the rough assumption, that all countries in the new USSR have had the same ratio of change as the ex-USSR from 1990 to 1992.

Graph 3.3/2: **BSR total primary energy supply (TPES)**



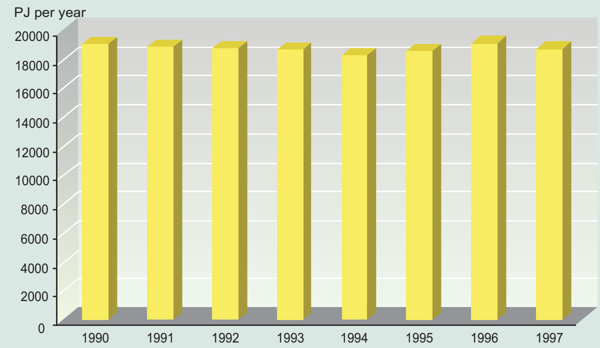
Data source: International Energy Agency.
Notes: The figures for north-western Russia data do not include data for Novgorod and Arkhangelsk. The 1990 and 1991 statistics for Estonia, Latvia, Lithuania and NW Russia are in some degree based on linear regression from the ex-USSR statistics. This is based on the rough assumption, that all countries in the new USSR have had the same ratio of change as the ex-USSR from 1990 to 1992.

Graph 3.3/3: **BSR energy self sufficiency**



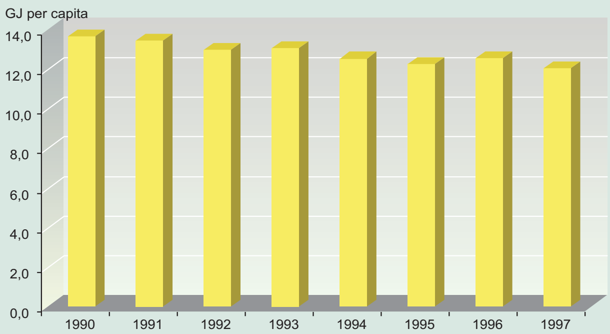
Definition: Energy production to TPES (%).
Data source: International Energy Agency.
Notes: The figures for north-western Russia data do not include data for Novgorod and Arkhangelsk. The 1990 and 1991 statistics for Estonia, Latvia, Lithuania and NW Russia are in some degree based on linear regression from the ex-USSR statistics. This is based on the rough assumption, that all countries in the new USSR have had the same ratio of change as the ex-USSR from 1990 to 1992.

Graph 3.3/4: **BSR total final energy consumption (TFC)**



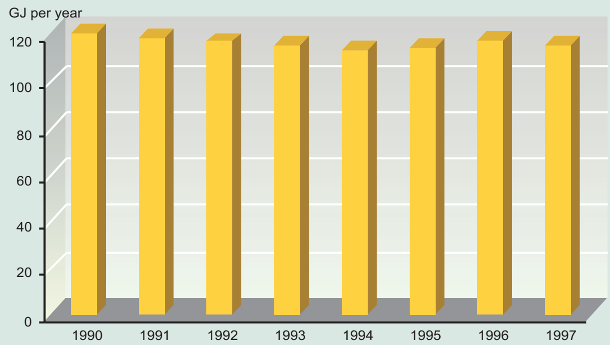
Data source: International Energy Agency.
Notes: The figures for north-western Russia data do not include data for Novgorod and Arkhangelsk. The 1990 and 1991 statistics for Estonia, Latvia, Lithuania and NW Russia are in some degree based on linear regression from the ex-USSR statistics. This is based on the rough assumption, that all countries in the new USSR have had the same ratio of change as the ex-USSR from 1990 to 1992.

Graph 3.3/5: **BSR energy intensity**



Definition: Ratio of Total Primary Energy Supply (TPES) to GDP (PPP).
Data source: International Energy Agency.
Notes: The figures for north-western Russia data do not include data for Novgorod and Arkhangelsk. The 1990 and 1991 statistics for Estonia, Latvia, Lithuania and NW Russia are in some degree based on linear regression from the ex-USSR statistics. This is based on the rough assumption, that all countries in the new USSR have had the same ratio of change as the ex-USSR from 1990 to 1992.

Graph 3.3/6: **BSR total final energy consumption (TFC) per capita**



Definition: Ratio of total final energy consumption to population.
Data source: International Energy Agency.
Notes: The figures for north-western Russia data do not include data for Novgorod and Arkhangelsk. The 1990 and 1991 statistics for Estonia, Latvia, Lithuania and NW Russia are in some degree based on linear regression from the ex-USSR statistics. This is based on the rough assumption, that all countries in the new USSR have had the same ratio of change as the ex-USSR from 1990 to 1992.

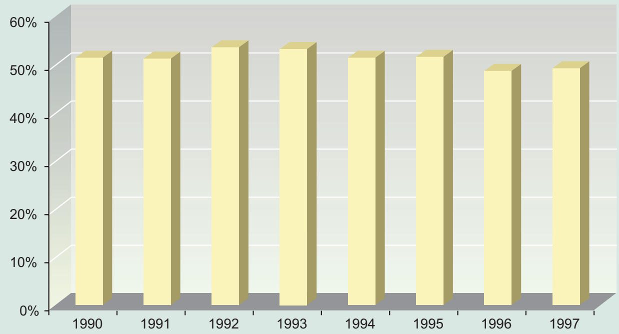
"Increased energy efficiency, including combined heat and power production."

Energy is lost when transforming and transmitting heat and electricity from generating plants to the consumers. The energy transformation and transfer efficiency has been relatively constant at 50% during the last decade (graph 3.3/7), which means that 50% of the energy input is lost in the transformation and transmission processes. More efficient use of existing district heating systems for combined heat and power production (CHP) is one of the main tools for increased energy efficiency. The potential for increased synergy between hydropower and CHP is unique for the Baltic Sea Region and could further enhance the energy efficiency if the market framework and infrastructure is developed properly. By increasing the use of combined heat and power production (CHP), and with an unchanged share of hydropower, the energy transformation and transfer efficiency could rise to 80%.

"Increased use of renewable energy resources and substitution of high-carbon fossil fuels by low-carbon fossil fuels."

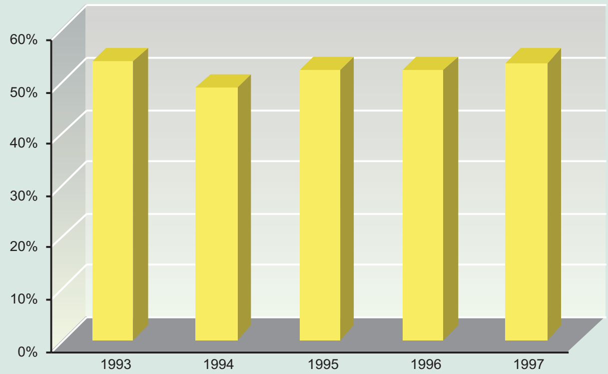
The share of renewable energy in the Baltic Sea Region is about 7% (graph 3.3/10). About 40% of the renewable energy in 1997 was hydropower. Other renewables, mainly biomass, has increased substan-

Graph 3.3/7: BSR efficiency in central transformation and transmission



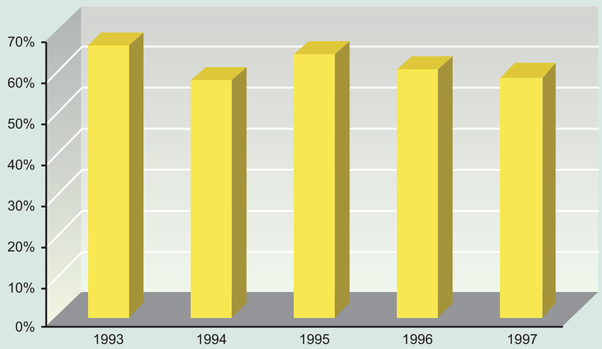
Definition: Output to end consumer from electricity, CHP and heat plants per fuel input, %.
Data source: International Energy Agency.
Notes: The figures for north-western Russia data do not include data for Novgorod and Arkhangelsk. The 1990 and 1991 statistics for Estonia, Latvia, Lithuania and NW Russia are in some degree based on linear regression from the ex-USSR statistics. This is based on the rough assumption, that all countries in the new USSR have had the same ratio of change as the ex-USSR from 1990 to 1992.

Graph 3.3/9: BSR CHP heat per total heating



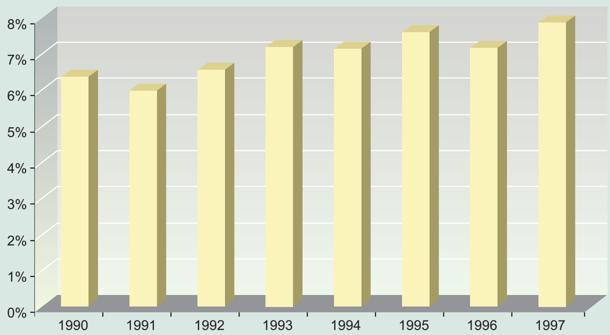
Definition: Ratio of CHP Heat to Total Heat.
Data source: International Energy Agency.
Notes: Possible data problems: Russia 1990-93, Germany 1990-97. The figures for north-western Russia data do not include data for Novgorod and Arkhangelsk. The 1990 and 1991 statistics for Estonia, Latvia, Lithuania and NW Russia are in some degree based on linear regression from the ex-USSR statistics. This is based on the rough assumption, that all countries in the new USSR have had the same ratio of change as the ex-USSR from 1990 to 1992.

Graph 3.3/8: BSR CHP efficiency



Definition: CHP Electricity and Heat production to CHP energy consumption.
Data source: International Energy Agency.
Notes: The figures for north-western Russia data do not include data for Novgorod and Arkhangelsk. The 1990 and 1991 statistics for Estonia, Latvia, Lithuania and NW Russia are in some degree based on linear regression from the ex-USSR statistics. This is based on the rough assumption, that all countries in the new USSR have had the same ratio of change as the ex-USSR from 1990 to 1992.

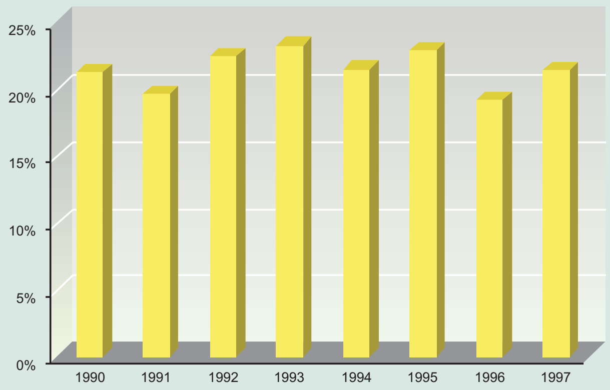
Graph 3.3/10: BSR renewable energy versus total final energy supply



Definition: Renewable energy includes electricity production in hydro power plants; geothermal, solar, wind, tide and wave energy; combustible renewables and waste.
Data source: International Energy Agency.
Notes: The figures for north-western Russia data do not include data for Novgorod and Arkhangelsk. The 1990 and 1991 statistics for Estonia, Latvia, Lithuania and NW Russia are in some degree based on linear regression from the ex-USSR statistics. This is based on the rough assumption, that all countries in the new USSR have had the same ratio of change as the ex-USSR from 1990 to 1992.

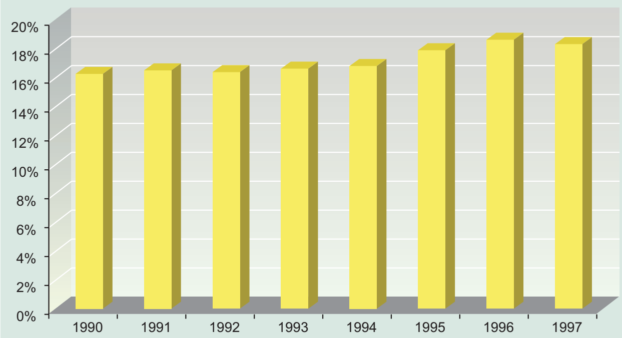
tially, and is still increasing. Also the use of natural gas is substantial and rapidly increasing in the old democracies. The regional use has however been rather stable during the 1990s (graph 3.3/12) due to decreased use in the new democracies.

Graph 3.3/11: Renewable electricity per total electricity



Definition: Ratio of Renewable Electricity Production to Total Electricity.
Data source: International Energy Agency.
Notes: The figures for north-western Russia data do not include data for Novgorod and Arkhangelsk. The 1990 and 1991 statistics for Estonia, Latvia, Lithuania and NW Russia are in some degree based on linear regression from the ex-USSR statistics. This is based on the rough assumption, that all countries in the new USSR have had the same ratio of change as the ex-USSR from 1990 to 1992.

Graph 3.3/12: Relative natural gas consumption in the BSR



Definition: Ratio of Natural gas to Total Primary Energy Supply.
Data source: International Energy Agency.
Notes: The figures for north-western Russia data do not include data for Novgorod and Arkhangelsk. The 1990 and 1991 statistics for Estonia, Latvia, Lithuania and NW Russia are in some degree based on linear regression from the ex-USSR statistics. This is based on the rough assumption, that all countries in the new USSR have had the same ratio of change as the ex-USSR from 1990 to 1992.

3.4 Development in the Fisheries Sector

FISHERIES SECTOR GOAL AND CORE INDICATORS

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.*

  Indicators:
  - Spawning Stock Biomass
  - Fishing mortality
  - Recruitment

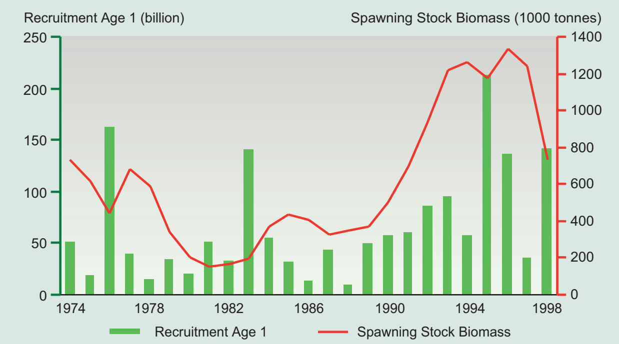
- *Within these limits, establish maximum fishing possibilities and appropriate selective fishing techniques for harvesting stocks.*

  Indicators:
  - Landings per country: tonnes of cod, salmon, herring, sprat
  - Number of fishing vessels per country operating in the Baltic Sea
  - Average fishing fleet engine power per country
  - Fish consumption per capita per country

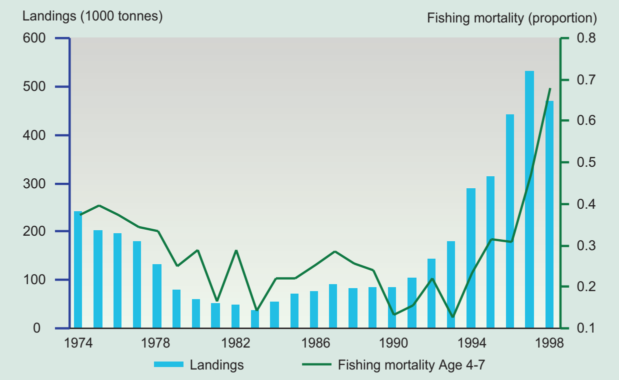
- *Distribute the direct and indirect benefits of open sea and coastal fishery resources between local communities in an equitable manner.*

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

Graph 3.4/1a: Sprat (sub-division 22-32 in the Baltic Sea) Recruitment and Spawning Stock Biomass



Graph 3.4/1b: Sprat (sub-division 22-32 in the Baltic Sea) Landings and Fishing Mortality



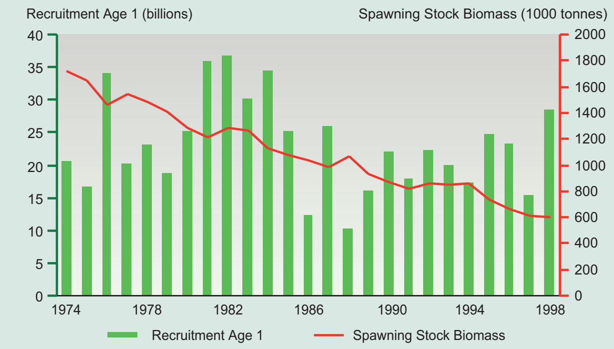
Definitions:
Spawning stock biomass: the biomass of a fish species taking part in the reproduction process.
Fishing mortality: The proportion of the average population removed annually by fishing.
Recruitment: The number of fish reaching the age where they enter the fisheries.
Data sources:
Recruitment, spawning stock and fishing mortality: International Council for the Exploration of the Sea.
Landings: International Baltic Sea Fishery Commission.

"Maintaining biologically 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."

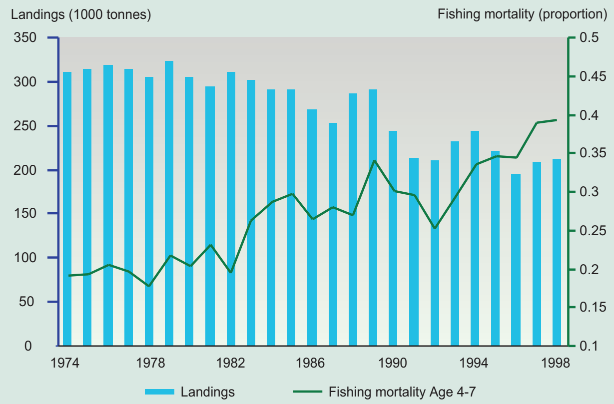
Since the size of the fish stocks in the Baltic Sea varies due to natural conditions (e.g. fluctuations in the inflows of saline water from the North Sea), it is not possible to achieve a static balance in the fish stocks. However biological indicators like the spawning stock biomass (the biomass of a fish species taking part in the reproduction process), fishing mortality (the proportion of the average population removed annually by fishing) and recruitment (the number of fish reaching the age where they enter the fisheries) play an important role when establishing national fish quota, Total Allowable Catches (TACs), and thus on economic parameters like the landing of fish.

From 1992-1998 the total yield from the Baltic Sea increased by about 60 %, in particular due to high Sprat catches on the basis of a strong stock abundance. The spawning stock biomass of Sprat has however decreased in the most recent years. After the highest spawning stock on record (1992 – 1997), the stock is above the likely critical level under the

Graph 3.4/2a: Herring (sub-division 25-29+32 in the Baltic Sea)
Recruitment and Spawning Stock Biomass

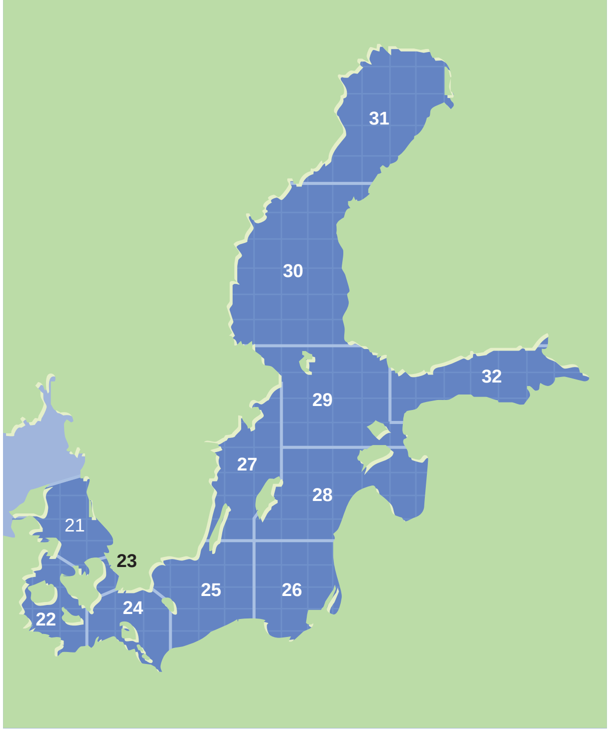


Graph 3.4/2b: Herring (sub-division 25-29+32 in the Baltic Sea)
Landings and Fishing Mortality

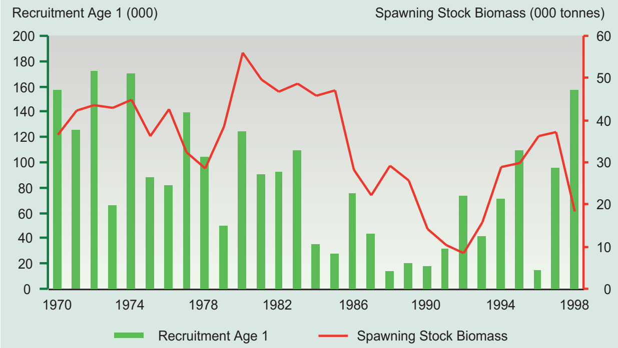


Definitions:
Spawning stock biomass: the biomass of a fish species taking part in the reproduction process.
Fishing mortality: The proportion of the average population removed annually by fishing.
Recruitment: The number of fish reaching the age where they enter the fisheries.
Data sources:
Recruitment, spawning stock and fishing mortality: International Council for the Exploration of the Sea.
Landings: International Baltic Sea Fishery Commission.

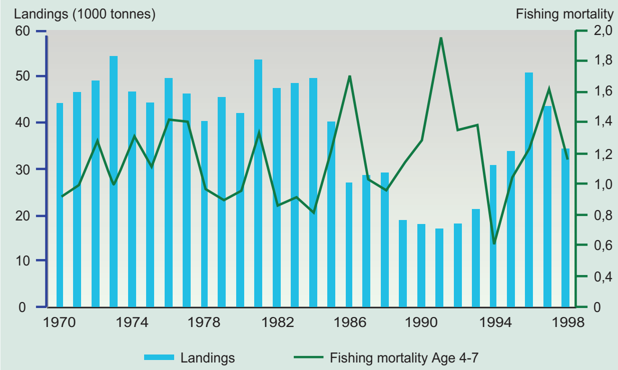
Baltic Sea sub-divisions



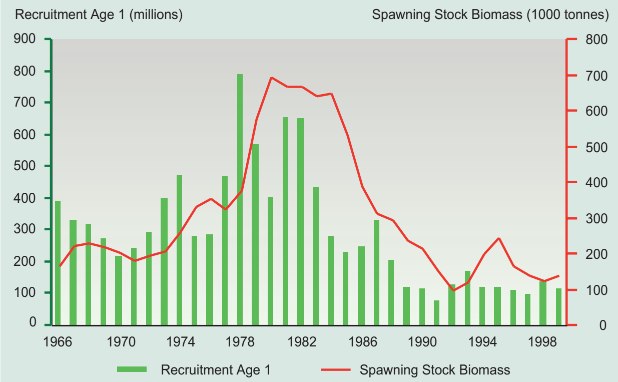
Graph 3.4/3a: Cod (sub-division 22-24 in the Baltic Sea)
Recruitment and Spawning Stock Biomass



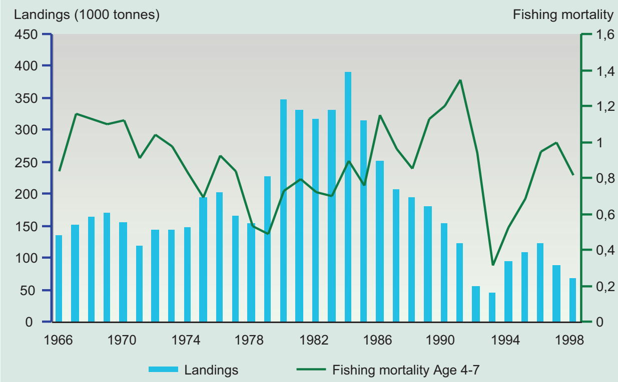
Graph 3.4/3b: Cod (sub-division 22-24 in the Baltic Sea)
Landings and Fishing Mortality



Graph 3.4/3c: Cod (sub-division 25-32 in the Baltic Sea)
Recruitment and Spawning Stock Biomass



Graph 3.4/3d: Cod (sub-division 25-32 in the Baltic Sea)
Landings and Fishing Mortality



Definitions:
Spawning stock biomass: the biomass of a fish species taking part in the reproduction process.
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.
Data sources:
Recruitment, spawning stock and fishing mortality: International Council for the Exploration of the Sea.
Landings: International Baltic Sea Fishery Commission.

current condition of low predation from Cod. Sprat landings increased from 143,000 in 1992 to a peak of about half a million tonnes in 1997/98. (graph 3.4/1)

During the same period the landings of Herring have been comparatively stable around 350 000 tonnes, and in the main basin about 200 000 tonnes. Knowledge of the present stock situation is limited. A critical stock size where remedial actions are needed can not be determined for the Herring. The biomass has constantly decreased (in tonnes) however the spawning stock has increased in number of fish (graph 3.4/2). However, due to the complexity of the Herring stock composition, the total stock does not always reflect the state of separate populations.

The increase of the total yield was to a certain degree also caused by increased Cod catches in the mid 1990s on the basis of an improved stock abundance at that time. From the historically lowest level of 40,000 tonnes (1993) it increased to 160,000 tonnes (1996) and it is going down again during the most recent years because of unfavourable natural conditions. Major inflows of saline North Sea water before 1976 led to the historically highest Cod spawning stock biomass in 1980 – 1985. Total lack of inflow between 1983 and 1992, and only one major inflow in 1993, thereafter caused a stagnation period in Baltic deep water and poor recruitment. (graph 3.4/3)

Besides the landing of fish, it has not been possible to analyse other economic and social aspects of the goal for sustainable fisheries due to the lack of statistics (table 3.4/1-4). An important social, economic and environmental aspect of sustainable fisheries is to balance the fishing fleet capacity and the number of fishermen to the fluctuating fish stocks, in order to safeguard a long-term and stable fishermen's income.

Table 3.4/1: Number of fishing vessels per country operating in the Baltic Sea

Year	Germany	Denmark	Sweden	Finland	Estonia	Latvia	Lithuania	Poland	Russia
1997	-	1 527	2 443	3 987	-	222	65*)	1 296	134
1998	2 160	1 376	-	-	233	220	65*)	1 315	130

*) Only vessels operating in the open sea.
Data source: Data collected from countries.

Table 3.4/2: Average engine power per country (kW)

Year	Germany	Denmark	Sweden	Finland	Estonia	Latvia	Lithuania	Poland	Russia
1997	-	86	104	53.7	-	176	194*)	95.1	267.5
1998	44	89	-	-	165	179	190*)	-	245.2

*) Only vessels operating in the open sea.
Definition: Total kilowatt of the fleet divided by the number of vessels..
Data source: Data collected from countries.

Table 3.4/3: Fish consumption per capita per country (kg)

Year	Germany	Denmark	Sweden	Finland	Estonia	Latvia	Lithuania	Poland	Russia
1997	14.6	18*)	18.7	14.5	-	12.5	12	6.7	9.3
1998	-	18*)	-	-	15	12.4	12	-	9.8

*) Minimum estimate.
Data source: Data collected from countries.

Table 3.4/4: Number of full time fishermen engaged in the Baltic Sea Region, per country.

Year	Germany	Denmark	Sweden	Finland	Estonia	Latvia	Lithuania	Poland	Russia
1997	1 900	550	1 330	1 071	-	*)	821**)	4 000	1 302
1998	1 900	550	-	-	15	*)	857**)	4 000	1 224

*) No reliable data are available. Fishermen registration started in January 1999.
**) Preliminary figures, no registration of fishermen yet.
Data source: Data collected from countries.

3.5 Development in the Forest Sector

FOREST SECTOR GOAL AND CORE INDICATORS

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:

1. *Maintenance and appropriate enhancement of forest resources and their contribution to global carbon cycles*

   Indicators:
   - 1.1 Area of forest and other wooded land and changes in area
   - 1.2 Changes in a) total volume of growing stock b) mean volume of growing stock on forest land c) age structure or appropriate diameter distribution classes
   - 1.3 Total carbon storage and, changes in the storage in forest stands

2. *Maintenance of forest ecosystem health and vitality*

   Indicators:
   - 2.1 Total amount of and, changes over the past 5 years in depositions of air pollutants.
   - 2.2 Changes in serious defoliation of forests using the UN/ECE and EU defoliation classification over the past 5 years
   - 2.3 Serious damages caused by biotic or abiotic agents: a) severe damage caused by insects and diseases with a measurement of seriousness of the damage as function of (mortality or) loss of growth b) annual area of burned 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

3. *Maintenance and encouragement of the productive functions of forests (wood and non-wood)*

   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
   - 3.3 Total amount of changes in the value and/or quantity of non-wood forest products

4. *Maintenance, conservation and appropriate enhancement of biological diversity in forest ecosystems*

   Indicators:
   - 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
   - 4.2 Changes in the number and percentage of threatened species in relation to total number of forests species
   - 4.3 Changes in the proportion 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 proportion of mixed stands of 2-3 tree species
   - 4.5 In relation to total area regenerated, proportion of annual area of natural regeneration

5. *Maintenance and appropriate enhancement of protective functions in forest management (notably soil and water)*

   Indicators:
   - 5.1 Proportion of forest area managed primarily for soil protection
   - 5.2 Proportion of forest area managed primarily for water protection

6. *Maintenance of other socio-economic functions and conditions*

   Indicators:
   - 6.1 Share of the forest sector from the gross national product
   - 6.2 Provision of recreation: area of forest with access per inhabitant, % of the total forest area
   - 6.3 Changes in the rate employment in forestry, notable in rural areas (persons employed in forestry, logging, forest industry)

Data are not available for all Pan-European indicators. The assessment of the development in the forest sector below is restricted to these indicators for which data are presented in "The International Report on Sustainable Forest Management in Europe", reported to the Third Ministerial Conference on the Protection of Forest in Europe. The indicators refereed to in the text below are:

- Area of forest and other wooded land
- Changes in area of forest and other wooded land
- Annual average change in forest growing stock
- Trees showing serious defoliation
- Causes for damage to forest and other wooded land
- Percentage of forest area managed according to a management plan or management guidelines
- Balance between fellings and net annual increment
- Forests according to "naturalness"
- Natural regeneration
- Proportion of mixed forest stands
- Threatened forest species
- Protection status of forest land
- Public access to forest and other wooded land
- Area of forest and other wooded land per inhabitant
- Ownership structure
- Age-class distribution of forest available for wood supply

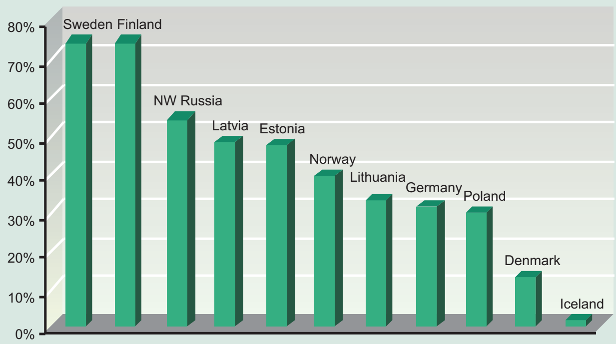
"Maintenance and appropriate enhancement of forest resources and their contribution to global carbon cycles."

The Baltic Sea region has a high proportion of forested land. Generally, the forest cover of the region shows a strong north-south gradient; from about 10% in Denmark to 70% in Finland. The forested land area (graph 3.5/1, graph 3.5/2), as well as the forest growth (measured as the average annual change in the volume of the growing stock, graph 3.5/3) increased during the last reference period in the region. Besides increasing the potential for wood harvesting, a growing forest and an increasing forest area, act like a sink for CO_2 emissions, and thus counteract global warming of CO_2 emissions.

"Maintenance of forest ecosystem health and vitality."

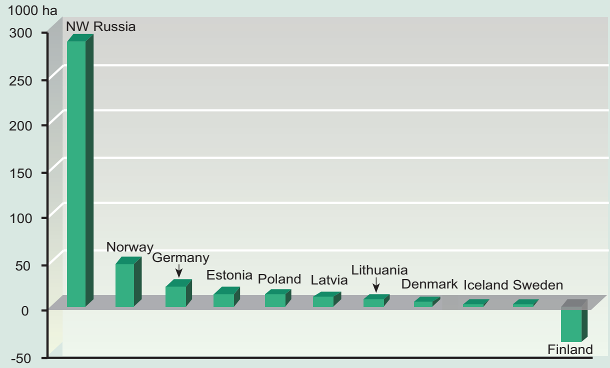
Acidification is one of the most severe environmental threats to the health of the forest ecosystems. The decreasing amount of land area where the deposition of acidifying substances exceeds the critical load levels (graph 3.1/12), indicates however that the situation will improve. The percentage of sampled trees showing serious defoliation (graph 3.5/4) is also decreasing. No conclusion can be drawn as to the causes of the defoliation, which vary from site to site. The relative importance of local pollution sources

Graph 3.5/1: Area of forest and other wooded land



Definition: Forest: tree crown coverage 10% or more of the land area, other wooded land: 5-10% coverage.
Data source: Pan-European compilation (Table 1 and 3), FAO internet db, UNECE internet db (Estonia) and Federal Forest Service of Russia (NW Russia).
Reference period:
Denmark: 1990
Estonia: 1995
Finland: 1991-96
Germany: 1987
Iceland: 1998
Latvia: 1997
Lithuania: 1996
Norway: 1994-96
Poland: 1992-96
NW Russia: 1998
Sweden: 1992-96
Notes: NW Russia: Data for St. Petersburg are not reported.

Graph 3.5/2: Changes in area of forest and other wooded land



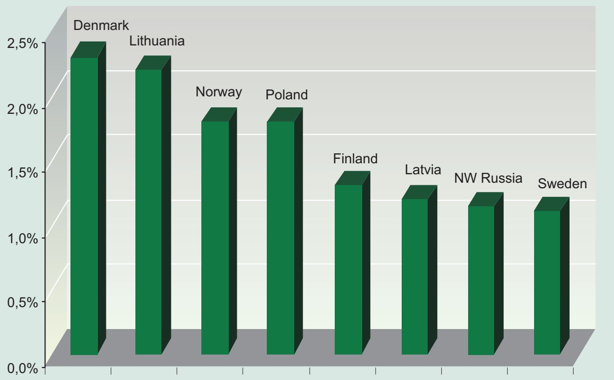
Definition: Annual average change in total forest and other wooded land area.
Data source: Pan-European compilation (Table 1 and 3), FAO internet db, UNECE internet db (Estonia) and Federal Forest Service of Russia (NW Russia).
Reference period:
Denmark: 1976, 1990
Finland: 1980-89, 1991-96
Germany: 1961, 1987
Iceland: 1990, 1998
Latvia: 1988, 1997
Lithuania: 1987, 1996
Norway: 1980-86, 1994-96
Poland: 1987-91, 1992-96
NW Russia: 1993, 1998
Sweden: 1985-89, 1992-96
Notes: NW Russia: Data for St. Petersburg are not reported.

are small compared to insect and disease epidemics, grazing, weather and climate conditions (graph 3.5/5) but interactions between pollution and biotic damage can be seen.

"Maintenance and encouragement of the productive functions of forests (wood and non-wood)"

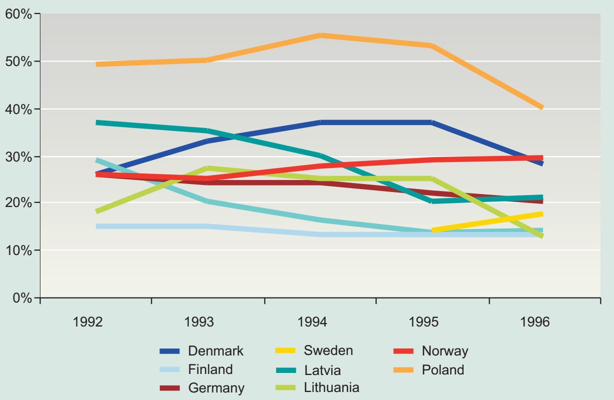
The great majority of the forests in the region are managed according to a management plan or management guidelines (graph 3.5/6). Also on a larger scale, national forestry plans or programmes have been or are going to be prepared in many countries. The ratio between fellings and growth represents a rough indication on the intensity of the use of forests for wood production. In the Baltic Sea Region, this indicator ranges from 30-75% (graph 3.5/7). The

Graph 3.5/3: Annual average change in forest growing stock



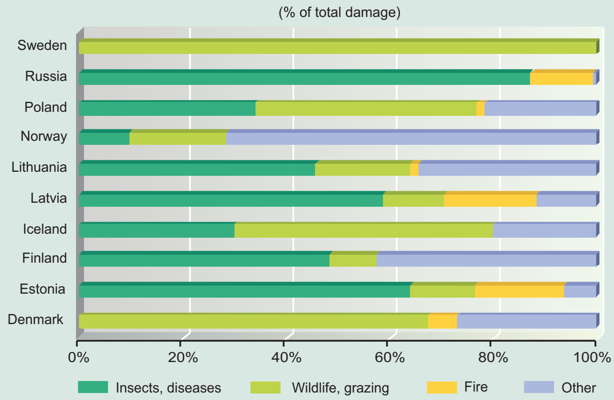
Definition: The growing stock includes all above ground stem volume. The change in the growing stock is due to the difference between growth and drain (fellings and natural losses) and changes in forest land area.
Data source: Pan-European compilation and Federal Forest Service of Russia (NW Russian data).
Reference periods:
Denmark: 1980, 1990
Finland: 1980-89, 1991 - 96
Germany: 1961, 1987
Latvia: 1988, 1997
Lithuania: 1987, 1996
Norway: 1980 – 86, 1994 - 96
Poland: 1987 – 91, 1992 - 96
NW Russia: 1993, 1998
Sweden: 1985 – 89, 1992 - 96
Notes: Data for Estonia and Iceland are missing.

Graph 3.5/4: Trees showing serious defoliation



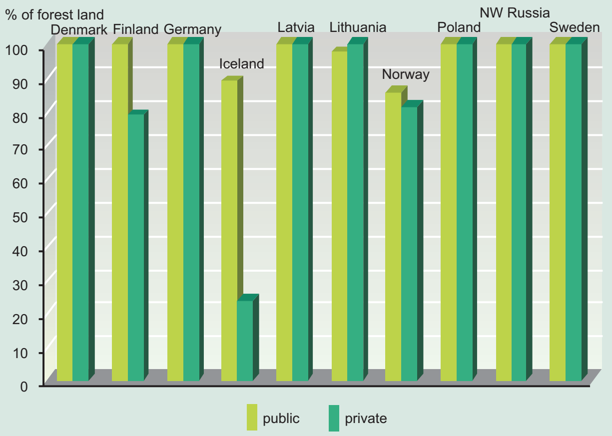
Definition: Percentage of total sampled trees in ICP Forest damage classes 2, 3 and 4, which means trees showing defoliation of 25% or more measured by a common methodology.
Data source: Pan-European compilation.
Notes: Data for Iceland and NW Russia are missing.

Graph 3.5/5: Causes for damage to forest and other wooded land



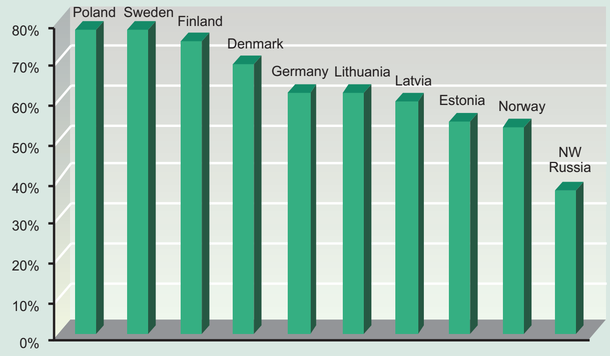
Definition: Relative importance of damage, % of total damage.
Data source: Pan-European compilation (Table 12).
Reference period:
Denmark: 1990-95
Finland: 1986-96
Iceland: 1992-97
Latvia: 1996
Lithuania: 1992-96
Norway: 1994-96
Poland: 1992-96
Russia: 1996
Sweden: 1992-1996

Graph 3.5/6: Forest area managed according to a management plan or management guidelines



Data source: Pan-European compilation (Table 15) and the Federal Forest Service of Russia (NW Russia).
Reference period:
Denmark: 1990
Finland: 1991-96
Germany: 1987
Iceland: 1985
Latvia: 1997
Lithuania: 1997
Norway: 1989
Poland: 1992-96
NW Russia: 1998
Sweden: 1992-96

Graph 3.5/7: **Balance between fellings and net annual increment**



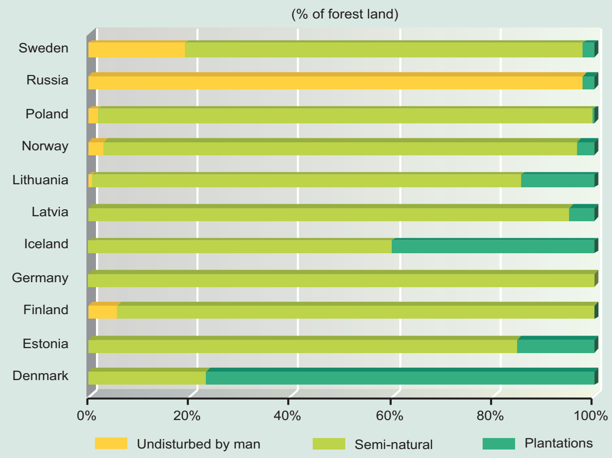
Definition: Fellings as a percentage of increment
Data source: Pan-European compilation (Figure 11) and the Federal Forest Service of Russia.
Reference period:
Denmark: 1996
Estonia: 1996
Finland: 1991-96
Germany: 1996
Latvia: 1996
Lithuania: 1992-96
Norway: 1994-96
Poland: 1992-96
NW Russia: 1997
Sweden: 1992-96

production of non-wood products like game, mushrooms and berries, and possible changes in the productivity of such products, are not sufficiently monitored to detect possible changes.

"Maintenance, conservation and appropriate enhancement of biological diversity in forest ecosystems."

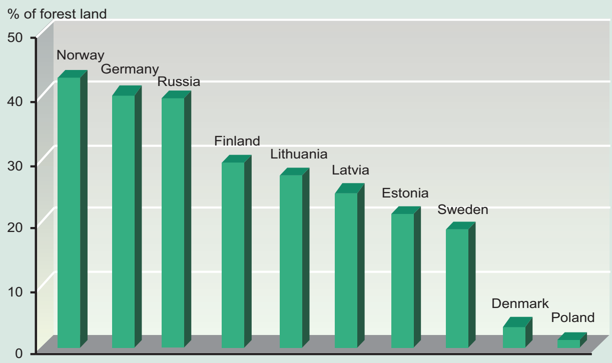
The Pan-European statistical material does not allow for any trend analyses of the forest ecosystem bio-diversity, but only for a description of the state in the region. One should also be careful when comparing countries since the interpretation of many parameters differs. The area of natural forests, that is forests without significant human impact, is comparatively small in the region. Natural and semi-natural forests dominate and only a minor part of the forests is plantations. (graph 3.5/8) The proportion of naturally regenerated forests is ranging from close to zero up to more than 40% depending on country (graph 3.5/9). Also the area of mixed forests (coniferous and broad-leaved) is rather small compared to the areas where one species group predominates (graph 3.5/10).

Graph 3.5/8: **Forests according to "naturalness"**



Definition: Undisturbed = no significant human impact, plantations are defined by the establishment method (plantings or seedings), semi-natural forests that are neither classified as disturbed or plantation.
Data source: Pan-European compilation (Table 16).
Reference period:
Denmark: 1990
Estonia: 1996
Finland: 1991-96
Germany: 1987
Iceland: 1998
Latvia: 1997
Lithuania: 1996
Norway: 1994-96
Poland: 1992-96
Russia: 1993
Sweden: 1992-96

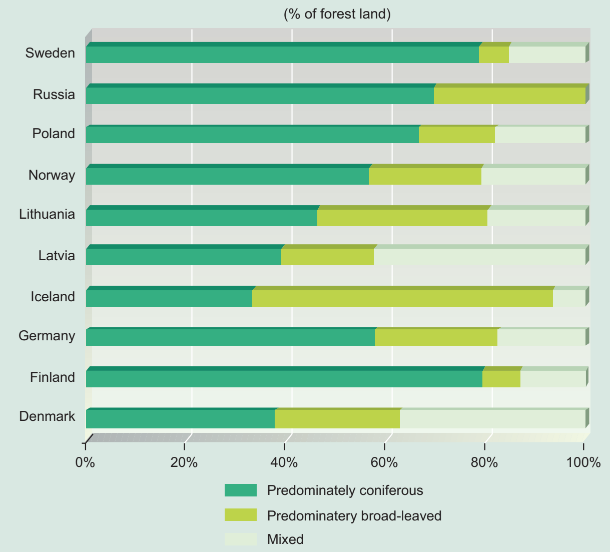
Graph 3.5/9: **Natural regeneration**



Definition: Proportion of regenerated area with natural regeneration.
Data source: Pan-European compilation (Table 19).
Reference period:
Denmark: 1990
Estonia: 1987-1996
Finland: 1987-96
Germany: 1987-96
Latvia: 1988-97
Lithuania: 1987-97
Norway: 1987-96
Poland: 1988-96
Russia: 1983 - 93
Sweden: 1987-96
Notes: The interpretation of "natural generation" may vary between countries.

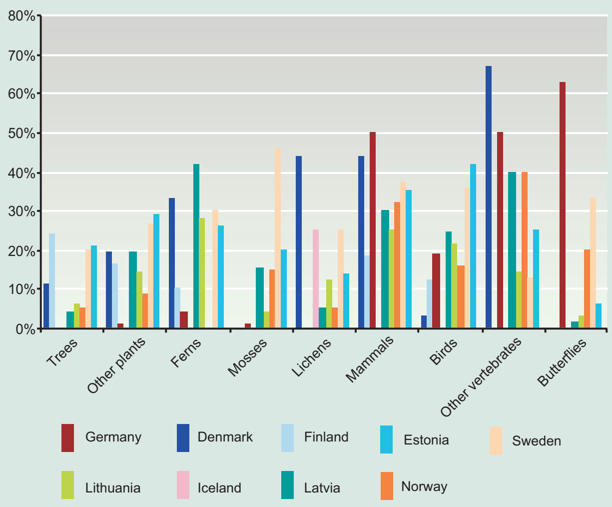
Rather intensive forestry has resulted in an increasing growing stock but to a great extent also in uniform forests. As a consequence, a number of specialised species of the flora and fauna is threatened - up to 40-60 % of certain forest plant and animal groups (graph 3.5/11). However, forestry practice and forestry research has considerably improved the understanding of forest ecosystems and natural processes. In many parts of the region, techniques working closer to nature have been developed, and

Graph 3.5/10: **Proportion of mixed forest stands**



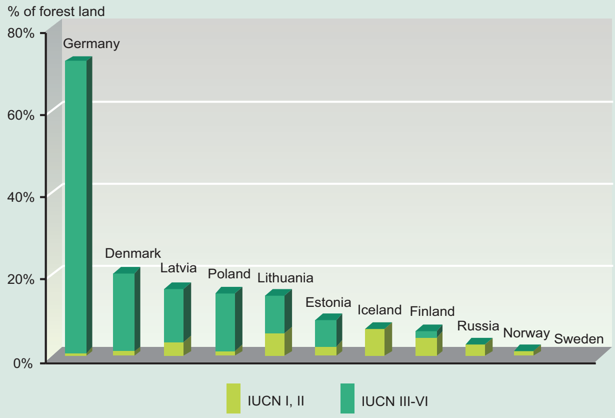
Definition: By predominantly is meant that the species group covers 75% or more of the area.
Data source: Pan-European compilation.
Reference period:
Denmark: 1990
Finland: 1991 - 1996
Germany: 1987
Iceland: 1998
Latvia: 1997
Lithuania: 1996
Norway: 1994 - 1996
Poland: 1992 - 1996
Russia: 1993
Sweden: 1992 - 1996
Notes: One should be careful when comparing countries since the number and composition of tree species differ naturally in different forest types.
Finland: The total figure is less than 100 % because temporarily unstocked forest areas area not assigned to any species group. Germany: Figures correspond to forest available for wood supply.

Graph 3.5/11: **Threatened forest species**



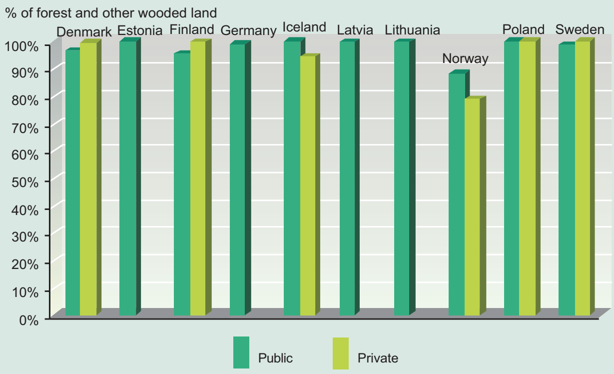
Definition: Threatened forest occurring species as % of total.
Data source: Pan-European compilation (Table 18 A).
Reference period:
No reference period is presented in the Pan-European compilation.
Notes: Care must be taken when interpreting the figures. There are natural differences in species richness between ecosystems and it has not been possible to harmonise the definition.
Data for NW Russia are missing.

Graph 3.5/12: **Protection status of forest land**



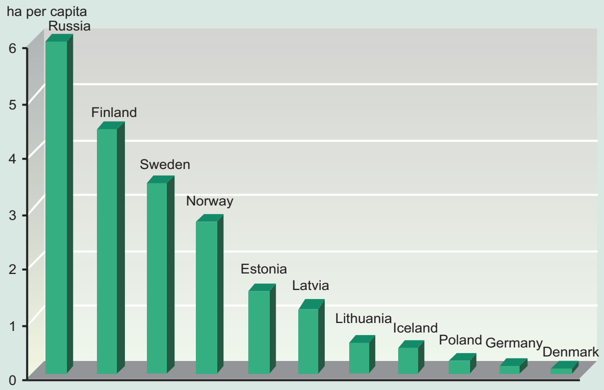
Definition: Protected areas by IUCN (World Conservation Union) Categories (I-V). IUCN has defined a series of protected area management categories based on management objective. Definitions of these categories, and examples of each, are provided in Guidelines for Protected Area Management Categories (IUCN, 1994). The six categories are:
CATEGORY Ia: Strict Nature Reserve: protected area managed mainly for science
CATEGORY Ib : Wilderness Area: protected area managed mainly for wilderness protection
CATEGORY II : National Park: protected area managed mainly for ecosystem protection and recreation
CATEGORY III : Natural Monument: protected area managed mainly for conservation of specific natural features
CATEGORY IV : Habitat/Species Management Area: protected area managed mainly for conservation through management intervention
CATEGORY V : Protected Landscape/Seascape: protected area managed mainly for landscape/seascape conservation and recreation
CATEGORY VI : Managed Resource Protected Area: protected area managed mainly for the sustainable use of natural ecosystems
Data source: Pan-European compilation (Table 17).
Reference period:
Denmark: 1990
Finland: 1991-96
Germany: 1993-96
Iceland: 1998
Latvia: 1997
Lithuania: 1996
Norway: 1997
Poland: 1996
Russia: 1993
Sweden: 1992
Notes: The interpretation of definitions may vary between countries.

Graph 3.5/13: **Public access to forest and other wooded land**



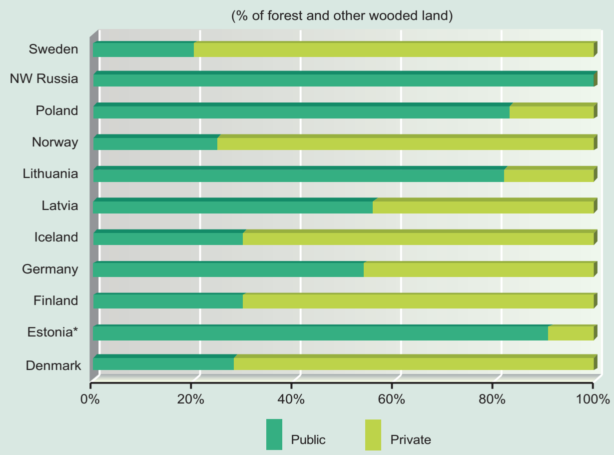
Data source: Pan-European compilation (Table 22).
Reference period:
Denmark: 1990 - 97
Finland: 1997
Germany: 1987
Iceland: 1998
Latvia: 1997
Lithuania: 1997
Norway: 1994-96
Poland: 1996
Sweden: 1992-96

Graph 3.5/14: Area of forest and other wooded land per inhabitant



Data source: Pan-European compilation (Table 21).
Reference period:
Denmark: 1990
Finland: 1991-96
Germany: 1997
Iceland: 1998
Latvia: 1997
Lithuania: 1996
Norway: 1994-96
Poland: 1992-96
Russia: 1993
Sweden: 1992-96

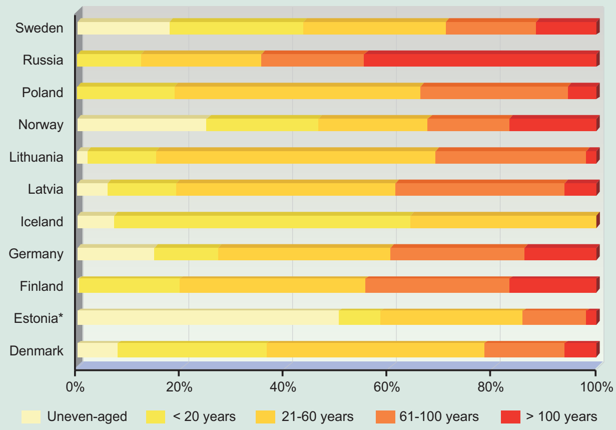
Graph 3.5/15: Ownership structure



Definition: Private includes both forests owned by companies and private families.
Data source: Pan-European compilation (Table 4) and the Federal Forest Service of Russia (NW Russia).
Reference period:
Denmark: 1990
Finland: 1991 -1996
Germany: 1987
Iceland: 1985
Latvia: 1997
Lithuania: 1997
Norway: 1989
Poland: 1992 - 1996
NW Russia: 1998
Sweden: 1992 – 1996

concern about, and activities towards, biodiversity conservation have increased considerably. The protected forests and forest area covered by restriction on forest practices in the countries is in average about 10-15% of the forest land (graph 3.5/12).

Graph 3.5/16: Age-class distribution of forest available for wood supply



Data source: Pan-European compilation (Table 8).
Reference period:
Denmark: 1990
Finland: 1992 - 1996
Germany: 1987
Iceland: 1998
Latvia: 1997
Lithuania: 1996
Norway: 1994 - 1996
Poland: 1992 - 1996
Russia: 1993
Sweden: 1992 - 1996
Notes: Denmark: Figures correspond to total forest area.

"Maintenance and appropriate enhancement of protective functions in forest management (notably soil and water)."

Two indicators have been selected to monitor this criteria; proportion of forest area managed primarily for soil protection and proportion of forest area managed primarily for water protection. The statistical material does however not yet allow any analysis of these important parameters.

"Maintenance of other socio-economic functions and conditions."

The forest sector is significant for the national economies in all countries in the Baltic Sea Region. Forestry, including small scale wood processing, can also be seen as a way to enhance rural development and employment. Furthermore the forests play an important role in providing recreation opportunities for both the local population and tourists. Most countries have in common free access to almost all forested land (graph 3.5/13). The forest area per person varies however widely between the countries in the region (graph 3.5/14), and thus the potential for accommodating recreational use.

3.6 Development in the industry Sector

INDUSTRY SECTOR GOAL AND CORE INDICATORS

Sustainable development for the industrial sector in the Baltic Sea Region is maintaining continuity of economic, social, technological 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.*

  Indicators:
  - Industrial production
  - Energy consumption
  - Renewable energy (total figures and % of total energy consumption)
  - CO_2 emissions
  - NO_2 emissions
  - SO_x emissions

- *Applying sustainable strategies to resources, processes, products and services.*

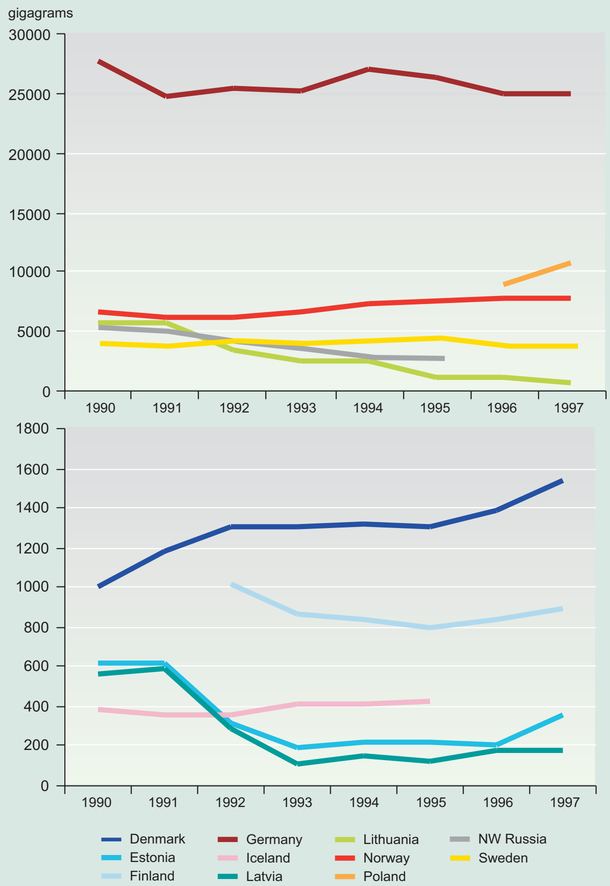
  Indicators:
  - Number of companies applying Environmental Management Systems
  - Number of companies applying Quality Management Systems

"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."

A challenge for sustainable development of the industry sector is to reduce its negative impact on the environment through air emissions and water discharges, to use energy and resources more efficiently and to increase the share of renewable energy and material. The industrial CO_2, NO_2 and SO_2 emissions follow the total regional emission trends with rather stable CO_2 emission level during the 1990s, and decreasing SO_2 and NO_x emissions (graph 3.6/1).

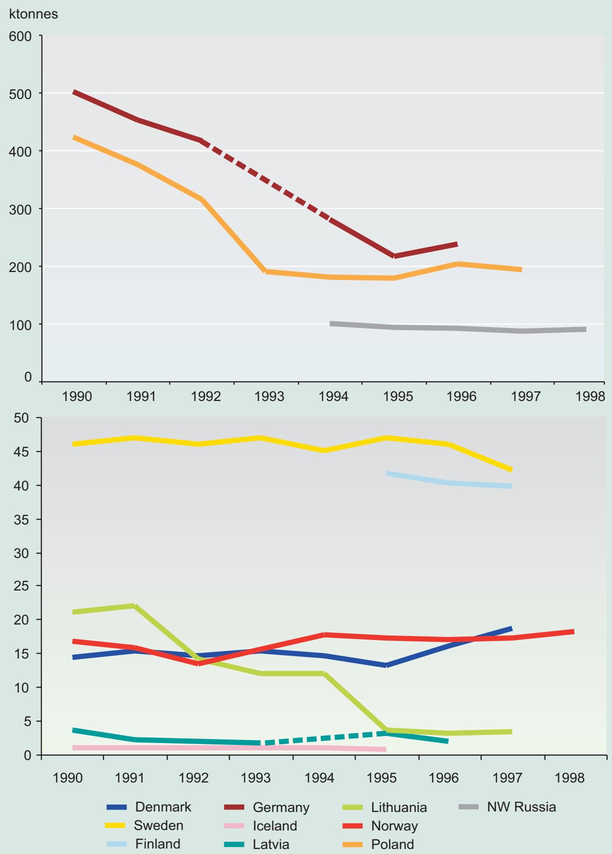
There is a possible small decrease in the industrial energy consumption (3.6/2), but this reflects not only measures taken to increase the energy efficiency, but also fluctuations in the industrial economic activity (3.6/3). The share of renewable energy is only a few percent in the region as a whole, but has steadily been increasing during the 1990s. Finland and Sweden are the two countries that use the highest share of renewable energy in their industrial production, primarily in pulp and paper production. (graph 3.6/2)

Graph 3.6/1a: Industrial CO_2 emissions



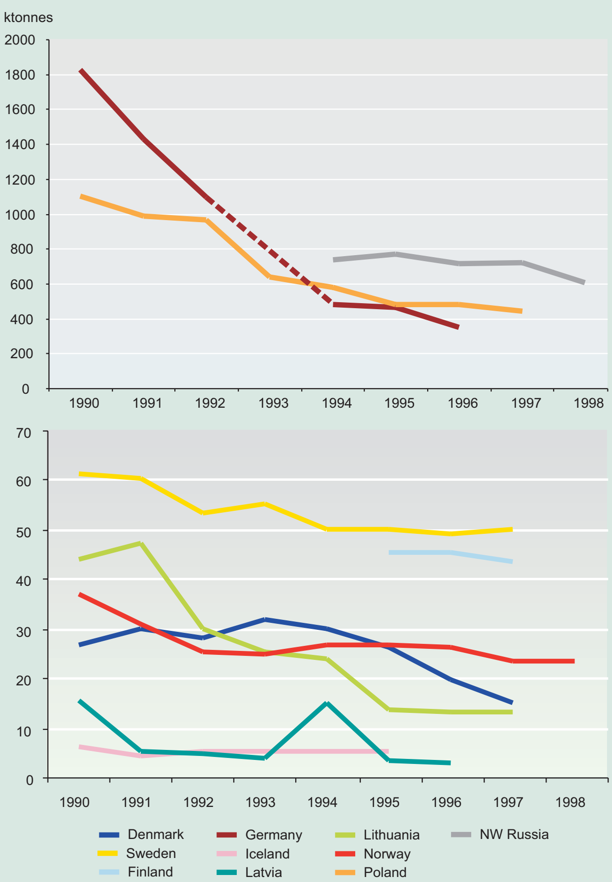
Definition: Emissions from total industrial processes: Mineral Products, Chemical Industry, Metal Production, Other Production, Production of Halocarbons and Sulphur Hexafluoride, Consumption of Halocarbons and Sulphur Hexafluoride, Other (Industrial Processes).
Data source: UNFCCC
Notes: The figures for NW Russia have been calculated from Russian statistics, using the share of the Russian population that lives in NW Russia as an index.

Graph 3.6/1b: Industrial NO_2 emissions



Definition: Emissions from combustion in manufacturing industry and from industrial production processes.
Data source: EMEP

Graph 3.6/1c: Industrial SO_2 emissions



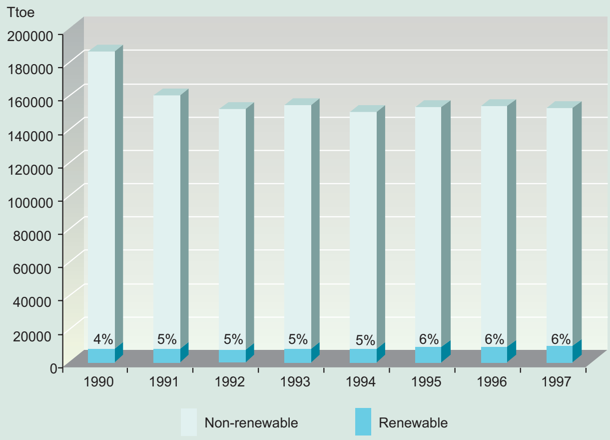
Definition: Emissions from combustion in manufacturing industry and from industrial production processes.
Data source: EMEP

It has not been possible to assess the regional trend as regard to the industrial sector dependency on non-renewable materials, nor its generation of waste. However, the dependency of non-renewable material is high in the entire region and resource management through reuse, recirculation and increased use of renewable substitutes is a great challenge to all our societies. Here the industry sector has an important role to play.

"Improvement of the working environment and the industrial safety for the workforce."

Despite of the industrial development, there are still problems with injuries and fatalities of industrial workers. Some of the problems are related to hazardous chemicals, dangerous emissions and noise etc. Today there exists some difficulties regarding the collection of statistical information about injuries and fatalities of industry workers in the region, which makes it difficult to assess this aspect of a sustainable industrial sector.

Graph 3.6/2: BSR industrial energy consumption, renewable and non-renewable

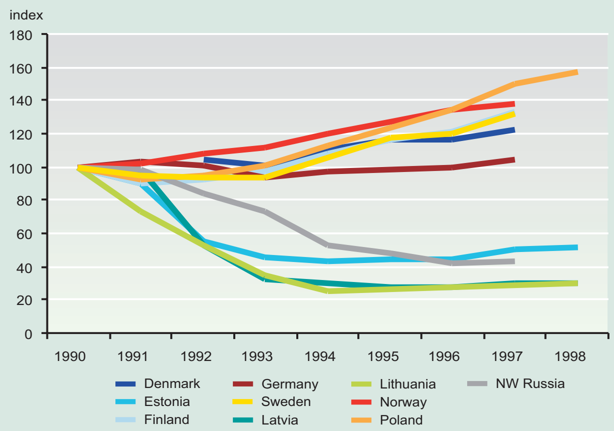


Definition:
Energy consumption: Total Final Consumption for the industry sector is specified for the following sub-sectors (energy used for transport by the industry not included here): iron and steel industry (ISIC group 271 and class 2731), chemical industry (ISIC Division 24), non-ferrous metals basic industries (ISIC group 272 and class 2732), non-metals basic industries (ISIC Division 26) , transport equipment (ISIC Division 34 and 35), machinery (ISIC Division 28, 29, 30, 31 and 32), mining (excluding fuels) and quarrying (ISIC Division 13 and 14), food and tobacco (ISIC Division 15 and 16), paper, pulp and print (ISIC Division 21 and 22), wood and wood production (ISIC Division 45), textile and leather (ISIC Division 17, 18 and 19), non-specified (ISIC Division 25, 33, 36 and 37).
Renewable energy: Renewable energy includes electricity production in hydro power plants; geothermal, solar, wind, tide and wave energy; combustible renewables and waste.
Data source: International Energy Agency
Notes: The figures for NW Russia have been calculated from Russian statistics, using the share of the Russian population that lives in NW Russia as an index.

"Applying sustainable strategies to resources, processes, products and services."

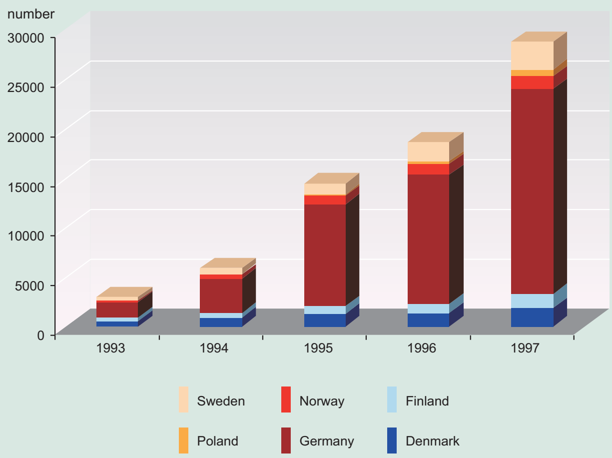
An important measure for reducing the pressure on the natural environment and to manage the use of natural resources is the introduction of environmental management systems at the company level. The most known and used management systems are the international standard ISO 14001 and the corresponding system within the EU - EMAS. Also quality standards, like ISO 9000, are of importance for an efficient and high quality industrial production. The number of ISO and EMAS (only EU-countries) companies is increasing, most markedly in the old market economies, but also in the CITs. The market forces favouring the registration and certification according to ISO14000 is very strong in the old market economies, and is starting to grow also in the CITs. (graph 3.6/4)

Graph 3.6/3: Industrial production

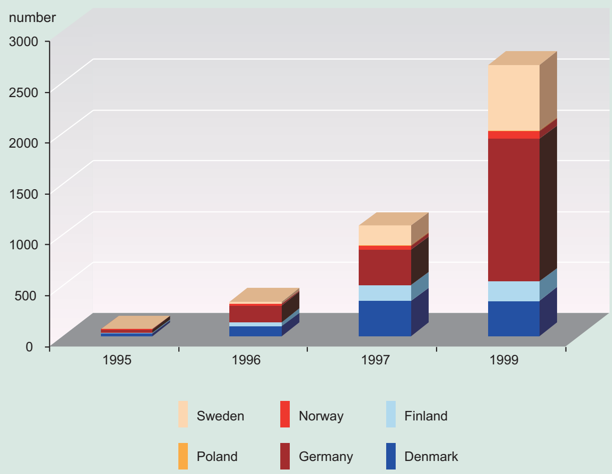


Definition: The industrial production is presented as an index, measuring changes in the physical volume of production. 1990 is used as the index year.
OECD countries: The goods produced by establishments engaged in mining, manufacturing, and production of electricity, gas and water (ISIC groups 2, 3 and 4).
Non-OECD countries: Industrial production, real change in % against 1990.
NW Russia: Industrial GDP in comparable prices (calculated in 1990 prices).
Data source:
OECD countries: OECD Main Economic Indicators, Indicators of Industrial Activity
Non OECD countries (except NW Russia): Business Central Europe (http://www.bcemag.com/).
NW Russia: Centre for Preparation and Implementation of International Projects on Technical Assistance.

Graph 3.6/4a: ISO certified companies (ISO 9000)



Graph 3.6/4b: ISO certified companies (ISO 14001)



Data source: ISO World: GlobalNet http://www.iso14000.net/databasetemplate.cfm. ISO, http://www.iso.ch/, The ISO Survey of ISO 9000 and ISO 14000 Certificates. Seventh cycle – 1997 also ISO information at http://www.iso14000.com/.

3.7 Development in the Tourism Sector

TOURISM SECTOR GOAL AND CORE INDICATORS

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.*
  Indicators:
  • Number of tourist overnight stays
  • Tourism sector share of GDP

- *To create satisfactory social conditions for tourists and the local population.*
  Indicators:
  • Number of tourism sector employed personnel

Table 3.7/1: Tourism sector share of GDP

	1991	1992	1993	1994	1995	1996	1997	1998
Denmark						3.9	3.8	3.7
Estonia				7.0	13.0	14.0	15.0	15.0
Finland	1.8	1.7	1.6	1.5	1.6	1.5	1.5	
Germany					5.6	6.0	6.0	8.0
Iceland								
Latvia						2.0		
Lithuania					4.0	4.4	4.2	4.7
Norway								
Poland	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Russia								
Sweden	3.1	3.2	3.2	3.3	3.2	3.3		

Definition: Percentage of GDP in current international dollars in tourism sector.
Data source: Data provided by Baltic 21 tourism sector network.
Notes: The comparability of data between countries is low since countries define the tourism sector differently.

Table 3.7/2: Number of tourism sector employed personnel

	1991	1992	1993	1994	1995	1996	1997	1998
Denmark						72.3	73.4	72.0
Estonia				31.0	61.0	67.0	70.0	70.0
Finland	70.0	64.0	60.0	58.0	60.0	62.0	65.0	
Germany					2000.0	2000.0	2000.0	2600.0
Iceland	4.0	4.1	4.1	4.2	4.4	4.7		
Latvia						60.0		
Lithuania						70.0	73.0	76.0
Norway								
Poland	N.A.	164.4	170.1	175.8	185.9	188.0	201.8	211.3
Russia								
Sweden					132.0	132.0		

Definition: Number (1000 persons) of direct employed personnel in tourism sector.
Data source: Data provided by Baltic 21 tourism sector network.
Notes: The comparability of data between countries is low since countries define the tourism sector differently.

The goal for sustainable tourism is perhaps the most difficult to monitor with quantitative indicators. Data for some economic indicators are available, but national statistics on resource use and environmental impact by tourists are lacking, as well as data on the social positive and negative impact of tourism. It should however be kept in mind that the degree of sustainable development within the tourism sector is highly linked to the development in the transport sector.

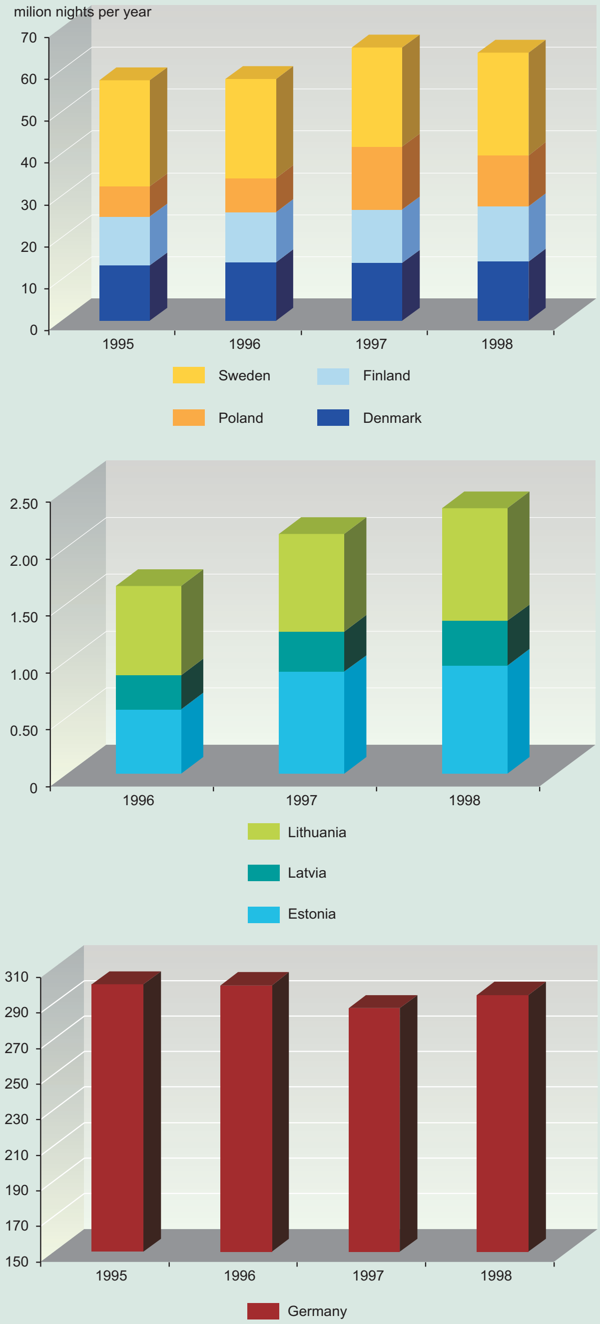
"To sustain a sound environment, to safeguard the recreational quality of natural and man-made landscape and to integrate natural, cultural and human environments."

Hotels, other types of accommodation, and tour operators have started to introduce environmental management systems to reduce their environmental impact, to use resources more efficiently and to attract customers. Statistical information on this indicator is however poor, but can be expected to improve in the future. The Baltic 21 tourism sector is planning to monitor the number of tourism destinations that have or will start a process, involving relevant public and private stakeholders in a process of setting up goals and strategies for sustainable development of their tourist destination.

"To promote and sustain the competitive quality and efficiency of the tourism business. To create satisfactory social conditions for tourists and the local population."

According to the World Tourism Organisation (WTO) prognosis, the Baltic Sea Region will experience considerable growth as a tourist destination in the coming decades. During the 1990s, the number of hotel overnight stays has increased in several of the Baltic Sea Region countries (1995-1998) (graph 3.7/1), as well as the tourism sector share of GDP (1991-1998) (table 3.7/1) and the number of persons employed in the tourism sector (1995-1998) (table 3.7/2). For sustainable development, it is important that the anticipated growth within this sector is combined with social and environmental concern.

Graph 3.7/1: Number of tourist hotel overnight stays



Definition: Number of resident and non-resident tourist overnight stays in hotels.
Data source: Data provided by Baltic 21 tourism sector network.
Notes: Norwegian and NW Russian data are missing.

3.8 Development in the Transport Sector

TRANSPORT SECTOR GOAL AND CORE INDICATORS

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 the environment, in particular the sensitive ecosystems of the region.*

Indicators:
- CO_2 emission
- NO_x emission
- SO_2 emission
- VOC emission
- Particle emission
- Road traffic injuries and fatalities

- *To retain transport's ability to serve the economic and social development of the Baltic Sea region.*

Indicators:
- Motor vehicle density
- Passenger car density
- Road Traffic
- Road and rail network density

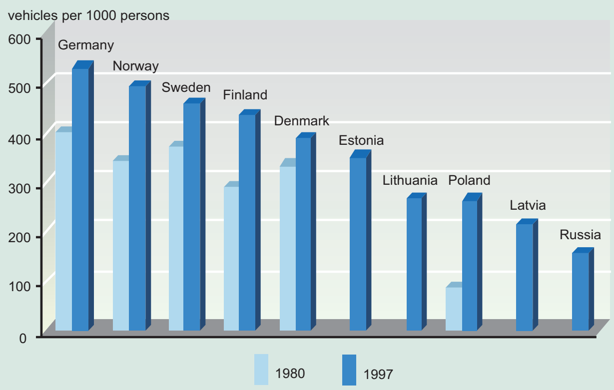
"To retain transport's ability to serve the economic and social development of the Baltic Sea region."

"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 the environment, in particular the sensitive ecosystems of the region."

The transport sector is of great importance to modern society, for providing mobility of persons and goods. The development of the transport sector has however severe negative impacts on the environment and on human health, through air pollution, noise and physical alterations in cities and landscapes.

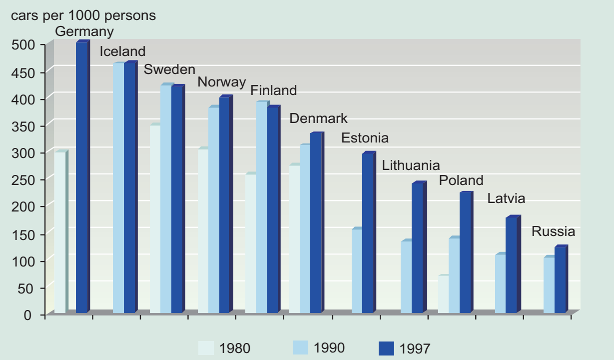
The motor vehicle and passenger car density (graph 3.8.1, 3.8/2), as well as the road traffic (motor vehicle kilometres, graph 3.8/3), have increased substantially in all countries in the Baltic Sea Region since the 1980s. The number of motor vehicles and passenger cars per 1000 persons is highest in the old market economies. The density of road and rail networks has remained rather stable during the 1990s, but is an important parameter to follow over longer time periods (graphs 3.8/4 and 3.8/5). Public transport provides a less energy demanding and polluting

Graph 3.8/1: Motor vehicle density (1980, 1997)



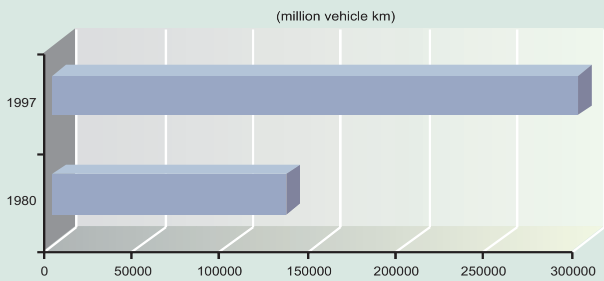
Data source: World bank, 1999 Development Indicators.

Graph 3.8/2: Passenger car density (1980, 1990, 1997)



Data source: World bank development indicators.

Graph 3.8/3: Road Traffic (Denmark, Finland, Poland, Sweden)

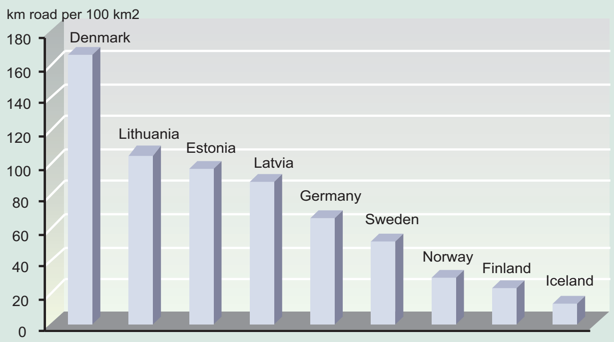


Data source: World bank, 1999 Development Indicators.

mode of transport, but it has not been possible to compile statistics on the share of public transport in the region for this report. The CITs, however, have inherited a fairly large reliance on public transport systems and infrastructure, which is now threatened.

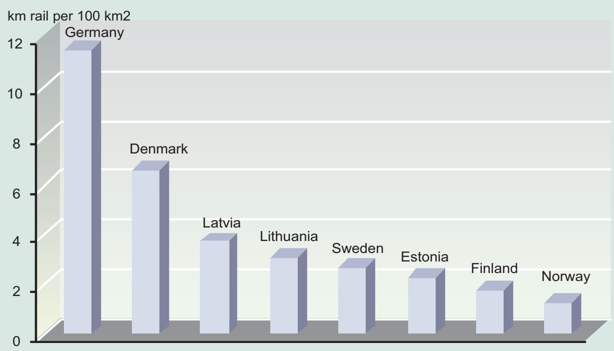
The emissions from the transport sector follows the total emission trends presented in section 3.1. The CO_2 emissions have been rather stable during the 1990s, while the SO_2 and NO_2 have decreased (graph 3.8/6). Also the VOC and particle emissions (graphs 3.8/7 and 3.8/8) generated by transport decreased, which is a positive development since it means a reduced negative impact on human health. Tightened emission standards, especially in the Scandinavian countries and in Germany since the mid 80's, have been important measures to reduce the emissions. The positive effect of improved technology is how-

Graph 3.8/4: Road network density (1997)



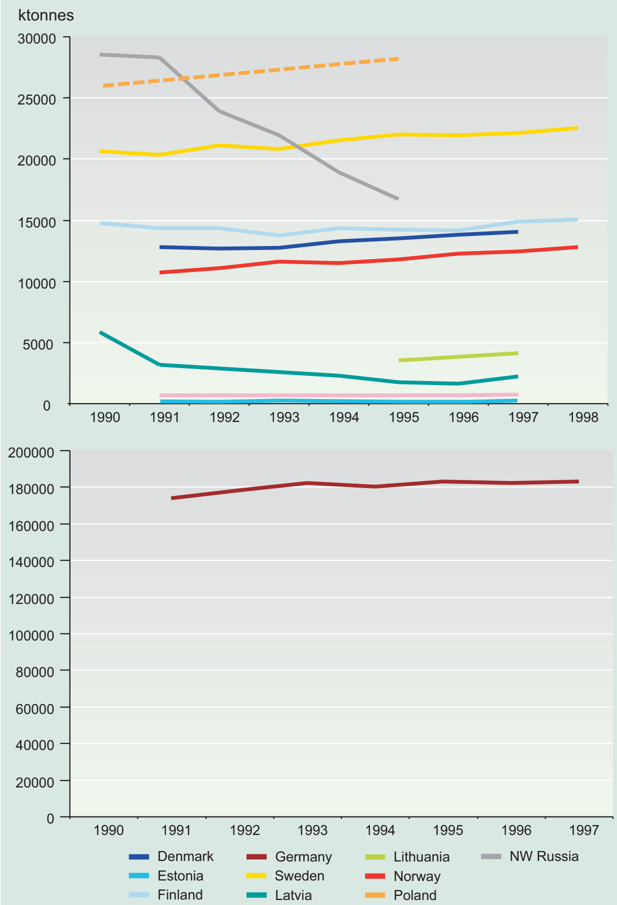
Data sources:
Denmark: Denmark Statistics. Data include public roads only.
Estonia: Estonian National Road Administration. Data include public roads, other roads and main roads.
Finland: Finnish National Road Administration (www.tieh.fi). Public roads, without ramps and ferry routes
Germany: Statistisches Jahrbuch, Verkehr in Zahlen. Only public roads are included.
Iceland: Statistical Yearbook of Iceland 1998. All roads.
Latvia: Latvian Road Administration.
Lithuania: Statistical Yearbook of Lithuania 1998. Roads refer to motorways, main or national highways, secondary or regional roads, and others.
Norway: Statistics Norway, Department for Economic Statistics. Roads refer to public roads.
Sweden: Statistical yearbook of Sweden
Notes: The categories of roads that are included differ between countries.

Graph 3.8/5: Rail network density (1996)



Data sources:
Denmark: Denmark Statistics. Data include state railways and private railways but excludes private tracks.
Estonia: Estonian Ministry of Transport and Communications.
Finland: Transport and Communications Statistical Yearbook for Finland.
Germany: Statistisches Jahrbuch, Verkehr in Zahlen.
Latvia: Latvian Road Administration.
Lithuania: Statistical Yearbook of Lithuania 1998.
Norway: Official Statistics of Norway.
Sweden: Statistical yearbook of Sweden

Graph 3.8/6a: Transport CO_2 emissions

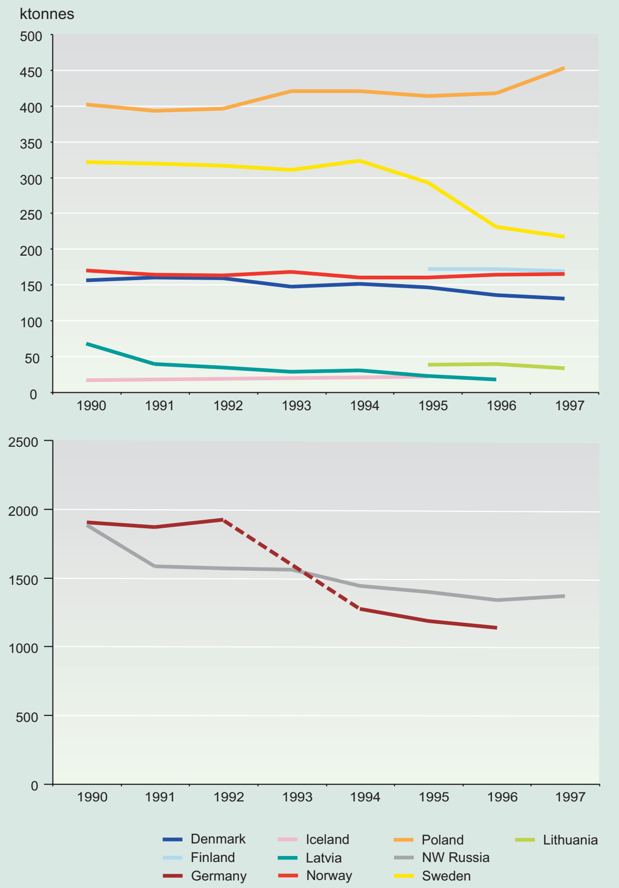


Definition: The comparability between the national CO2 emission data is low since the countries have defined the transport sector in different ways.
Data source: Baltic 21 transport sector network.
Notes: NW Russia: The figures for NW Russia have been calculated from Russian statistics, using the share of the Russian population that lives in NW Russia (11.7%) as an index.

ever partly offset by the growing transport volume, and also by the demand for stronger engines rather than fuel-efficient vehicles.

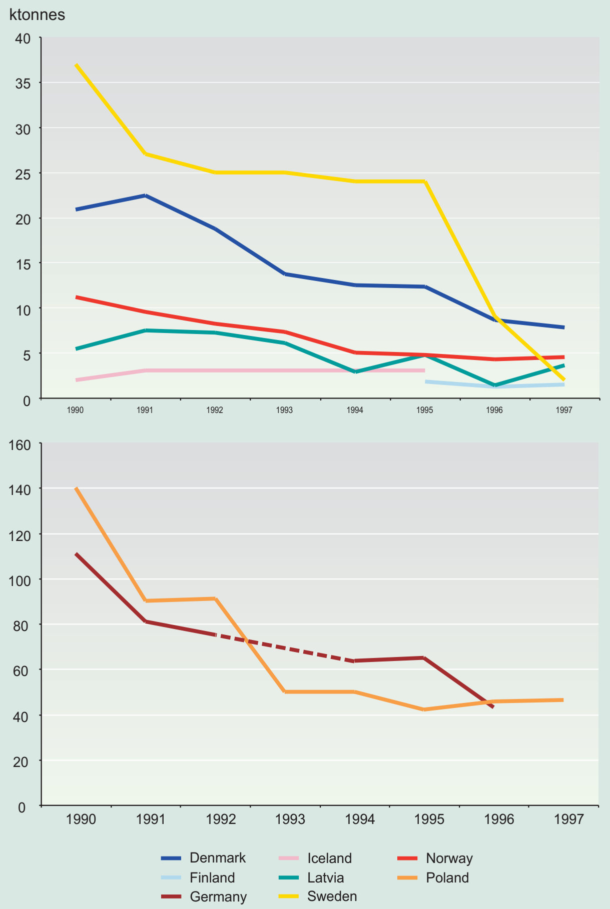
Another severe problem generated by transport is that many people are killed or injured each year in traffic. The number of fatalities has fortunately decreased considerably during the 1990s, while the number of injuries has remained rather stable. (graph 3.8/9)

Graph 3.8/6b: Transport NO_2 emissions



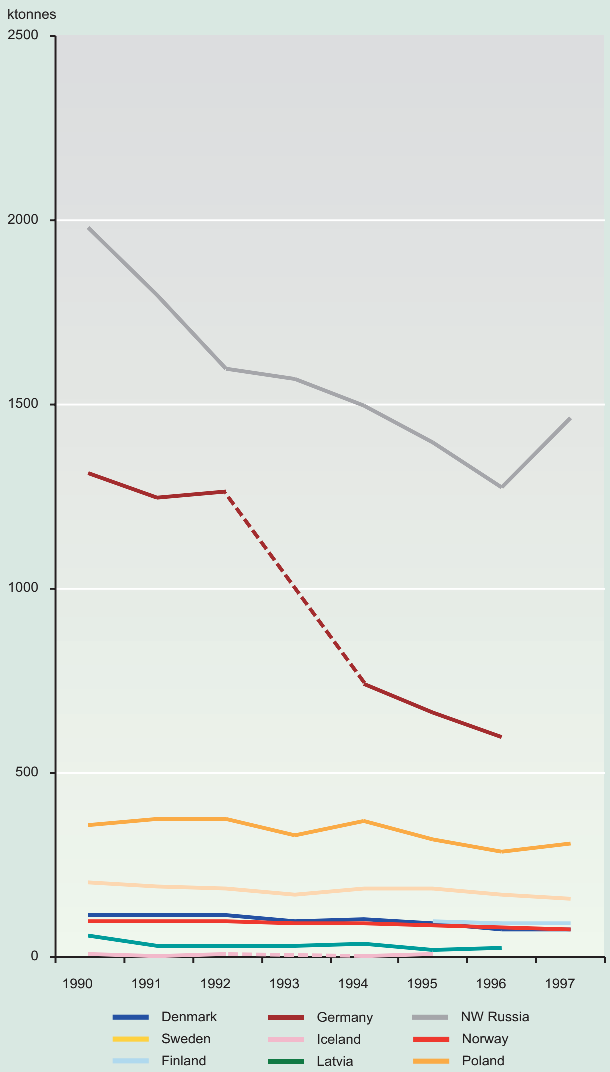
Definition: The NO_2 emissions include emissions from road transport and other mobile sources and machinery.
Data source: EMEP.
Notes: NW Russia = European part of EMEP area.

Graph 3.8/6c: Transport SO_2 emissions



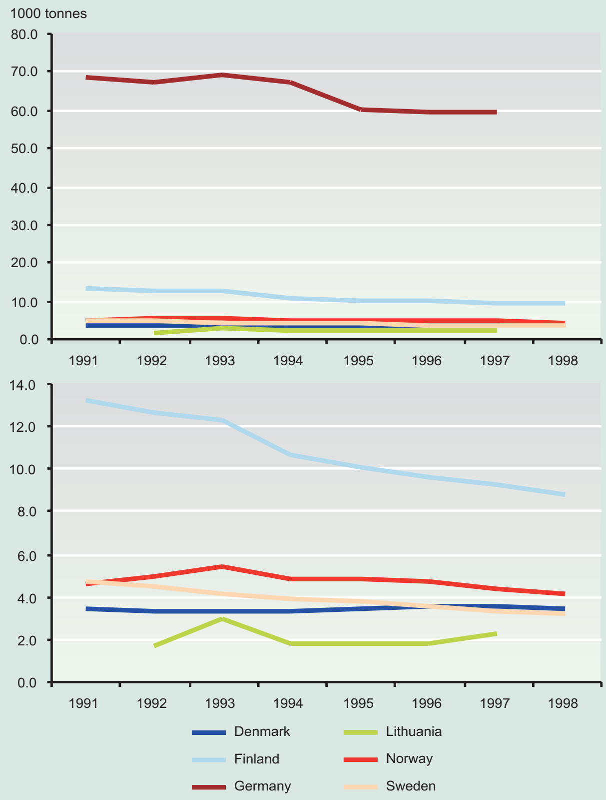
Definition: The SO_2 emissions include emissions from road transport and other mobile sources and machinery.
Data source: EMEP.
Notes: NW Russia = European part of EMEP area.

Graph 3.8/7: Transport VOC emissions (ktonnes)



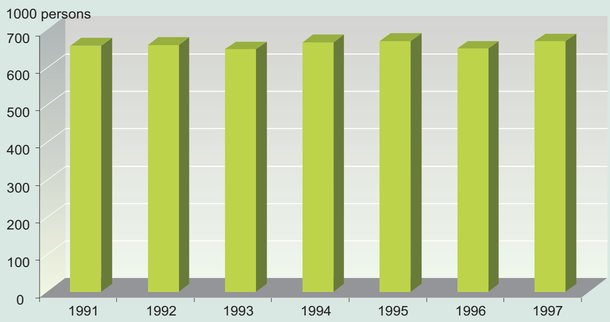
Definition: Definition of transport sector: road transport, other mobile sources and machinery.
Data source: EMEP.
Notes: NW Russia = European part of EMEP area.

Graph 3.8/8: Transport particle emissions

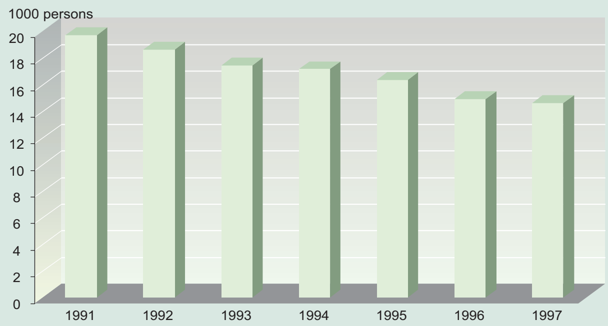


Data sources:
Denmark: Ministry of Transport, Reference model.
Estonia: Estonian Environment Information Centre, “Transport and Communications ‘96”, “Transport and Communications 97/98”; Ministry of Transport and Communications.
Finland: LIPASTO 98_(Http://www.vtt.fi/yki/lipasto) .
Germany: Umweltbundesamt, 1999. Data include dust.
Lithuania: Ministry of Environment to the Convention of the Long Range Transboundary Air Pollution.
Norway: Statistics Norway, Natural Resources and the Environment, 1991-1998.
Sweden: Environmental performance report from The Swedish national road administration. Figures only includes emissions from road traffic.
Notes: The data are not comparable between countries since the definition used for the transport sector by countries differs.

Graph 3.8/9a: Road traffic injuries in the Baltic Sea Region



Graph 3.8/9b: Road traffic fatalities in the Baltic Sea Region



Data sources:
Denmark: Statistics Denmark.
Estonia: “Transport and Communications 97/98”; Ministry of Transport and Communications, “Estonian economy 98/99”; Ministry of Economic Affairs.
Finland: Road Accidents in Finland, Statistics Finland. Killed in road accidents in Finland: any person who was killed outright or who died within 30 days as a result of the accident
Germany: DIW, Vrkehr in Zahlen, 1998.
Iceland: Statistical Yearbook of Iceland, 1995.
Latvia: Statistical Yearbook of Latvia, 1998.
Lithuania: Statistical Yearbook of Lithuania 1998.
Norway: The Directorate of Public Roads.
Sweden: Traffic injuries, Official statistics of Sweden.
Notes: Data for Poland and NW Russia are missing.

3.9 Conclusion

In conclusion, the Baltic Sea Region has entered the road towards but is still far from sustainable development. During the early 90´s, after the downfall of communism, the CITs suffered considerable drops in economic activities, evident by diminishing GDPs and industrial output. This caused to a certain extent reductions in pollution, waste generation and energy consumption. However, now when economic activities are picking up again, the risk of going back to unsustainable production and consumption patterns is substantial. The old market economies on the other hand have managed to control many pollution sources, e.g. industrial point sources, while other, diffuse sources of pollution have proven much more difficult to control. The use of natural resources is also far from being sustainable in any of the Baltic Sea region countries. These different development paths lead to, when summarised for the region, that several important positive trends are visible, but a number of fundamental economic, social and environmental criteria for a sustainable society are not met.

Sustainable development in the Baltic Sea Region will remain a difficult but necessary task and challenge for the 21st century

Annex 1

Acronyms

Baltic 21	Agenda 21 for the Baltic Sea Region
BSR	Baltic Sea Region
CBSS	Council of the Baltic Sea States
CHP	Combined Heat and Power Production
CIT	Country in transition
CO_2	Carbon dioxide
GDP	Gross domestic product
EBRD	European bank for Reconstruction and Development.
EIB	European Investment Bank
EMAS	The European Eco Management and Audit Scheme
EMEP	Co-operative programme for monitoring and evaluation of the long range transmission of air pollutants in Europe.
EMS	Environmental Management Systems
FAO	Food and Agriculture Organisation of the United Nations.
HELCOM	Helsinki Commission
IBSFC	International Baltic Sea Fisheries Commission
ICES	International Council for the Exploration of the Sea
IEA	International Energy Agency
ISO	International Organisation for Standardisation
Nefco	Nordic Environment Finance Corporation
NIB	Nordic Investment Bank
NO_2	Nitrogen dioxide
NO_x	Nitrogen oxides
NW Russia	North western Russia
SO_2	Sulphur dioxide
SOG	Senior Officials Group
TFC	Total Final Consumption
TPES	Total primary energy supply
VASAB 2010	Visions and Strategies Around the Baltic Sea 2010

In May 1996, the Prime Ministers in the Baltic Sea Region: Denmark, Estonia, Finland, Germany, Iceland, Latvia, Lithuania, Norway, Poland, north-western Russia and Sweden, decided that a regional Agenda 21 for the Baltic Sea Region should be developed. The work was divided into seven economic sectors of crucial importance for sustainable development; agriculture, forests, fishery, industry, energy, transport and tourism; and spatial planning.

In June 1998, the Foreign Ministers of the CBSS adopted the Agenda 21 for the Baltic Sea Region – Baltic 21. The Agenda contains goals for sustainable development and an action program. The progress in implementing Baltic 21 will be reported to the sectoral and environmental ministers every 2nd or 3rd year, to the Prime Ministers every 5th year, and to the Foreign Ministers when appropriate.

The Baltic Sea Region is the first region in the world to adopt common regional goals for sustainable development. In order to monitor the development in the region towards the goals, a set of core indicators has been elaborated and statistics compiled. This report provides a full presentation of the Baltic 21 goals, the indicators and the compiled statistics, together with the assessment of the deve-lopment during the 1990s. The report also contains a chapter on the mode of work for selecting the indicators and for compiling the necessary statistics for monitoring.

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
No 15/98	Information for Joint Policy and Decision Making towards a Sustainable Baltic Sea Region
No 1/2000	Baltic 21 Biennial Report – 2000
No 2/2000	Development in the Baltic Sea Region towards the Baltic 21 Goals – An Indicator Based Assessment

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.