VROMraad

Advice 016E

Global Sustainability and the ecological Footprint

The Council for Housing, Spatial Planning and the Environment (VROM-council) was established by the Act of 10 October 1996. The task of the VROM-council is to advise government and parliament on an overall policy with regard to the sustainable quality of the living environment and on other aspects of national policy which are relevant for this overall policy. The VROM-council also has the job of advising on government's environmental policy activities at the international level.

VROM-council
Koningin Julianaplein 2
P.O. Box 30949 - IPC 105
2500 GX The Hague
telephone +31 70 339 1505
fascimile +31 70 339 1970
E-mail: vormraad@vromraad.cs.minvrom.nl
Web site: http://www.vromraad.nl/engels

Colophon

Global Sustainability and the Ecological Footprint

Design
Drupsteen + Straathof, The Hague

Translation
Jonathan Pearse

Printing
Smiet Offset bv, The Hague

ISBN 90-75445-58-X

Global Sustainability and the Ecological Footprint

Advice 016E
september 1999

To the Minister of Housing,
Spatial Planning and the Environment
Mr. J.P. Pronk
PO Box 20951, IPC 100
2500 EZ THE HAGUE

VROMraad

Koningin Julianaplein 2 2595 AA Postbus 30949 2500 GX Den Haag
telefoon (070) 339 4 09 fax (070) 339 1970 e-mail: vromraad@vromraad.minvrom.nl

Date: 3 September 1999
Reference: br90903.020
Subject: Advice on the ecological footprint

Minister,

In a letter dated 23 December 1998 you asked the Council to prepare an advice on the 'ecological footprint'. The present advice examines not only the practicality of using the ecological footprint as an indicator of ecological sustainability, but also in particular the ways in which the Netherlands can contribute to bringing global sustainability closer.

We have pleasure in submitting to you our advice 'Global sustainability and the ecological footprint'.

Yours faithfully,

Chairman

T. Quené

General Secretary

W.A. Haeser

Contents

Conclusions and recommendations

Global sustainability as point of departure

The introduction of the concept of the 'ecological footprint' and the conclusions which can be drawn by calculating this footprint have given a new lease of life to discussions about global sustainability in various fora. The footprint gives an indication of the effects of our consumption on (more or less) scarce environmental resources anywhere in the world. The results show that these effects exceed the carrying capacity of our planet, but also that the use of these scarce environmental resources is distributed very unevenly. The ecological footprint also shows clearly that our consumption has an environmental impact not only within our own frontiers but also in other countries. The Council intends in this advice to examine these issues and to structure the various elements relevant to the discussion.

States bear a common responsibility for reaching a sustainable and therefore ecologically tenable development of society. But this responsibility is also differentiated. The developing countries, for example, acknowledge their own specific responsibility for achieving sustainable development by virtue, amongst other factors, of the greater pressure which their societies place on the global environment and the technologies and financial resources they possess. In this context, the VROM Council takes the view that Dutch environmental policy should not confine itself to the impact observable in our own country, but should also extend to the environmental impact which we impose on other countries as a consequence of our consumption pattern. This means that policy must have regard to the entire production-consumption cycle. And the same should apply to other countries. This is the only way to attain the sustainable management of the earth's environmental resources.

The ecological footprint is not a policy indicator

The question arises as to whether the ecological footprint is a reliable measure of the effects of environmental policy. Some people appear to use the ecological footprint as a light-hearted way of reflecting on their own consumption behaviour. Because the measure effectively aggregates information into a single quantity, it does not provide the insights needed for policy-making purposes. The underlying figures are needed for this. Nor does it provide a comprehensive picture of sustainability, the pressures being placed on resource stocks or the efforts needed to improve the situation. Furthermore it is not appropriate to compare the land-use per country with the area available in that country because on this basis densely populated countries will by definition score poorly. The debate on the ecological footprint and the Minister's request for an advice provide the opportunity from the ecological point-of-view to look in more detail in this advice into

the question of global sustainability. Important themes here include: the sustainable management of the world's environmental resources, containing the environmental pressures which occur not only at home but also in other countries as a consequence of our consumption pattern, and the scope for reducing the environmental pressure resulting from our consumption. These are the themes which the VROM Council wishes to take as starting point in its quest for appropriate indicators and measures of (ecological) sustainability.

The management of each resource category demands its own instrument

Economics and the environment are no respecters of national frontiers. People provide for their needs by using a wide range of raw materials,scattered unevenly over the earth's surface. People throughout the world depend for their survival on the capacity of the biosphere to provide unpriced services, such as regulation of the climate and the breakdown of waste. For this reason, the Council looks at global environmental resources in this advice. Raw materials can become scarce or contaminated, thus increasing the costs and environmental impact of extraction and use. The services provided by the biosphere are being put under pressure particularly by the reduction in the area of natural habitat and by pollution and nuisance. The policy options depend on the degree of control which national states have over environmental resources. Market-based instruments (which price environmental resources) are appropriate for resources which are traded. Otherwise there are three possibilities.

Resources over which no-one has control are best protected through international agreements. It is vital that the Netherlands adopts a consistent posture in this regard,since we are dealing with a case of the 'prisoner's dilemma' at the international level, which can only be resolved through mutual trust. For those resources which are distributed amongst all countries, the Netherlands must manage its share sustainably. For those resources which only occur in specific locations, we must be willing to contribute towards their sustainable management or, if they occur in the Netherlands, to manage them sustainably ourselves.Finally, national environmental policy for the export-oriented industries can be based on international agreements or emissions trading in order to limit transboundary fluxes of emissions and waste.

Practical problems loom large

Trade and investment can contribute to improving global prosperity. In practice however, foreign investments are often not screened for adverse ecological, environmental and social effects. The Council recommends that both public and private sector investors should adopt the rules of the World Bank. Goods are often imported whose production is at odds with sustainable development. Although various international environmental treaties call for sustainable development, the present situation is perpetu-

ated because, for example, the World Trade Organisation (WTO), as part of its efforts to further liberalise world trade,systematically prohibits requirements being placed on production processes in other countries.

On the other hand, many individual countries provide subsidies which hamper the achievement of sustainable development,against which the WTO can take no action without a complaint from another country. It is crucial that this should change, and that environmental pressures due to trade and investment should be reduced where possible.

Can we reduce the environmental pressures due to the growth in our consumption?

Consumption continues to soar, causing a (relative) increase in the environmental pressure. It is difficult to alter the nature and particularly the volume of consumption. This is precisely why the Dutch government must support the willingness already manifested by part of the population to change consumptive behaviour. The Council expects the greatest result from the development and application of technology which unites functionality with a reduced environmental impact. The role of the government here is to remove constraints,stimulate research into cleaner, more efficient technology, and itself invest in function and system innovation. In developing new technologies, however, account must be taken of the rebound effect.

How can we measure progress?

In order to measure the relevant aspects of global sustainability we need indicators for environmental resources, consumption, environmental pressure and efforts to improve the environment. These indicators must be policy-relevant,scientifically sound and actually measurable. Indicators will have to be developed for the quantity and quality of fertile land, raw materials, fresh water and biodiversity. The existing Dutch indicators for the themes climate change, acidification, eutrophication and toxic and hazardous substances need to be supplemented with indicators which represent the emissions in the Netherlands and other countries resulting from Dutch consumption. The development of indicators which measure the efforts of government and the target groups to improve the environment (response indicators) is still in its infancy.

In this connection the Council makes the following recommendations.

1. Do not use the ecological footprint as a policy indicator for sustainability, but promote the self-regulation of personal environmental behaviour

Like other unifying indicators, the ecological footprint does not provide sufficient insight into underlying mechanisms to be of much value for policy development.

Furthermore it is not a comprehensive measure of pollution and the depletion of raw materials. There are also major reservations about the way the ecological footprint is calculated. This means that the ecological footprint is not sufficiently useful as a policy tool. Furthermore the comparison of the available area of land with the footprint of that country is inappropriate. The public attention which the concept has received has nevertheless provided a welcome boost to the discussion of the framework for Dutch policy on sustainability. Some parties have apparently been using the ecological footprint to obtain insight into their own environmental behaviour and the possibilities of improving this behaviour. By removing as far as possible the metho dological objections to the composition and calculational methods,and by supplementing it with an indicator for the (direct and indirect) energy consumption and related CO_2 emissions,and for the consumption of materials, the ecological footprint can fulfil this function in broad terms.

2. Link development cooperation activities to our trade relations

In the Declaration of Rio de Janeiro (principle 7) the developed countries recognise the special responsibility they have, given the pressures which their societies place on the global environment and the financial resources they possess, in the international quest for sustainable development. The Netherlands could target its development cooperation towards countries,amongst others, which are experiencing an adverse impact on sustainability as a result of activities which relate to exports to the Netherlands or investments from the Netherlands. This criterion has not yet been used in the selection of countries. A reason for cooperation might also be that an area or object of world importance is under threat. In this case, the improvement brought about in the local social and economic situation and for the environment and nature conservation is an important criterion. The wholehearted cooperation of the counterpart concerned is an absolute precondition. There are many ways, already applied on a modest scale, in which this can be done,including technology transfer, the conclusion of business contracts in which the environmental costs are met, debt-for-nature swaps or the establishment of trust funds which defray the costs of environmental investments or the income foregone when particular environmentally harmful activities are abandoned. It is important that the technology transferred to developing countries should be appropriate to local needs and possibilities. Local training and credit facilities can enhance these possibilities.

3. Preserve Dutch credibility

If the Netherlands is to be credible internationally, it must manage carefully the environmental resources of world importance within her own frontiers. This means, for example, that the nature conservation area which is most important in international terms, the Waddenzee, must be managed as a nature reserve, and that activities which could harm this ecosystem, such as drilling, fishing for shell-fish and military exercises must be painstakingly assessed. The positions adopted by the Netherlands in interna-

tional fora should always be consistent with the quest for sustainable development. Relevant topics in this connection include the common agricultural policy, non-European fisheries and the inclusion of commercial varieties of tree on the CITES list.

4. Prevent competition from being at the cost of the environment

The Netherlands should, preferably within the EU or the OECD, press for the WTO to accept the consequences of international environmental treaties and apply them in the trade rules. The Netherlands should itself also abolish subsidies which are undesirable in sustainable development terms, and press for similar action elsewhere. Ultimately, all environmental costs should be consistently and fully reflected in the prices on the world market, for example in the energy and fisheries sectors.

5. Promote research into the environmental effects of foreign trade and investment

As yet we have only a fragmentary understanding of the environmental consequences of Dutch foreign trade and investment, but these consequences are probably considerable. Research is necessary to improve this understanding. The World Bank guidelines on the provision of credit should be applied to credits and guarantees extended from public funds - such as the ORET (Scheme for Development-Relevant Export Transactions) and the activities of the NCM (Netherlands Credit Underwriting Company) - and should also be used when reviewing existing projects. Private investors such as banks, insurance companies and pension funds could also be invited to do this.

6. Promote product and process innovation

The Dutch government should vigorously promote the development and application of technology which will bring about a substantial net reduction in environmental pressures worldwide. At home this effort to improve products should be directed towards the removal of constraints, for example through deregulation, reducing taxation in relation to research and selective concessions for environmentally benign innovations. 'Dematerialisation' can be promoted domestically mainly by setting product standards within covenants and long-term environmental agreements made with industry. Government funding should concentrate mainly on achieving function and system innovation,since the investments concerned have extremely long payback periods. These are also the developments which can produce the greatest environmental return. Where possible these efforts should be coordinated internationally, for example through agreements between large multinationals on one side , and a group of like-minded countries on the other.

7. Promote environmentally benign behaviour

The government should where possible remove impediments (lack of informa-

tion,insufficient availability of alternatives, wrong price signals, regulations) to less environmentally intrusive lifestyles. These might involve changes in consumption patterns or a trend to give up income in exchange for more free time. Although only a small proportion of the population is actively seeking to effect substantial shifts in their own lifestyles, it is vital that this initiative is not discouraged. Awareness-building, example-setting and making environmentally benign behaviour the norm may all make a key contribution in the long run to reducing the adverse effects of consumption.

8. Increasing the influence of the consumer

The Netherlands should set about strengthening the influence which consumers can exercise on producers through their purchasing behaviour. One of the ways of bringing this about is by having a high-quality information system which quantifies the life cycle environmental effects of products so that consumers have the opportunity to express their values in their purchasing behaviour. Such a system could be introduced into the Netherlands for those products for which this information can be assembled with a reasonable effort and where there is a reasonable likelihood that it will be used by consumers or voluntary organisations /pressure groups.Place for such a system should also be made in the system of European directives. The Netherlands should also press for having a law on product information (over the entire life cycle) included in the world trade agreements.

9. Develop indicators for sustainable development

It is important to gain a better understanding of the location,nature, extent and causal mechanisms of the adverse effects which our consumption is having on our efforts to bring sustainable development closer. The results of policy efforts must also be measurable if there is to be an operational policy objective for reducing these adverse effects. Our understanding of the environmental impact of Dutch consumption is still poor. As policy becomes more specific, the need grows to improve this understanding. The RIVM (National Institute of Public Health and Environment) is expected to make a concrete estimate of these effects for the Fifth Environmental Outlook (Milieuverkenning). This analysis will not be able to demonstrate causal relationships, however. In the future, more research will be needed to develop indicators which represent the Dutch influence on land-use, soil fertility, erosion, the availability of appropriate water, biodiversity and the fulfilment of ecological functions. The Netherlands may be able to make use of systems of indicators being developed internationally. The existing system of theme indicators needs to be supplemented by indicators which reflect all the emissions resulting from goods and services consumed in the Netherlands (from cradle to grave). In order to measure the sustainability of this consumption,use could be made of national resource accounting, pollution balances and the environmental load per guilder.

10. Promote the coordination of policy aimed at sustainability

A policy for global sustainability will impinge on international trade, development cooperation, working conditions,fisheries,agriculture,nature conservation, technology and the environment.Strong coordination within the Dutch government, in regard both to domestic measures and to ensuring that the Dutch position is heard at the international level, is a precondition for a successful policy on sustainability.

1 Introduction

1.1 The advice request

On 23 December 1998 the Minister of Housing, Spatial Planning and the Environment ('VROM') requested the VROM Council to prepare an advice on the ecological footprint (see Annex 1). The introduction to the request refers to the fact that the effects of consumption and production in the Netherlands extend far beyond our national frontiers. Given that the Netherlands has a shared responsibility for promoting sustainable development (see Third National Environmental Policy Plan), there is a need to gain insight into the ecological footprint of the Netherlands, the scope for modifying this footprint, and the significance of these matters for Dutch environmental policy. The advice request was formulated as follows:

"So as to indicate to me the relevance of the problem outlined, I hereby request you to prepare an advice on how an appropriate modification of the ecological footprint can contribute to the advancement of global sustainability, and what an intention to modify the ecological footprint means for the content and the direction of environmental policy."

The Council has interpreted the advice request broadly, partly in view of the following words of the Minister in another context:

"We must gain a greater understanding of our ecological footprint. By this I mean the 'tracks' which our national economy leaves elsewhere in the world. And I don't mean just the space usage, in hectares, but equally in terms of other resources such as the claim made on energy or the loss of biodiversity. In other words we are talking about the quality of the space we use." [1]

The request states that the advice may make a contribution to the formulation of the policy document which will set forth a vision on 'Economy and Environment International' and also play a role in the preparations for the Fourth National Environmental Policy Plan.

1.2 Purpose and structure of this advice

Taking as its starting point a broad interpretation of the advice request, the Council examines the possibilities the Netherlands has to limit the adverse effects of its consumption both at home and abroad. Chapter 2 starts by discussing the concept of the ecological footprint and its possible significance for environmental policy. In view of the

[1] Speech by Minister Pronk to the NCDO (National Committee for Sustainable Development) Congress, December 1998.

discussion about the ecological footprint and the Minister's advice request, in chapter 3 the Council examines the possibilities for achieving a sustainable management of the global environmental resources. Chapter 4 turns its attention to the possibilities for reducing the environmental pressure in other countries caused by our consumption patterns. More specifically, the Council examines the relationship between the environmental pressure on one hand, and international trade and investment on the other. In chapter 5 the Council looks at possibilities for reducing the environmental pressure due to consumption in the Netherlands. In chapters 3 to 5 the Council provides guidance in structuring the many aspects which are relevant in reducing environmental pressures worldwide. Finally, chapter 6 contains a review of the ways in which indicators can be used to monitor the environmental pressure in a policy-relevant manner. The main conclusions and recommendations are summarised at the beginning of the advice.

2 The ecological footprint

This chapter considers the concept of the ecological footprint, its applications and its value for environmental policy. The ecological footprint, as defined by Wackernagel and Rees (1996), is a representation of the environmental consequences of consumption, expressed in a single quantity which is easy to comprehend by the general public: the hypothetical area of fertile ground and water used[2].

The starting point for the calculation of the ecological footprint is the consumption of a group of people. The consumption is calculated from figures for production, imports and exports, and is determined for over 20 biotic resources which are needed for this consumption. FAO figures for the world average productivity of land are used to compute for each biotic resource the productive (land or water) area needed to make this consumption possible. This gives the space requirements for the net consumption, excluding energy use. The energy usage associated both directly and indirectly with this consumption is taken account of by calculating the CO_2 emissions thus caused, and the total area of new forest needed to reabsorb this CO_2. The sum of these two quantities gives the total footprint. The authors define a number of applications, which can be divided into two categories: (1) the per capita footprint and (2) the footprint of regions and countries.

The per capita footprint represents the surface area necessary to provide for the needs of an individual. It allows a comparison to be made between the environmental pressure associated with different lifestyles. It is possible, for example, to do the calculation either for an individual lifestyle, where a consumer can calculate his own footprint, or an average lifestyle, where the footprint for a whole country is calculated and divided by population,thus giving the footprint per head of the population. In this latter case the focus is on the comparison between countries or regions. For the per capita figure the authors define a reference case: the 'fair earth share'. This is calculated by subtracting from the total land surface of the earth that area which is unavailable (unproductive land and an area reserved for natural ecosystems), and dividing the result by the world population. This per capita application leads to the following general conclusions.

Energy consumption accounts for a major share of each individual footprint, which would indicate that worldwide energy use is one of the main causes of environmental problems.

---

[2] The originators' definition is as follows: *"An indicator for the flows of energy and raw materials required by a particular economy or activity, together with the waste stream generated, expressed in the land and water area needed to generate and to process these flows."*

The footprint of individuals in developed countries is an order of magnitude greater than that of individuals in developing countries,indicating the inequality in the use of environmental resources across the world.

The calculated footprint of the average world citizen is larger than the calculated fair earth share, which suggests that the present use of energy and environmental resources is not sustainable.

Environmental pressures are already exceeding the earth's carrying capacity in some areas. This threatens to occur in many more areas. In these cases we need to consider how the scarce resources are to be distributed, or how the costs of securing a reduction in the environmental pressure are to be distributed. This issue of distribution is the subject of a politically very relevant discussion.Global environmental treaties advocate a reduction in international differences in living standards (as in principle 5 of the Declaration of Rio de Janeiro on Environment and Development). Many treaties also state that the developed countries bear a greater responsibility for solving global environmental problems[3]. The VROM Council wholeheartedly endorses this position (see VROM Council 1998b). How the distribution can best be put into effect depends on different factors such as differences in living standards, the geographical distribution of the resource concerned, practical matters of control, the historical responsibility in the genesis of the problem,specific needs, and technological and financial possibilities to reduce the problem. Discussion and negotiation at the international level are the appropriate ways in specific cases to implement this principle of reducing differences, as exemplified by the Treaty of Montreal and the Kyoto Protocol.

In evaluating the footprint of regions or countries, the footprint is calculated for an entire region, and this is then compared with the available productive area in the country or region concerned. If the footprint is larger, then either the local sustainable productive capacity of the land is exceeded, resulting in a risk of degradation and erosion locally, or there is a transfer of the pressures to other areas. The main conclusion drawn by the authors is that in densely populated areas the ecological footprint is often larger than the available land area,particularly in the developed countries.

The simplicity of the ecological footprint as an indicator combined with its felicitous imagery means that it has struck a responsive chord. A number of Dutch municipalities are currently engaged in analysing their own footprints, and people can calculate their own footprint with the help of computer software available on diskette or on the Internet. The footprint therefore forms a light-hearted device for self-analysis. On the

[3] Davidson (1995) derives the right to an equal share of environmental resources from the ideas of the founders of liberalism John Locke and Thomas Paine, and he also points out that this right was adopted as a principle by the UN Commission on Environment and Development (Brundtland Commission).

other hand the ecological footprint also comes in for some criticism, in regard both to the way the indicator is constructed and calculated and to the indicative value of the results of these calculations for policy purposes. Some, in particular economists (Van den Bergh and Verbruggen, 1999) consider that the impression is created, wrongly, that using more than the average share of fertile land is undesirable when seeking to achieve sustainability. The use of this land is after all paid for, and the owner of the land sells his produce of his own free will. Others consider that the footprint is based on so many debatable assumptions that it has little significance. Furthermore the footprint aggregates information into a single one-dimensional measure, and does not include all environmental aspects. The main and most commonly articulated criticism relates to its use for a country or region, where it can be concluded that a high density of population is bad for the environment. This is actually at odds with the statement of Wackernagel and Rees themselves that concentration of the population can lead to some functions being carried out much more efficiently, and therefore creates less environmental pressure. Criticisms of the ecological footprint are summarised below. These criticisms are relevant for the application of the ecological footprint as a policy indicator, where it must interface closely with specific operational policy objectives. The criticism also usually applies when the footprint is calculated for individual use, but is regarded as less serious because the calculation is only used by individuals to reflect on their own environmental behaviour.

The completeness of the ecological footprint and the variables included

1. The ecological footprint is based in part on arbitrary assumptions and data.
2. The ecological footprint includes only the direct space requirements and the space calculated by converting the CO_2 emissions, and therefore gives an incomplete picture of the environmental impact.
3. Over 50% of the ecological footprint for developed countries consists of a component for afforestation to compensate for the CO_2 emissions The decision to convert CO_2 into land area is subjective, however.
4. The CO_2 component does not reflect the depletion of fossil fuel reserves,the alternatives to absorption by forests (for example underground storage),and the considerable capacity of the sea and vegetation to absorb CO_2.
5 The ecological footprint does not reflect the relationship between environmental quality and the productivity of the land, even though this can be a vital factor.
6. The ecological footprint does not distinguish between the sustainable use and the consumption of productive land. The non-sustainable use of land leads to erosion and depletion, and thereby reduces the available productive surface area of the earth.

7. No account is taken of the possibilities for multifunctional land-use.
8. The ecological footprint approach tends to ignore the environmental aspect associated with the world's finite reserves, apart from land and, to a point, biodiversity.

These criticisms can be summarised as "the indicator is incomplete and the way certain variables are incorporated is not entirely satisfactory". The ecological footprint is not unique in this regard; this criticism can be made of many indicators of sustainability or environmental pressure. The above criticism could, in the opinion of the Council, be addressed through further development of the footprint, and some of the objections could be removed.

Aggregation to a single indicator of ecological sustainability

9. The ecological footprint is based on a subjective choice of certain weights, specifically for space usage and CO_2 emissions. Other environmental impacts are implicitly given 0 weight.
10. Because of its high level of aggregation the ecological footprint gives little or no insight into the underlying factors and mechanisms, and for this reason has little utility for policy-making purposes.
11. The ecological footprint does not provide guidance on the optimum location and spatial configuration of the different land-related functions, which is certainly desirable at the local level.

Aggregation normally leads to loss of information. The VROM Council is of the opinion that the ecological footprint, like the 'living environment balance' (VROM-raad 1999) is far too aggregated to serve as a basis for informed policy decisions. This objection can be obviated by separating out the underlying factors. Sometimes highly aggregated indicators can actually give the wrong signal in relation to given developments. This is indeed the case for the regional application, although not because of the high aggregation. It is not known whether the same applies to the per capita applications,and this would have to be looked into.

Visualisation and acceptance

12. The ecological footprint risks introducing a bias against international trade into policy. This is mainly due to the fact that those who devised the ecological footprint introduced this connotation themselves. The way the ecological footprint is actually calculated does not strictly speaking have this effect. The ecological footprint does not actually provide a basis for making a proper estimate of the effects of trade.
13. In inter-country comparisons, densely populated countries tend to show up

unduly badly and sparsely populated countries similarly tend to show up unduly well. This ignores allocation factors and the positive effects of specialisation; the footprint could tend to discourage specialisation, desirable in economic terms. It also disregards the environmental benefits of the concentration of population (reduced habitat fragmentation, shorter transport lines and scale effects for waste processing, water and electricity supply).

14. The comparison of individual or collective lifestyles demands that a judgement be made about the fairness of the unequal distribution of resources, and has less to do with the ecological aspect of sustainability.

The Council favours trade as a means of exploiting comparative advantage, but considers that the environmental pressure associated with the production of goods for export must be limited. Population density should not be ignored in comparing environmental pressure. The Council considers the issue of distribution important. A fair distribution of the use of scarce resources, and of the costs of solving global environmental problems, must be sought internationally through discussion and negotiation for the various topics.

In view of these various factors the Council advises against using the ecological footprint as an indicator for policy-making purposes. There are less objections to its use by individuals to gain insight into the environmental consequences of their own behaviour, particularly if the way the footprint is calculated is improved to meet some of the objections mentioned above, and it is used in conjunction with indicators of material and energy usage (or CO_2 emissions). The Council also acknowledges that the various issues which the ecological footprint helps to put on the agenda are useful, and could make a contribution to adjustments in policy. Because the Council does not wish to simply reject the concept, four of these aspects are looked at in the succeeding chapters. In chapter 3 the issue of global ecological sustainability is examined, with a special focus on the sustainable management of global environmental resources, along the lines of the Dutch 'resource dissipation' environmental policy theme. Chapter 4 looks at the way that international trade and investment can lead to the (undesired) displacement of environmental pressures to other countries.Special attention is paid to developing countries. In chapter 5 consideration is given to the question of consumption, the environmental problems associated with it and the possibilities for the Dutch government to pursue a policy which reduces the negative environmental effects of consumption. Finally, chapter 6 looks at the development of indicators of sustainability. Indications are given of how the current set of indicators can be extended in order to give a better picture of the environmental effects which result from the use of environmental resources located in other countries but caused directly or indirectly by Dutch consumption.

3 Sustainable management of global environmental resources

3.1 The use of global environmental resources and environmental effects

At present, Dutch policy is focused almost exclusively on the Dutch environment, in line with Agenda 21 which calls for all countries to be responsible for managing their own environmental resources. The environment and economies are no respecters of national frontiers, however, and do not impact only on the present generation. Agenda 21 therefore calls for the sustainable management of global environmental resources. This chapter considers what are the critical environmental resources at the global level, the extent to which and how these resources are being threatened, and what options there are to counter these threats. These issues are approached from the Dutch perspective.

Global environmental resources, functions and threats

Some environmental resources provide us with goods (sources: sand,fresh water, petroleum, iron, fish, timber or genetic material) which can be traded. Others provide unpriced services such as the decomposition of waste (sinks: biodegradability, chemical erosion) and the maintenance of the natural balances needed to make the environment habitable and pleasant for humans (life-support: pH regulation, temperature, humidity, diseases and infestations). These services are provided primarily by biotic resources (species and ecosystems). Some important resources belong to no-one or occur in all countries, such as the ozone layer, the atmosphere, the oceans, and the organisms necessary for photosynthesis. Other resources are owned, and may be distributed very unevenly between different countries in the world.

Reserves can be depleted (quantitative effect) or become unsuitable for use (qualitative effect). The economic damage associated with depletion can be limited by substituting by other resources. Qualitative degradation of resources can occur as a result of pollution or physical disturbance. This applies particularly to drinking water and organisms, so that they become unsuitable for consumption or other applications. Resources which provide environmental services can also become scarce. Agriculture and construction supplant certain ecosystems, thereby impairing their capacity to provide unpriced services. But the biosphere as a whole can also be very sensitive to loss of quality, for example due to depletion of the ozone layer, climate change and persistent micro-pollutants.

Consequences of using resources

The use of environmental goods has effects not only on the relevant resources themselves, but also on the environment. The extraction of copper ore, for example, requires large areas of land, and during the various phases of its life cycle from extraction through to waste processing the copper is scattered into the environment,thereby also impairing the quality of other resources. It is conceivable that these effects are more likely to lead to restrictions on the use of copper rather than the exhaustion of copper ore reserves. Another example is the use of fossil fuels. This results in emissions of CO_2, thus contributing to the enhanced greenhouse effect and therefore considerably damaging the terrestrial ecosystem, while the fossil fuels themselves are not, for the time being at any rate, becoming exhausted. The management of resources which provide goods must be directed at both the quality and quantity of the reserves of resources themselves, and the consequences of their use. This latter element is generally expected to impose the greatest constraints on sustainable use.

The use of resources which provide unpriced services does not cause harmful effects. These resources can suffer from the effects of the use of environmental goods, however. The availability of environmental services can be reduced as a consequence of the adverse effects of the use of environmental goods.

The most critical environmental resources

The resource stock approach is developed within the 'resource dissipation' environmental policy theme. It was concluded in the Second National Environmental Policy Plan that specific resources are often interchangeable when considered in terms of the goods and services they provide. Three key resources have been identified as essential for the availability of all the others: energy, space and biodiversity (see Parliamentary Documents II, 24 405, nos.1-2). These three resources are so interrelated that optimisation of one of the three is generally at the expense of one of the other two, and account must be taken of this in formulating policy. These key resources form an analytical framework, but they are not necessarily the most appropriate variables for steering purposes. Energy is won from a variety of source resources,particularly fossil fuels.Space is a resource of an entirely different nature: it provides neither goods nor services but constitutes a precondition within which the desired goods and services have to be created. Biodiversity, in its widest sense of the entire biosphere and all the variety it contains, provides important goods (timber, fish, medicines). It is the life-support function of this resource, which maintains the conditions needed to sustain human and other life, which is the crucial one, however. We examine below some of the resources of greatest importance to the world, and the threats they face. We shall discuss in turn the following environmental resources: (1) biodiversity, timber and fisheries, (2) fertile land, (3) fresh water of adequate quality and finally (4) non-renewable resources including fossil fuels. We examine the problems involved.

Biodiversity, timber and fisheries

The UN Biodiversity Convention, signed by almost all countries, places obligations on signatories to preserve species and use nature sustainably. Sustainable use means that populations have to be large enough to maintain a whole range of spontaneous ecological functions at a sufficient level. Examples of such functions are soil formation and conservation, pestilence regulation, and the growth of biomass (timber, wildlife, fish stocks). A refined methodology is being developed to allow the effect of Dutch consumption on biodiversity to be measured (CREM, 1996/1998). The destruction of ecosystems and environmental pollution, alongside the (illegal) trade in plants and animals, are thought to be the main mechanisms by which biodiversity is being impaired. Species are becoming extinct at an estimated rate in the order of 0.1% per year. Some years ago the former Environment Council observed that biodiversity is protected on paper in the Netherlands, but that implementation leaves much to be desired. This applies particularly to the Waddenzee, which is of great importance in international terms, but where intrusive activities are still permitted or are in danger of being permitted (Besselink, 1999a).

Forest stands are steadily being depleted, and in the long run, scarcity threatens. Clear felling of tropical rain forests is irreversible because of soil erosion. The land made available by these activities can often only be used temporarily for agriculture, so that further development of the land is still necessary. The most sustainable form of agriculture on less fertile land in the wet tropics would therefore be agroforestry. The problem of declining timber resources can be ameliorated not only by selective felling, replanting and fertilisation, but also by a more selective use of timbers of different qualities, combined with new techniques for processing and upgrading the timber (PLATO). The purchase of sustainably produced (FSC) timber will also be a step in this direction.

Despite the growing capacity of the international fishing fleet[4], the annual catch worldwide has declined by 14% compared with the peaks of the 1970s and 1980s (Brown et al 1995). This indicates that fish stocks are being depleted. There is a worldwide awareness of this, but the 'tragedy of the global commons' makes it difficult to contemplate concluding enforceable agreements at the global or regional level to regulate and restrict catches. And yet this is what is necessary.

Fertile land

There are many causes for the reduction in the area of fertile land (see German Advisory Council on Global Change 1994 and Brown and Cane 1994). Along with fresh water, this area is a determinant of the production potential of agriculture and forestry.

[4] UN figures suggest that in 1989 the fishing sector suffered a loss of US$ 22 billion on a turnover of US$ 70 billion. Total state support of US$ 53 billion in the form of loans and subsidies was granted to compensate for these losses and further increase capacity (Besselink 1995).

Combined with demographic growth, this reduction is causing food problems in an increasing number of regions: the declining area of fertile land will therefore have to be much better husbanded through better management,measures to combat erosion,and closing nutrient cycles. In the Netherlands, this may mean that strong spatial separation of the production of fodder and the rearing of stock must be reduced, which might also help to reduce eutrophication.

Fresh water

The volume of water available for human use depends mainly on the use /recycling and management of water resources. At present consumption is equivalent to half the annual precipitation, and demand is doubling every twenty years. Fresh water is a precondition for agriculture. Agriculture is also by far the largest user (70%) of water (irrigation).The global distribution of freshwater resources is very uneven. In many countries the volume of precipitation is nowhere near enough to satisfy water needs,and use is made of fossil sources. For decades,local shortages have constrained the expansion of human activities. Because ownership rights are often unclear, water scarcity often leads to conflicts. Water resources are also often contaminated as a result of the use of agrochemicals which run off or leach from agricultural land, and make costly purification necessary. In the future, water scarcity is likely to be one of the main global environmental and indeed general problems we face. We cannot do without water. Possible solutions include measures to increase the efficiency with which water is used. It appears inevitable that in the future new methods of supplying water will have to be found, such as the desalination of sea-water. The sustainable management of fresh water resources is therefore an important area for future attention.

Non-renewable resources

The currently prevailing view is that the scarcity of non-renewable resources (the hypothesis of the Club of Rome) does not, generally speaking, constitute a problem (Hodges 1995). Where scarcity occurs, prices will rise. This will lead to substitution by less scarce resources or - through technological innovation - improved availability or the recycling of raw and other materials.Environmental degradation caused by the use of non-renewable resources is seen by many as the greatest problem.Large but limited reserves of fossil fuels remain. The depletion of these resources is therefore less of a problem than the environmental effects which are associated with the present use of fossil fuels. At the global level it is mainly the emissions of CO_2 which are a problem. In order to protect the atmosphere we need to limit CO_2 emissions. CO_2 storage may offer the answer here. The VROM Council advocates research and demonstration of CO_2 storage in association with the development of hydrogen technology in the period of transition to a low-carbon energy economy (VROM Council 1998b).

3.2 Environmentally-oriented resource policy

Little is yet known about the functions of environmental resources (in particular those that provide for the life-support functions), the total claim being made on these resources worldwide and the part of this claim attributable to the Netherlands.

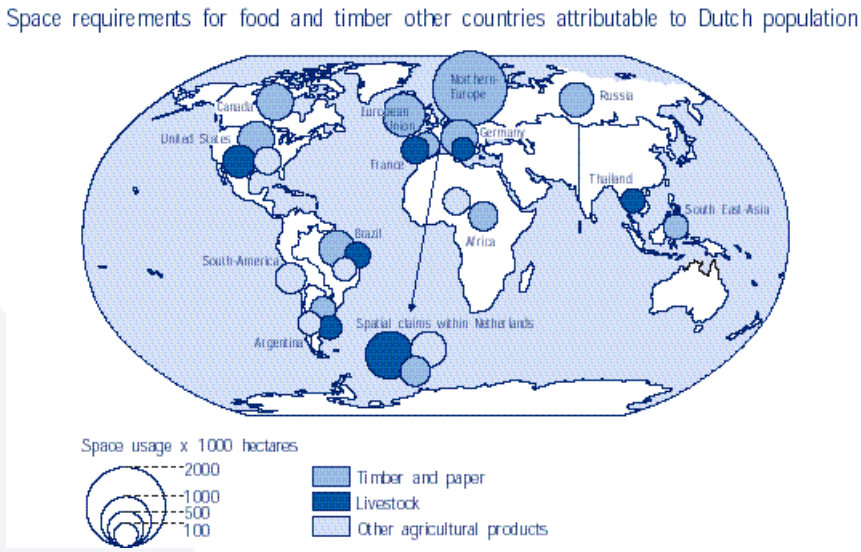


Figure 1 (produced by the RIVM) gives a rough impression at the level of broad geographical sectors and very aggregated import categories. A first,necessary step is therefore to further improve our understanding of this phenomenon. Chapter 6 examines the formulation of indicators in this connection. It is important to form a picture of the global resources which are of crucial importance and need to be considered by policy-makers. The figure above gives a first impression in this regard. The present section examines the possibilities for policy once it has been clearly established which resources need to be protected as a priority. As long as this is not necessary it seems appropriate that our actions should be guided by the precautionary principle, in particular for the biological resources which fulfill life-support functions.

In order to formulate Dutch policy on global resources it is important to bear in mind two things: (1) the claim made on these resources and the use made of them by the Netherlands and (2) the control exercised by the Netherlands over them. The first determines whether action by the Netherlands is required while the second determines what the Netherlands is able to do and the possible form a Dutch policy might take.

Global resources and national control

Resources from the res communis (oceans, ozone layer) belong to no-one and there is no market in them; at the same time they are manifestly of great importance globally, in particular because of the environmental services they provide. These resources can be said to be subject to a (partly informal) collective responsibility. The obvious way to manage these resources is through international agreements which regulate their usage. There are a number of examples of such international agreements. One example is the (effective) Montreal Protocol for substances which deplete the ozone layer. Agreements of this kind are also made at the continental level, for example the fisheries policy of the North Sea countries. It is important that the Netherlands steadfastly adopts a policy consistent with the goal of global sustainable development in negotiations of this kind.

A second type of resource comprises environmental goods traded on the world market. These include agricultural products, timber and fossil fuels. These are also global resources,since everyone has access to them via the market. Once they are on the market it is in principle possible to use this same market to influence them. Market forces do not automatically guarantee that these resources will be used sustainably because in many cases scarcity leads to substitution. It is possible to utilise market forces by working towards the inclusion of environmental costs in the prices. These environmental costs should reflect not only the depletion of the resource itself together with the associated loss of functionality, but also the extent to which the use of the resource results in the impairment of the regenerative capacity of other resources. International trade agreements however make it almost impossible to do this at the level of the individual country. International agreements will therefore also have to be sought for the sustainable management of these resources (see chapter 4). It applies equally here that the Netherlands must adopt a consistent position directed towards sustainability. In this respect the Netherlands should look, for example, at its stance towards the EU common agricultural policy, fisheries outside EU waters and the inclusion of commercial species of tree on the CITES[5] list.

Thirdly, there are resources which are found throughou the world, and are manifestly important, but are not traded on world markets. Examples of such resources are fresh water and (service-providing) ecosystems. These resources more or less escape the attention of international policy: no country can impose its own standards for their management and use on others. National policy is therefore crucial for these resources. The domestic environmental policy needs to be such as to ensure they are carefully husbanded: no wastage, no contamination. In this way every country can do its bit for global

[5] Convention on International Trade in Endangered Species of wild fauna and flora.

management, which will then be the sum of these national parts. As far as the Netherlands is concerned, this boils down to continuing the direction which has so far prevailed in environmental policy. At the international level it can work for standards and agreements on what such careful husbandry actually entails. This is in fact being done, for example in EU directives. At the global level,there is a basis for this in international environmental law (see chapter 4).

Finally, there are resources which only occur in certain countries, but which are regarded as being of global importance. Examples of these are local/regional ecosystems with an important life-support function, such as tropical forests, and specific species - protected species or species which have a specific source function. In the case of the Netherlands there is the Waddenzee which has a spawning ground function. These are the resources which play a crucial role in the global debate about biodiversity. Their management is an entirely national matter; it is not even possible to use the argument that "everyone must do their bit". In fact the reverse often applies: that countries with natural resources which are considerable because they have not yet exploited them do not welcome interference from countries which have cashed in their own natural resources in the past and therefore no longer have them. If we in the Netherlands wish to see such resources preserved, we should therefore also be willing to pay for them. Among the possibilities, for example,are international debt-for-environment swaps. In the area of consumer policy the provision of information (e.g. the Forest Stewardship Certificate for timber) is a possibility. Often the consumer will have to pay more for a product which spares these resources. When resources of international significance of this kind are found within our own national frontiers, it is obviously fitting to ensure that they are properly managed. Seen in these terms, a high priority needs to be given to the conservation of the Waddenzee, including the species which inhabit it and the contribution made to the life-support function, if we wish to be taken seriously in international fora. The VROM Council therefore agrees with the Countryside Council that activities such as gas drilling, shell-fish catching and military exercises should only be permitted if it be demonstrated incontrovertibly that they do not harm the area.

Transboundary pollution

As argued above, resources can also be impaired through a reduction in their quality. This can occur as a result of pollution. Internationally important resources can be impaired by pollution emitted within Dutch frontiers but which is then transported by water or air to other countries (transboundary pollution). But attention also needs to be paid to emissions associated with Dutch consumption, which occurs both within the Netherlands, but also elsewhere (cradle to grave emissions).

The Netherlands can ensure the effective regulation of transboundary pollution originating from its own territory through its policy-making. Seen from the perspective of global resource management, we need to identify the emissions which have adverse effects worldwide. The Netherlands can reduce these emissions on its own initiative, or can do so within the framework of international agreements, as are currently being concluded on greenhouse gas emissions. There are also well-established examples of such agreements at the continental level. Examples are the objectives for emissions of acidifying substances in Europe based on considerations of critical loads, the consultations between the North Sea states to reduce the influx of anthropogenic pollution into the North Sea, and the Kyoto Protocol for reducing the emissions of greenhouse gases. Relevant emissions include not only the macro-nutrients such as carbon,nitrogen and phosphorus, but also persistent micro-pollutants such as metals,dioxins,hormone-disrupting compounds, etc., which are transported all over the world and accumulate for example in the vulnerable polar ecosystems. A possibility would be to set global ceilings for such pollutants, which would then be apportioned between countries. A system of tradeable emission permits would also be a possibility.

The cradle-to-grave emissions resulting from Dutch consumption can also be regarded as a responsibility of the Netherlands. A not inconsiderable proportion of these emissions will occur in other countries,however, outside the control of the Netherlands. It is difficult to incorporate considerations of this kind in a policy towards consumers, because measures can very easily fall afoul of international trade agreements (chapter 4). The possibilities for reducing these emissions through a consumer policy are considered in chapter 5. What the Netherlands certainly can do is to support projects in other countries directed towards reducing environmental pressures through mechanisms such as Joint Implementation.

3.3 Conclusions

As part of the sustainable management of global resources, specific attention needs to be paid to the management of fertile ground,fresh water, carbon (because of the greenhouse gas problem) and biodiversity. The management of global resources is largely an international matter. Individual countries can often accomplish little on their own. Many of the recommendations formulated below are therefore aimed at international agreements. The role of the Netherlands can of course only be limited in such agreements, but it does not have to be nil. This role can range from (passive) cooperation,through pressing for comprehensive agreements to the initiation of discussions. The possibilities for a Dutch policy are much greater in the case of issues related to resources situated in Dutch territory or to Dutch emissions which pose a threat to world resources. The following are some of the means by which the Netherlands can contribute to the management of the various resources.

1. Strive consistently for sustainability when negotiating international agreements on the management and qualitative protection of the global res communis resources which fulfil life-support functions.
2. Aim consistently in international negotiations for all (cradle to grave) effects to be reflected in market prices of global environmental goods so as to limit the degradation of service-providing resources.
3. Careful husbandry of the internationally important resources situated within Dutch territory, such as the Waddenzee.
4. Give priority to abating transboundary pollution which is causing damage on a global scale, either unilaterally or within the framework of international agreements.
5. Conclude bilateral or multilateral agreements regarding the conservation of resources in other countries considered important by the Netherlands, for example through ‘debt-for-environment’ swaps.

4 Environmental pressure in relation to international trade and investment

4.1 The relationship between trade and investment and environmental effects

Through its consumption of resources the Netherlands causes environmental pressure both at home and abroad. The environmental pressures caused within the Netherlands are fairly well charted, although the part attributable to national consumption is not always clear. In the quest for sustainable development this is not sufficient, as was seen above. We have scarcely any picture of the environmental pressure in other countries, although this is thought to be considerable. The Netherlands has long been a major importer of raw materials. These are partly re-exported on to other countries (via Rotterdam),partly exported after conversion (oil refining, meat) and partly used for domestic consumption. In recent decades imported raw materials and products have increasingly been consumed domestically. It is possible that the emissions and the claim placed on resources in other countries in this way occupy an increasing share of the total consumption-related environmental pressure.

This chapter explores the scope for reducing the environmental pressure by changes in foreign trade and investment policy.

There are various examples which show that Dutch consumption gives rise to adverse effects abroad: the mining of the raw materials we need, which in many cases poses a threat to nature and health in developing countries, and the import of all kind of agricultural products, which causes deforestation and erosion in tropical areas. Transport - an automatic consequence of international trade - is also an important cause of environmental problems. In environmental life cycle analysis, transport often turns out to be one of the most important components of the life cycle. It is however by no means the case that environmental pressures created in other countries must be valued as less good or bad. Economists stress the fact that international trade can in fact lead to a reduction in overall environmental pressure globally because of the gain in efficiency which results from the specialisation of countries where they have a comparative advantage. In this perspective, greater self-sufficiency would actually be a bad thing because production is not then being optimised at the global level.

Furthermore it does not create a fair picture to consider only the transfer of Dutch environmental pressures to other countries. The reverse also occurs: environmental pressure is created in the Netherlands by consumption in other countries as a consequence of the high concentration of industry together with the port and transport functions of the Rhine delta. In 1997, for example, Dutch production for export gave rise to CO_2 emissions in the Netherlands of 138 Mtons. The emissions in other countries in respect of Dutch imports, on the other hand, totalled 92 Mtons. The balance of 46 Mtons represented 22% of the total Dutch emissions of 211 Mtons (Buiten and De Haan, 1998). A similar situation applies with regard to the emissions of heavy metals, where the Netherlands also retains net emissions in respect of consumption elsewhere. The environmental pressure shifted to the Netherlands in this way is, up to a certain point, not perceived as a problem by the Dutch government and Dutch society, because the high concentration of industry and the transport function ("Netherlands, Distribution Land") corresponds to long-held aspirations for socio-economic development in the Netherlands. The environmental pressures are apparently seen as being offset by the attendant benefits - economic growth and employment - in combination with the possibility of ever further internalising the environmental costs and developing and implementing more environmentally friendly environmental technology.

It is not immediately clear what the net effect of all this is, and in what regard exactly Dutch policy needs to be modified. Further analysis is needed. It is important, for example, to know whether a raw material or a product comes from a nature conservation area, a 'modified'area (combined nature conservation/agriculture), a cultivated area (exclusively agriculture) or a built-up area, because this indicates the likely seriousness of the environmental pressure created. Account also needs to be taken of indirect effects (such as the opening up of virgin land). Research carried out under contract to the Ministry of VROM (CREM, 1996) shows, for example, that the direct space requirements for mining pale into insignificance beside the indirect space requirements. The study also showed that this land use is associated with a major loss of ecosystem services as a result of the loss of biodiversity. Furthermore it is evident that the entire cycle from extraction through production, consumption to the waste phase must be looked at. This will allow, for example, the impact of the increased or reduced transportation to be made clear if the production and the environmental pressure occurs in the consuming country or region rather than elsewhere. It is important to pay attention not only to the situation in the countries in which the production or extraction occurs, but also to choose a global approach which looks at ways of optimising eco-efficiency. We have to consider what the alternatives are for a given production scheme, and whether these are more or less environmentally harmful when a life cycle approach is taken.

Based on the above, a number of important factors can be identified which are needed to make an assessment of the environmental pressure caused in other countries by Dutch consumption.

- How ecologically sensitive is the area where the environmental pressure occurs?
- What kind of environmental effect is it, and at what geographical levels does it operate?
- Are there sufficient offsetting benefits in the country in which the environmental pressure occurs in the form of increasing living standards and employment?
- Does the country in which the environmental pressure occurs have sufficient resources available to internalise the environmental costs, for example by developing and enforcing environmental policy and by developing and implementing progressively more environmentally friendly techniques, and is there a role for the Netherlands to play in this?
- Are the environmental norms and standards for the environment, enforcement and efficiency in the country in which the environmental pressure occurs higher or lower than in the Netherlands?
- What alternatives are there to production in the country concerned, and would these alternatives have a higher net eco-efficiency?

Trade and the displacement of environmental pressure to or from other countries

Environmental pressure can be displaced to or from other countries as a result of the continuing development of trade relations. As already indicated,international trade can contribute to a better distribution of the available environmental space and, in consequence, to a reduction in environmental pressure. Trade can remove local constraints and create an optimum balance between living standards and environmental quality, given the differences in the distribution of population, raw materials and other natural resources (comparative advantage). Two important caveats apply, however.

- Firstly, markets generally do not properly reflect future scarcity or over-exploitation, or environmental and other externalities. This is a problem. The world market also suffers an additional deficiency: the absence of an authority with sufficient powers to formulate and enforce ecological constraints (Verbruggen,1992).
- Secondly, there is a kind of unequal exchange between the North on one side and the South and the former Eastern Bloc countries on the other. The developed countries at present import many environmental goods from the South at a relatively low price, or even without any price attached at all. The South, by contrast, does pay part of the environmental costs of the North,i.e. that part which is passed on in the exports of the developed countries (Verbruggen,1999). This will only change when a fully-fledged environmental policy is pursued at all levels (local, national, regional, global).

Existing trade flows can be analysed for possible problematic forms of environmental pressure caused in other countries. Such an analysis must look at the different types of imports, and examine which type of trade relationship is entertained with which countries. The type of trade also needs to be looked at (long-term contracts or rapidly changing short-term agreements). These factors are relevant in determining whether a change of policy is necessary and possible. An example of such a trade flow is the import of timber.

The average Dutch inhabitant consumes 1 m^3 of timber each year, of which 10% is hardwood. Softwood is imported mainly from countries such as France,Germany, Sweden, Finland, Canada and the US, while hardwood is imported primarily from Brazil, Indonesia and Central Africa. This can lead to the depletion of remaining woodland areas in Western countries and/or pressure on developing countries to fell their forests to provide timber for Western countries, including the Netherlands.

Investment and the displacement of environmental pressure to or from other countries

Foreign investment can have a major impact on the environment and on environmental policy in the countries in which the investment is made. This issue does not feature prominently on the political agenda, as witnessed by the very late stage at which the environment was introduced during the preparation of the Multilateral Agreement on Investments (MAI). It then transpired that the proposed regulations were in direct conflict in a number of respects with both national environmental policy and the goal of sustainable development as agreed in the UN Biodiversity Convention. This fact, together with the fact that it was realised that the MAI would have undesirable social consequences, eventually led to its rejection. At present there is no international treaty on investments, and countries still operate with bilateral treaties. Globally, this still often operates to the disadvantage of an ecologically sustainable development. It does however give countries the opportunity to incorporate environmental considerations into the agreement if they both consider this advantageous.

The Netherlands is considered to be an extremely active investor (for example third in Brazil), partly because it is the home of many large transnational enterprises. Companies sited in the Netherlands are often active in the markets for foodstuffs and raw materials (for example minerals) which tends to mean that the Netherlands is particularly active in developing countries. Furthermore Dutch financial institutions possess large investment portfolios in foreign companies involved in projects which can have a major impact on natural ecosystems and the environment, for example in petroleum and coal mining. Three different types of Dutch investment can be distinguished.

1. The investments of financial institutions (banks, investment funds) in specific projects.Government support from the Ministry of Foreign Affairs/Directorate-General for International Cooperation (ORET and MILIEV) and the Ministry of Economic Affairs (PSOM and PESP) through the Netherlands Credit Guarantee Company (NCM) or the Netherlands Finance Company for Developing Countries (FMO) is sometimes of crucial importance.
2. Participation by companies or their subsidiaries in projects with an environmental impact, for example in the extraction, processing and transport of fossil fuels, or in the cultivation of raw materials for the foodstuffs industry, such as vegetable oils and proteins, in nature conservation areas. In particular there is extensive Dutch government financial support (through ORET, MILIEV, NCM, FMO) for the construction and maintenance of transport and other infrastructure.
3. Dutch bilateral development aid or participation in multilateral investments: EU projects, or financing through the Global Environmental Facility (GEF), the International Monetary Fund (IMF) or the World Bank. The Netherlands can make a substantial contribution in relation to the testing of expenditure on ecological criteria.

Some of the organisations and schemes mentioned already have regard, in a very variable degree, to the environmental consequences of their aid. It is important that the environmental implications of investments are systematically considered, and that a clearer picture is formed of the environmental pressures which result from investments.

4.2 Environmental trade and investment policy

National policy

Because our own consumption patterns and the changes in them have effects on other countries through emissions and trade flows, both on the environment and on social and economic conditions there, the Council endorses the international orientation which the Minister wishes to give to the Fourth Environmental Policy Plan. One of the approaches which can be adopted by Dutch policy to reduce problematical forms of environmental pressure in other countries is to change Dutch consumption patterns. These possibilities are discussed in chapter 5. Another possibility is to strengthen directly the environmental policy in other countries, for example by supporting technology development and, more concretely, by helping developing countries with the establishment of production processes. Technology transfer is seen by many as a way not only of reducing environmental pressure but also of contributing to the socio-economic development of other countries. The former National Advisory Council for Development Cooperation expresses, in its Advice

on Technology and Development (1996a), some reservations about this: if technology transfer is to succeed, certain very definite conditions must be met.

International organisations

As expressed in principle 2 of the Declaration of Rio de Janeiro, each country itself bears primary responsibility for strengthening its environmental policy. Modern international law places limits on the freedom of states to do whatever they please within their own territory and jurisdiction. Sovereignty brings with it the obligation on the part of states to observe the principles and rules of international environmental law, not only in regard to the transboundary and even global effects of their actions, but also in regard to the sustainable management of their own territory and its natural assets and resources, both on land and in the maritime areas which fall under their jurisdiction (petroleum, gas,fisheries). This certainly provides some indications for international policy.

Apart from institutions such as the United Nations Environmental Programme (UNEP) and the Commission on Sustainable Development, which can play a role in getting these obligations enshrined in the environmental and other policy of the different countries, it is particularly the international institutions concerned with trade and economics (e.g. the WTO, the EU) which are important in terms of taking account of upstream/downstream effects in other countries.

WTO rules do not permit the Netherlands to stipulate conditions on the way other countries produce unless this results in adverse environmental effects in the Netherlands itself, for example in the use or waste processing phases: “WTO rules place essentially no constraints on the policy choices available to a country to protect its own environment against damage either from domestic production or from the consumption of domestically produced or imported products” (WTO 1997). This situation is perpetuated on one hand by developing countries themselves because they find themselves, or are placed,under pressure to generate foreign earnings through exports, although this can lead to environmental degradation and overly low prices for raw material exports. On the other hand the developed countries also maintain the status quo because the present situation of cheap imports is advantageous for them (in the short term),and because they can with justice be accused of not themselves having an unblemished record. In international discussions on the protection of tropical forests, for example, from felling for Western consumption, the position of the Western countries is extremely weak. In Europe, for example, only 1% of the area of forest is native forest, most of which is in the European part of Russia. What right has the Netherlands or the EU therefore got to demand that developing countries leave their own forests alone? The argument that things are different now because of the climate change problem and the reduction in biodiversity than they were at the start of the industrial revolution cuts little ice

with developing countries (so far).

Various authors plead for the establishment of a World Environment Organisation (WEO) as a counterbalance to the WTO. The existing bodies which coordinate matters related to the environment and sustainable development, such as UNEP and the CSD, have shown themselves not to have sufficient muscle and power. A WEO would put on its agenda, amongst other subjects, the international management of raw materials, and could take charge,amongst other matters, of coordinating the development and implementation of international treaties. Others argue that a WEO would be unlikely to have much impact given that countries have not proved willing to invest more powers in, for example,UNEP.

In its international environmental policy the Netherlands can tackle the issue of problematic forms of environmental pressure in other countries caused by imports by raising this matter within the EU and the WTO. This is the most sensible course because the leeway for a Dutch foreign environmental policy is determined partly by the common policy of the EU, and by agreements on trade and investment to be made in the framework of the WTO. Particularly in the light of the continuing liberalisation of world trade, it is vital that the Netherlands tests proposals made in these fora against the possibilities for countries to pursue an international policy which actually promotes the sustainable production of raw materials for their own consumption. In their relations with developing countries, the developed countries must meet their responsibilities by providing financial resources and by technology transfer, so as to enable an effective approach to be taken to, amongst others, environmental issues. It is evident that developed countries such as the Netherlands must put their own house in order, for it is only by setting a good example which combines high living standards with a low environmental pressure and clean and efficient energy and material usage that others will follow.

International agreements on environmental management

It was indicated in Chapter 3 that international agreements are in particular desirable for (1) the management of the global commons and (2) the market-based regulation of sources traded on the world market. In the case of the global commons,the best course is to strive for global agreements such as the Montreal Protocol on substances which deplete the ozone layer. In the case of sources traded on the world market, regulation might be achieved through the following possibilities.

- Making agreements on production methods and technologies and providing funding for the accelerated introduction of these methods.
- The introduction of a levy on the import of raw materials in order to generate funds for research into the environmental effects of the extraction and processing of these raw materials in producing countries and into possible sustainable pro-

duction technologies. This could only be done within the WTO rules if the raw material concerned is one which is not produced on a large scale within the EU because only then would it be a non-discriminatory measure.

- The conclusion of agreements on raw materials which aim to introduce sustainable production technologies and to internalise environmental costs and any future scarcity in the price.
- The establishment of compensation schemes with producing countries in order to limit production, for example through debt-for-environment swaps (IUCN, 1996).
- The facilitation of tradeable permits for emissions or the use of natural resources. These might be an economically efficient manner of ensuring the cleaner and more efficient use of raw materials, energy and other materials.

It is clear, however, that these possibilities will require a very great deal of discussion and negotiation.

International investments

As is apparent from the above, it is certainly far from normal to look at the environmental implications when making investment decisions. The Dutch government has only very limited means of intervening in such matters. It nevertheless seems a good idea to devote more attention to this in the future. The following are some of the possibilities.

- A new international agreement on investment (MAI)
  Any future international agreement on investment should be consistent with agreements on sustainability and sustainable development.
- The greening of the risk assessments for export credit and export credit guarantees
  The World Bank environmental guidelines should be applied to credits and guarantees extended from public funds - such as the ORET (Scheme for Development-Relevant Export Transactions) and the activities of the NCM (Netherlands Credit Underwriting Company) - and should also be used when reviewing existing projects. Private investors such as banks, insurance companies and pension funds could also be invited to do this. The existence of a respectable number of 'green funds' which are making use of the existing 'Green Investment' scheme testifies to the feasibility of this.

4.3 Conclusions

Set out below is a non-exhaustive list of policy options for reducing problematic forms of environmental pressure in other countries due to Dutch imports. The following policy options could be further developed or accelerated.

1. Technology transfer in order to reduce the environmental effects of extraction and production in other countries.
2. The provision of information to Dutch consumers by the government and by industry about the environmental consequences in other countries of their consumption, in particular where the effort involved in providing this information is reasonable, and where there is a reasonable likelihood that it will be used by consumers or voluntary organisations /pressure groups (for example for eco- and other labelling, certification and environmental information hotlines).
3. Encourage multinationals to apply the production standards adopted in the Netherlands also elsewhere. This will prevent the establishment of 'pollution havens', and will also accelerate the internalisation of environmental policy. The Dutch government can also ask companies to impose requirements on their suppliers which relate not only to the product phase but the entire life cycle (cradle to grave).
4. Explore at the international level the possibilities for the greening of risk assessments for export credit and investment guarantees.
5. Aim for a 'greening' of financial/economic instruments in order to reflect the depletion of natural resources and environmental impacts in the prices of goods and services.
6. Diplomatic efforts in the framework of the WTO directed towards the proper management of raw materials, the establishment of the desired environmental and ethical standards and the internalisation of environmental costs. It may also be useful to further strengthen existing international bodies such as UNEP and the CSD in order to press for such aspects to be taken on board.

5 Consumption and the environment

5.1 The environmental effects of consumption

A first justification for devoting attention to the consumption of consumers is the fact that directly and indirectly consumers provide the driving force behind all the environmentally intrusive processes of extraction, production, transport and waste processing. The economy only operates by virtue of consumer demand. It was pointed out in the Third National Environmental Policy Plan that extra expenditure resulting from rising living standards leads to growth in consumption and an associated rise in environmental pressures. This in part offsets the effect of increasing environmental efficiency in productive processes and waste processing. Despite this trend, it can be observed that many environmental pressures are reducing in the Netherlands.

A second argument is that consumers are able to exercise considerable influence on producers through the market. While industry may drag its feet in response to the wishes of the authorities, it will be immediately convinced by a clear demand from consumers for more environmentally friendly products. Greater insight on the part of consumers into production processes, and more feedback from consumers to companies might, according to this argument, be more effective than direct appeals to companies by the authorities.

A third argument is the increasing importance of emissions to the environment during the consumption phase, both in the Netherlands and elsewhere. When the emissions from the production and waste phases are reduced, as has happened for a number of pollutants as a result of regulation, the emissions from the consumption phase remain. These are often diffuse and are seldom measured. This makes them difficult to tackle. They occur, for example, during actual use (solvents,paint,sprays) or as a corrosive leakage: the term ‘dissipative use’ is often used here.

A fourth reason for taking a look at consumption relates to the realisation that domestic consumption can lead to undesirable environmental effects in other countries. If a product is looked at in life cycle terms from the cradle to the grave then it is seen that the cradle (winning of raw materials) and the grave (waste processing) are often located abroad. A cleaner environment at home does not necessarily mean that there is an environmental gain at the global level.

A fifth phenomenon, not often acknowledged but nonetheless important, relates to the build-up of stocks in the economy as a result of lags. This phenomenon remains invisible when we confine our attention to the entire life cycle, but crops up when mate-

rial balances or 'accounts' are drawn up. Apparently, for example, one third of the quantity of materials which flow into the Dutch economy each year accumulate in a variety of inventories of products and applications of materials. This results in a rapidly rising inventory of materials in the consumption phase. In the long run, however, these inventories will enter the environment in the form of waste and emissions. Many forecasts fail to allow for this, and therefore underestimate future waste streams. For specific materials, the fraction of the influx which accumulates each year can be very large. An example of this is CFCs. In the case of CFCs, it is apparently the case that even in the event of a worldwide ban in 2000, total emissions in the 21st century will be of the same magnitude as the total accumulated emissions to date. A similar situation applies for PVC and metals, which means that even a policy of complete substitution will have to contend with a long-term lag effect hitherto severely underestimated. Indeed in the case of metals it transpires that a policy which has succeeded in reducing emissions has had the entirely unintended effect of increasing the growth in inventories (which is not the same as a longer residence time in the economy), which may result in higher emissions in the future. This phenomenon whereby the economy acts as a kind of buffer, storing problems for the future, is one which needs to examined further.

These phenomena appear to justify a deepening of our knowledge and greater attention on the part of policy-makers for the relationship between consumption and the environment. In the section below some possible avenues which might be pursued are considered.

5.2 Environmental policy aimed at consumers

A sensible approach for a national policy would seem to be to examine functions at the macro level. Policy can be directed towards identifying and promoting more sustainable ways of fulfilling these macro functions. A formula used to ascribe the environmental pressure to individuals is the following:

$$EP = P \times LS \times E$$

where EP represents the environmental pressure, P is the population, LS is a measure of living standard per person (in this context it can be represented by consumption) and E represents the environmental pressure per guilder. This formula can provide indications for policy. The first variable, the number of people, remains outside the scope of environmental policy. That leaves two other variables: the environmental pressure per guilder and per capita consumption. Two approaches are discussed to reduce the environmental pressure per guilder, which we shall refer to as (1) the eco-efficiency approach and (2) modifying behaviour. Finally, (3) volume-reduction policy, will be discussed as a means of modifying the per capita consumption.

Eco-efficiency approach

The eco-efficiency approach is predicated on the principle that all the links of the production-consumption chain must be made as clean and efficient as possible. This means that policy must be directed towards technological improvements which lead to reduced environmental pressure in all phases of the life cycle: cleaner raw material extraction and production, the better design of products so as to use less or different raw materials, less environmental impact during the use phase and better possibilities for recycling and waste processing. The responsibility for cleaning up the consumption cycle then rests with the authorities,industry and the environmental sectors, in line with current thinking on environmental policy, and also directly consistent with the concept of functionality at the macro level. In its 1996 advice 'Sustainable consumption: a realistic perspective' the former Environment Council described this approach as the technology perspective. This direction was explored in the large-scale research programme Sustainable Technology Development. An important conclusion of this programme was that it should in theory be possible to reduce the environmental pressure for a number of functions at the macro level by a factor of 20. This improvement could be partly realised in the short term with measures aimed at product improvement and chain optimisation, such as process improvements and recycling. Part of the reduction will have to be achieved, on a longer-term perspective, by switching to a new basis, e.g. more solar energy, or obtain more protein from plants. In order to achieve system innovations of this kind, big social changes will be necessary. It is concluded that there are few technological impediments to such change. An optimistic picture is painted in this respect. The application of such possibilities will demand a policy directed strongly towards technological innovation and implementation. The Sustainable Technology Development programme focused mainly on the scope for improving eco-efficiency in the production sectors. The use phase and waste processing were only touched on incidentally. The issue of storing problems up for the future as a result of the accumulation of inventories in the economy was largely disregarded. Apart from prevention, for example in the form of prolonging the life of different applications, a waste processing policy more oriented towards the decomposition or immobilisation of waste should also contribute to the sustainable management of these resources.

In drawing up policy for technological improvement, one problem is that the cradle and grave phases of the life cycle are often located in other countries. Dutch policy can only have limited influence in the internal affairs of other countries. One approach which can achieve something is to provide consumers with relevant information which allows them, if they so wish, to modify their purchasing behaviour (see below), for example by means of ecolabelling. Discussions are currently being held within the WTO about the provision of such information: what should and should not be permissible, and on what grounds? Other options suitable for discussion at the international level

were dealt with in chapters 3 and 4. Specific bilateral agreements or assistance ,agreements with multinationals which transport raw materials and semi-manufactures between locations in different countries, etc., can have an influence on consumption goods at the initial and final phases of their life cycle.

Influencing behaviour

Behaviour-influencing measures target the consumer directly. There will only be a substantial collective environmental gain if a large number of individual consumers modify their behaviour. Influencing behaviour can impact on three different aspects of consumer behaviour, i.e. behaviour in relation to purchasing, use and disposal.

Attempts to influence purchasing behaviour address the nature rather than the magnitude of consumers' expenditure. A shift can be achieved without loss of functionality by, for example, always choosing the most environmentally friendly product or service from the available alternatives. Policy can then be directed towards extending choice in an environmentally friendly direction (product policy). Since environmental considerations ordinarily only play a limited role in the purchase of products,attention needs to be paid to the normal requirements of functionality and aesthetics. If an alternative product also has other advantages - better for the health, for example - this can aid the process of switching. Information about the product and the production process, in the form for example of labelling or certification, can play a vital part in facilitating such a shift.

A shift can also be effected between functions,associated with a real change in consumption patterns. Such shifts, referred to by the Environment Council in its advice as 'changed expenditure patterns', have been studied far less. The 'Perspectief ' project, initiated by the Ministry of VROM, which showed that a significant increase in income can be consistent with an equally significant energy saving, is a clear illustration of this. By spending incomes differently - for example less travel (or travelling differently), more purchase of works of art - considerably less energy could in theory be used. In order to properly target policy it is necessary to have an understanding of the other forms of environmental pressure associated with the different ways of allocating expenditure. The most environmentally burdensome expenditures, for example, could be taxed to the point of unattractiveness. Consumer information can also play its part in bringing about such a shift, although its effect will usually be limited.

User behaviour relates to the period after purchase. It includes issues such as the regulation of the temperature and lighting in the home,mobility behaviour, the maintenance and repair of appliances, etc. In this field some disturbing trends are discernible related to the introduction of more environmentally friendly products, such as the tend-

ency to leave the lights on in rooms where no-one is because they are only low-energy light bulbs, taking longer showers when water-conserving shower-heads are used, or using fuel-efficient cars more (the 'rebound' effect). It is virtually impossible to influence user behaviour directly. An attempt can be made, however, to build awareness in consumers about the effects of different forms of user behaviour through the provision of information.

The third category of behaviour-influencing measures relates to the disposal of end-of-life products. It is important to have proper insight into the reasons why and the moment at which consumers decide to discard certain products if these factors are to be addressed by policy. Policy can then allow for this behaviour through appropriate product design (design for recycling), but also through waste processing (take-back obligation, collection structures, processing facilities). Disposal behaviour can be influenced by information, by prices and through systems of returnable deposits.

It is the case for all three categories of behaviour referred to above that of themselves they nowhere near achieve the desired standard. A number of constraints can be identified which contribute in different degrees to this situation.

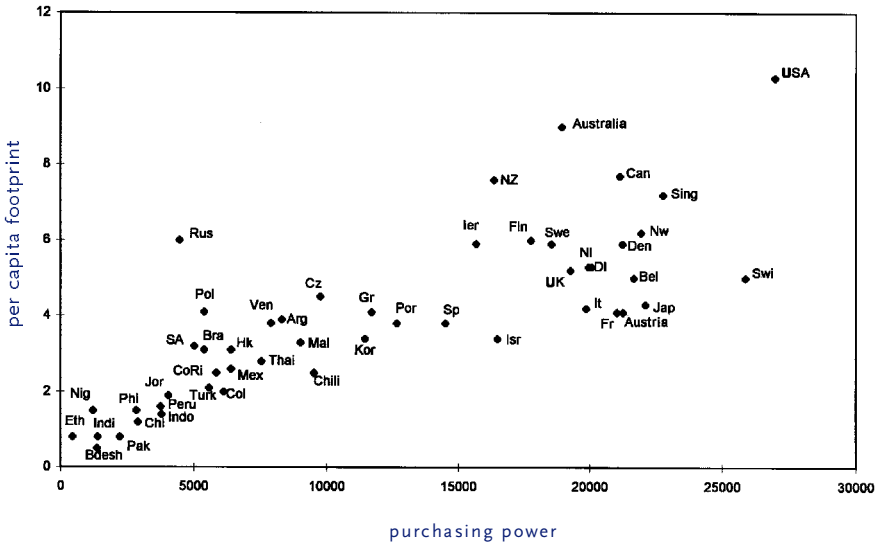
1. The consumer has a deficit of information (matched to his needs) on the properties of a particular product/service combination, on the production process, on the behavioural alternatives open to him or on the expectations of the authorities.
2. The consumer lacks the concrete possibilities needed to make the desired behavioural change, or the disadvantages of such a change are too great. For example a new residential neighbourhood may not yet have public transport facilities, at a time when travelling habits are being formed.
3. Consumers are given the wrong price signal, for example when employers provide free parking for their employees.
4. Changes in consumer behaviour are often discouraged by government rules which may only make a marginal contribution to the purpose for which they were introduced, or which act more generally than is necessary.

Volume-reduction policy

Many studies have shown that environmental pressure correlates strongly with purchasing power (see for example figure 2: Relationship between mean per capita ecological footprint and mean purchasing power for different countries). This relationship suggests that the way to reduce environmental pressure is to reduce expenditure. At first sight it seems rather unlikely that this will happen of its own accord or can be imposed at the national level. And yet there are possibilities. A certain tendency is discernible for people to forego salary in favour of more free time. Smaller salaries mean lower expendi-

ture and therefore a reduction in the environmental pressure. There are all kinds of factors which tend to reduce the net effect, such as higher levels of workforce participation. Part of the effect is therefore offset (verbal communication Koopmans,CPB). It is also entirely conceivable that more free time will lead to increased levels of certain forms of environmental pressure, for example as a result of increased recreational activities. Nevertheless it is quite possible that the net effect of this trend will be positive. This matter requires further study.

ecological footprint plotted against purchasing power (GNR PPP)



These three policy directions can complement one another. It is at this stage difficult to say to what extent the nature and magnitude of expenditure can be steered,and to what extent improvements in efficiency lead in practice to a decoupling of environmental pressure from expenditure. Further research into these matters is needed.

5.3 Conclusions

There seem to be various possible avenues for an environmental policy targeted at consumption and consumers. The many uncertainties mean that for the moment it is not clear which is the most promising. The following conclusions are drawn.

1. It would be sensible to conduct research into behaviour (lifestyles) and the possibilities of steering consumers and consumption, so that a soundly-based policy can be pursued. The planned research of the RIVM in this area for the Fifth Environmental Outlook may make a contribution to this.
2. Another subject which should be researched is how changing individual behaviour can lead to a substantial reduction in the overall environmental pressure due to Dutch consumption.
3. It is also recommended that potential avenues for creating a domestic policy which will increase efficiency, shift expenditure patterns and reduce the volume of consumption should be explored and compared with one another.
4. The scope for influencing the 'cradle' and 'grave' phases of the life cycle of Dutch consumption by means of international agreements, trade agreements and information-based instruments such as the ecolabel (see chapters 3 and 4) should be explored.

6 Indicators of sustainable use of the global environment

6.1 Functions of indicators

This advice considers the question as to how global sustainability can be promoted and what the concrete implications of this are for the content and manner of implementation of national environmental policy. Data are needed for this, as otherwise the nature and magnitude of the problem remain unclear, and the effectiveness of policy cannot be assessed. This chapter looks at the formulation of indicators for environmental policy from the viewpoint of global sustainability, the environmental pressure in other countries and consumption. The ecological footprint is such an indicator but, as the Council concludes in chapter 2, it provides an insufficient basis for policy-making. The choice of appropriate indicators is related to how precisely the concepts of sustainability and sustainable development are perceived.. The hard sustainability approach emphasises the finite nature of the environment as a resource, and the need to place absolute limits on collective and individual use of the environment. The ecological footprint fits well into this view of the world. Soft sustainability emphasises the interchangeability of social, economic and environmental resources. Decisions are often taken on the basis of relative measures such as a benchmark of eco-efficiency based on performance in other countries, or cost-effectiveness. Indicators are needed for both of these approaches.

The indicators used in Dutch environmental policy have hitherto largely confined themselves to measuring the environmental quality in the Netherlands and recording the emissions which occur within its national frontiers. Combined with the system of standards, this is primarily a hard sustainability approach. In section 6.2 an overview is given of the indicators used in the Netherlands and internationally for national environmental policy. So far the relationship with other countries has consisted of determining the transboundary flows of some pollutants: the fraction of Dutch emissions transported through the environment to other countries, and the quantities of these pollutants which enter the Netherlands by water or air. In addition, records are kept by means of the trade statistics of imports and exports of raw and other materials, and also waste. For a number of important substances (carbon, nutrients,some metals) it is possible to draw up a practically complete overview of inflows and outflows. This is not sufficient,however, to provide an understanding of the Dutch impact on global sustainability. In order to specify this, another approach is necessary: that of the life cycle of consumption from cradle to grave, which takes as starting point the products and services needed for Dutch consumption, and describes the adverse effects which result from the extraction, processing and transport of raw materials, production, use and waste pro-

cessing, wherever in the world these processes occur. This is more of an eco-efficiency approach. Consumption life cycles have until now only been specified incidentally. This chapter looks at how more systematic consideration can be given to consumption life cycles.

Stepping up the scale of monitoring in this way requires more international coordination and exchange of data. The three directions of attack dealt with in this advice, in chapters 3, 4 and 5 (global environmental stocks, trade and investment, consumption),each provide a basis for the formulation of indicators, and these can lead to complementary insights. These are discussed in sections 6.3 to 6.5.

What we need to do is to identify those aspects which should form an indispensable and substantial element of a picture, meaningful in policy terms, of the Dutch contribution to the desired global sustainability. Sustainability comprises at least three aspects: ecology, economics and social aspects. Although it is not necessary to include all three of these in a single set of indicators, these three facets must at least play a balanced role in the eventual policy-making. Although we shall concentrate on the ecological aspects as specified in the advice request, section 6.6 considers briefly how the ecological indicators could be supplemented.Finally, section 6.7 presents the conclusions of this chapter.

The purpose of indicators is to monitor aspects of sustainability and sustainable development, and to provide indications on which policy can be based. In order to meet this objective,(sets of) indicators of sustainability must satisfy a number of requirements. Bakkes et al (1994)[6] formulate requirements as to policy relevance,usability, scientific basis and the measurability of indicators, which should also apply to the possibilities presented here.

6.2 Indicators of environmental pressure in the Netherlands

For several years, standard indicators have been published in the annual Environmental Programmes for most of the 'themes' of environmental policy[7]. Some of these indicators present current emissions compared with the national objective. These indicators are aggregated on the basis of the property which determines the environmen-

[6] J.A. Bakker et al: An Overview of Environmental Indicators:State of the art and perspectives, RIVM/UNEP, June 1994. The various requirements are formulated differently in the various publications, and are aggregated at different levels. There are generally standard requirements relating to representativeness, replicability, underlying data, unambiguousness, etc. In this connection,especially important requirements are: completeness of the environmental effects included,insight into the entire life cycle and the transfer of problems to future generations.

[7] See Second Chamber, 1996-1997 session, 25 005, nos.1-2, pp. 126,132,136,140, 160 and 166.

tal effect dealt with by the theme (e.g. for climate change: global warming potential, acidification: acid equivalents, eutrophication: emissions of macro-nutrients, weighted by the mean ratio of uptake by plants, and toxic and hazardous substances: emissions of micro-pollutants weighted by toxicity and residence time in the environment). These indicators prove to be very relevant for policy, and relatively uncontroversial. The waste disposal indicators (quantity of waste to landfill) and disturbance (numbers of persons experiencing odour or noise nuisance) monitor the effects. It has so far proved impossible to devise satisfactory indicators for the groundwater depletion and resource dissipation themes.

A study was carried out at the request of the Ministry of VROM into the possibility of designing an indicator which represents the trend in environmental pressure as a function of economic growth (Huele et al, 1999). The emphasis in the study lay on assessing different methods of aggregating to arrive at a figure for total environmental pressure. The authors conclude that the appropriateness of the various alternatives depends on the particular application involved. Aggregation using principal component analysis helps to identify the elements with the largest influence on the behaviour of the system, so that the nature of the linkage can be understood. Aggregation by themes fits best with the present theme-based approach adopted by Dutch environmental policy. Aggregation according to the importance ascribed by a panel reflects best the perceptions of the panel members concerned. Aggregation by mass fits well with the eco-efficiency philosophy, which also enjoys support in industry. If a decision were taken to develop more than one of these options,they should at least make use of the same data-set to ensure intercomparability. As with the theme-indicators, pursuing a policy based on a decoupling indicator of this kind can cause emissions to be displaced to other countries.

The DPSIR model now often plays a prominent role in the development of indicator sets for environmental policy. This model comprises a causal chain running from societal causes (Driving forces) through Pressures on the environment, the State of the environment and environmental Impacts, to society's Responses. The approach poses three questions: what is happening to the environment and natural resources, why is this happening and what are we doing about it? The most important practical application of the model has been in developing the indicator list of the UN Commission on Sustainable Development (CSD). This list comprises more than 100 indicators which relate to all possible environmental aspects. In the case of biodiversity, for example,there is a pressure indicator which represents land conversion and land fragmentation, a state indicator in the form of the number of species on an area of land and a response indicator in the form of the quantity of protected areas in a country or region. The World Bank has taken these ideas further, and is currently developing, in cooperation with UNEP, UNDP and FAO a set of land quality indicators. The European Union and the

European Environment Agency also make use of the DPSIR approach in evaluating the community's environmental policy. Various countries have also selected a group of indicators from the CSD list and developed them further. The choices made make it clear that environmental problems vary between countries, and they are based on the most important policy objectives of a country. Once again, these lists confine themselves to variables which do not look beyond national frontiers. The DPSIR model is also used in the Netherlands, for example in the various studies of decoupling indicators. In this work, response indicators have been notable for their scarcity.

6.3 Indicators of the sustainability of the use of global environmental resources

In chapter 3, global environmental resources were classified into three groups: source, sink and life-support.

Source resources can be measured in three different ways: by quantity, by quality and by the effects of their use. Quantitative measurement of source resources from a depletion perspective is already widely practised, certainly as far as global resources are concerned. Estimates of the quantities of fossil fuels and mineral ores in the earth's crust are being continuously made, and are modified each year. In order to measure the claim made by the Netherlands,import-export balances can be drawn up for these resources, thereby specifying the net Dutch consumption. This can also be done for non-world market sources such as fresh water, for example in the framework of a Natural Resource Accounting system. The net per capita consumption can be compared with per capita use in other countries or with the world average, so as to gain insight into the claim made on the resource concerned relative to others. It is pretty well unworkable to set a 'sustainable level' as a reference value for the extraction of specific resources. The quality of source resources - in particular fresh water and biota - is also widely measured. Water quality measurements are standard in most countries. The same applies to the measurement of contaminants in food products. In the Netherlands this is done pursuant to the Commodities Act for public health purposes. There appears to be no need to carry out further measurement activities. Losses during the use of source resources are sometimes measured (emissions monitoring, waste statistics), but hardly ever from a natural resource management viewpoint. The fact that leakages from the chromium cycle could place a greater constraint on chromium consumption than the stocks of chromium in the earth's crust has not led to a standard system of stock accounting for chromium. In the past the CBS (Statistics Netherlands) has occasionally drawn up mass flow diagrams for given source resource which specify the entire chain in so far as it lies within Dutch frontiers, and whereby leakages can be related to extraction. At the moment the only such activities still continuing are the annual accounts for nitrogen and phosphorus in the agricultural sector. It would be worthwhile to resume drawing up such accounts in a

more systematic manner for a number of the most crucial source resources. In addition, an attempt could be made for some of the crucial material cycles to specify the Dutch consumption cycle from cradle to grave.

Since making use of the services provided by sink and life-support resources does not cause adverse effects, it is sufficient to measure the magnitude and quality of these stocks. The size of ecosystems which fulfil life support functions is already measured in most countries, including the Netherlands, in terms of the area of woodland/forest and other natural habitats. The claim made on the world's land resources by the Netherlands through the consumption cycle can also be measured in terms of area. When converted to a per capita basis, this figure can be compared with the global average. Because land area is a readily and precisely quantifiable resource, a global reference value could be established, as is done for the ecological footprint. It would be possible to look at whether the unqualified land-use determined by means of the ecological footprint could be converted into a qualified loss of land area. Just as relevant but much trickier is to measure the global biomass available to provide life support services. Agricultural biomass and even parks and gardens in urban areas also contribute to the provision of these services.

In order to quantify the loss in quality of the service-providing resources, one possibility would be to measure the degradation in the working of certain important environmental processes. It will generally be more practical to measure this in terms of the pollution itself. As far as biodiversity is concerned, the relationships need to be established between, on one hand, Dutch consumption, and on the other hand, loss of species and loss of ecological functions. Not enough light has yet been thrown on these relationships, and research is therefore needed (De Lange and Besselink 1999).

6.4 Indicators of environmental pressure related to international trade and investment

There are as yet no indicators of the environmental pressure caused in other countries by the import of products and materials. The national theme indicators based on the emissions from Dutch production could be supplemented with the emissions arising as a result of Dutch consumption. This seems possible in any case for climate change, acidification and toxic and hazardous substances. Eutrophication is a specific problem for areas with intensive agriculture in, mainly, Western countries. It can be assumed that these countries will autonomously pursue an adequate policy, so that less priority can be given to this problem.

There are no standard environmental indicators related to international trade and investment. Before these can be formulated, the precise need must be defined. There

will be differences of opinion, certainly in relation to international trade. Some argue for greater self-sufficiency, and therefore less trade, because of the harmful effects of transport and the risk of an increase in environmental pressures elsewhere. On the other hand,international trade is regarded as a means of increasing the efficiency of production: every country has its own specific means and circumstances which can be deployed optimally through specialisation and therefore trade. Without taking sides in this discussion, it is clear that efficiency is an important consideration. In this connection, the activities of the World Business Council on Sustainable Development and related organisations can be mentioned, in which attention is paid to the concept of eco-efficiency. This can be defined in various ways: environmental pressure or resources and energy used per guilder earned, or per unit product delivered. Different production cycles can then be compared with one another and it will be seen which is the most efficient. In the view of the VROM Council, it can be useful for countries to develop eco-efficiency indicators to complement their indicators of environmental pressure and environmental quality in order to determine the extent to which international trade contributes to sustainable development or detracts from it.

As already argued in chapter 4, it is important to gain an understanding of the environmental consequences of investments. The 'greening' of risk assessments for export credit and investment guarantees, for which indicators must be developed, is particularly worthy of mention in this connection.

6.5 Indicators for the environmental effects of consumption

In chapter 5 a plea is made for environmental policy-makers to pay more attention to consumption and consumers. This would include indicators which relate environmental pressure to consumption. This section reviews the analytical methods and indicators already available, and evaluates them. A distinction is made in so doing between measures at the micro level, which focus on a particular product or service or the behaviour of individual consumers, or macro level measures which describe the functionality at the national level. All these measures can be seen as measures of eco-efficiency.

Micro measures

Life cycle analysis (LCA) quantifies the environmental pressure per functional unit,i.e. a product or service defined in terms of consumer demand. For this purpose,all the processes which contribute to this functional unit over the entire life cycle are specified,irrespective of place and time. In this way it is possible to identify the components of the life cycle which cause the greatest environmental impact, and where the most promising options for improvement are to be found. Alternative methods of providing for the same function can also be compared in terms of their life cycle effects. In principle a

full LCA includes all environmental effects, which are then translated into their potential contributions to a number of environmental problems. There are also simpler variants in which a smaller number of aspects are considered, for example the 'ecological rucksack' as defined by Schmidt-Bleek (1992), which specifies the material usage in kg of a given product or service.

Research into the purchasing behaviour of consumers is referred to as research into lifestyles. It is useful to know which lifestyles and parts of the total basket of consumption place the greatest pressure on the environment. Although there is a positive correlation between income and environmental pressure,there are also other factors. Research to date has concentrated mainly on energy use. It is seen that energy-intensiveness varies considerably. Expenditures which have a relatively large environmental impact include, for example, air holidays, car-use, meat-eating, cut flowers and dining out. There are differences between the lifestyles of men and women, between work and private life and between various age-groups. There is also a large spread in energy usage, both amongst high-income and low-income groups, even though there is a clear positive correlation between income and energy use. This spread suggests that it is possible to achieve growth in incomes even while a significant cut in energy use is being made. This has been confirmed by research (Ministry of VROM Perspectief project). This research shows that more attention needs to be paid to the relationship between environmental pressure and lifestyles.

There are various indicators for individual consumption and lifestyles. Apart from the size of the ecological footprint, in square metres, measures have been developed for energy use and for material use. The HOMES research programme of the NWO (Netherlands Scientific Research Committee) makes use of a 'sustainable mean energy use' per world inhabitant as a reference value. The Total Materials Requirement (TMR) is a measure for materials. Inhabitants of OECD countries apparently consume far more of some materials than those living in developing countries. A reference value has not yet been established for this, although a world average has been estimated for comparison purposes. It is conceivable that a global level of sustainable use of certain materials and other environmental resources could be defined which would take account of both depletion and contamination.

Macro measures

Apart from the ecological footprint there are several other macro measures which take account of effects over the entire life cycle, relate these to a reference value, and are capable of comparing disparate environmental impacts. These include the Total Materials Requirement (Wuppertal Institute), the CO_2 trade balance (RIVM) and the export of pollution, as developed in the framework of a research programme for four

heavy metals (NWO). All three of these measures quantify the global consequences of national consumption, and incorporate a measure of the environmental pressure created in other countries.

The CO_2 trade balance and the export of pollution relate the emissions generated worldwide in respect of Dutch demand to the emissions occurring within the Netherlands. When domestic emissions are smaller, then it can be said that problems are being exported to other countries. The converse also applies for these substances: in fact on balance the Netherlands retains emissions relating to consumption in other countries. The TMR is not in any way related to a reference value, but specifies the material flows generated in other countries by Dutch consumption (hidden flows). Dematerialisation is the desired direction. None of the three measures is capable of expressing disparate environmental effects in terms of a common denominator, as they are limited to metals and total material mass, CO_2 and metals respectively.

A set of indicators will have to be defined for a macro consumption policy at the national level. Important components of this are import-export balances for the main emissions and trade balances for some important global resources such as water and timber. Thinking about resources in the economy can provide insight into the transfer of problems to future generations. In order to gain insight into the dynamics of resources, their rundown over time must be recorded. Research of this kind can provide useful indications in drawing up environmental policy.

The application of LCA to functions at the national level raises questions about the weighing of the constituent environmental effects and the most appropriate aggregation level. Similar problems also have to be grappled with in the case of LCA at the micro level. Several approaches are being studied, and as yet no single one of these imposes itself as the best. The application of LCA at the macro level is in fact currently under debate. Conclusions made about the transport function at the micro level cannot simply be transferred to the macro level: while a single extra passenger on an airliner does not make any appreciable contribution to the environmental pressure, a wholesale switching of passengers from train to air travel would certainly make a difference. At present, various waste processing systems are being compared with one another using LCA. The effect of a change of scale on the validity of conclusions has not yet been thought out sufficiently to justify its use in policy.

6.6 Sustainability indicators

In the preceding three sections, various categories of ecological indicators were discussed. The quest for ecological improvement, in isolation, does not guarantee that sustainable development is being brought closer. For this it is also necessary to look at

the social and economic effects of all kinds of policy alternatives and initiatives of the market parties. It does not seem necessary to incorporate all three groups of effects into a single system. And that is just as well, given the numerous methodological and ideological complications which arise in setting up a set of indicators for ecological effects. The VROM Council would like to stress the importance of taking an integrated view. For the social and economic effects,there is an indicator available at the national level, The Human Development Index (HDI) is a dimensionless indicator which aggregates together various social and economic parameters (life expectancy, education and purchasing power). It is not clear how representative these aspects together are for social sustainability. A more general question is: what is a good indicator or set of indicators to monitor social sustainability? The government could consider asking the Council for Social Development (RMO) to draw up an advice on this issue. The HDI does not include any environmental aspects. This means that the HDI can only be used as a supplement to an ecological indicator. Furthermore the HDI portrays the situation in a given country, and therefore does not have an international dimension. Research is needed to see whether a relationship with the policy of other countries can be established. Despite the high level of integration, there appears to be sufficient confidence in this indicator for it to be useable[8]. In the quest for useable indicators for social and economic sustainability it may be possible to link in with the plans of the Advisory Council for Scientific Research in Development Cooperation ('RAWOO') to conduct research into social and economic effects[9] and the HDI.

Another example is the approach of the World Bank referred to as 'Wealth of Nations'[10]. The wealth of each country is calculated on the basis of human,natural and produced capital. By looking at the movements of capital between countries in a year, it is possible to determine whether a country has moved forward or backward. This idea is developed further in the concept of 'genuine saving', the saving achieved in a country after deducting the depletion of its natural resources and damage caused by pollution. The main criticism of this approach is that everything is expressed in monetary terms, which means that information about the physical flows is lost, and not everything can be included. Furthermore only approximately 8% of the total capital consists of natural capital, which many consider insufficient. Another shortcoming of this system of indicators is that it disregards the effects which some countries have on others.

[8] Verbal communication from Ms. T. Van der Schoor, NCDO.
[9] Verbal communication from J.B. Opschoor.
[10] ESB. Monitoring Environmental Progress; Expanding the Measure of Wealth, Conference Draft, September 1996.

6.7 Conclusions

For the most part, the indicators of environmental pressure and environmental quality used in the Netherlands function perfectly well. However they do not give an adequate picture of the environmental impact on other countries due to Dutch consumption. They therefore need to be supplemented in the following two regards:

1. The existing indicators for national environmental problems need to be supplemented with indicators which give the net environmental impacts in respect of Dutch consumption. It would also be worthwhile to pay more attention to indicators which measure Dutch efforts to resolve environmental problems.
2. The decoupling indicator presently being studied needs to take account of the entire life cycle so that it does not encourage the displacement of environmental problems to other countries.

The Dutch claim made on global resources has two aspects: quantitative and qualitative degradation. The quantitative effect for source resources takes the form of depletion due to extraction, and for sink and life-support functions,mainly of a reduction in the area of the ecosystems which are important for these functions.Qualitative degradation is caused by pollution. In addition, the use of source resources is associated with material leakages from the cycle. Because these can be restrictive for the use of the resources concerned, it is important that these leakages are also analysed. It is therefore recommended that the following five activities be undertaken.

3. Draw up and agree a list of resources of global importance.
4. Draw up import-export balances for those resources which fulfil a source function in order to gain insight into the impact which Dutch consumption has on them.
5. Devise a measure which represents the claim on space due to Dutch consumption. Unlike the ecological footprint, this should include only actual space used.
6. Identify the main global emissions relevant in terms of posing a threat to the quality of sink and life-support resources of global importance.
7. Draw up mass flow diagrams for the source resources which cause these emissions, in order to relate leakages from the cycle to the extraction of these resources.

In relation to considerations of international trade and investment, the Council considers the following measures to be important.

8. Develop eco-efficiency indicators to compare different production cycles in terms of energy and material usage and the associated environmental impacts.

9. Obtain more insight into the local effects of activities in other countries imputable to Dutch consumption.

It would appear to be sensible to develop consumption-related measures as a first step in gaining an understanding of the various aspects which determine the environmental pressures attributable to the consumption phase. Generally speaking we know little about this, and it would therefore be a sensible area for research. The VROM Council therefore recommends that the following indicators are studied.

10. Pollution balances for the main emissions.
11. Balances for some important environmental resources (in order to pinpoint cases where problem-transfer to other countries is occurring).
12. Capital accounts for the main resources in the economy (to pinpoint cases where problem-transfer to the future is occurring).
13. Eco-efficiency indicators for life cycles related to consumption at the macro level.
14. Systematic exploration of differences in lifestyles and associated environmental pressures,including non-energy-related pressures, followed by the definition of eco-efficiency indicators for various lifestyles.

There are at least three aspects of sustainable development, and we therefore have the general formulation.

15. In shaping policy, an integrated assessment of the effects on ecological, economic and social aspects must be made.

Literature consulted

Adriaanse,A.,S. Bringezu,A. Hammond, Y. Moriguchi, E Rodenburg, D. Rogich and H. Schütz. Resource flows: the Materials Basis of Industrial Economies, World Resources Institute, Washington DC,(1997).

- AIDEnvironment. Nederlands en mondiale uitputting van biodiversiteit, Publicatiereeks Milieustrategie 1996/6A, Ministry of Housing, Spatial Planning and the Environment, The Hague (1996).
- Bennekom, S. van. Overeenkomst investeringen omstreden,in: Ecologie & Ontwikkeling (6) 1 (1998) pp. 5-6.
- Bergh, J.C.J.M. van den and H. Verbruggen.Spatial sustainability, trade and indicators: an evaluation of the 'ecological footprint', in: Ecological Economics 29 (1999) pp. 61-72.
- Bergmans, W. Schuldenruil Nederlandse Antillen,Ecologie en Ontwikkeling (4) 2, (1996) pp. 12-13.
- Besselink, C. Spaanse furie waart door de wereldzeeën,in: Ecologie & Ontwikkeling, year 3, April/May (1995) pp. 10-12.
- Besselink, C. Kokkelvisserij Waddenzee bedreigt biodiversiteit, in: Ecologie & Ontwikkeling (7) 1 (1999a) pp. 5-6.
- Besselink, C. Grensoverschrijdend toerisme? in: Ecologie & Ontwikkeling (7) 4 (1999b) pp. 3-6.
- Biesiot, W. and H. C. Moll (eds.). Reduction of CO_2 emissions by Lifestyle Changes: Final Report to the NRP Global Air Pollution and Climate Change, Research Report no. 80, Center for Energy and Environmental Studies, Groningen University and Department of Science, Technology and Society, Utrecht University (1995).
- Bossel, Hartmut. Indicators for Sustainable Development: Theory, Method, Applications, A report to the Balaton Group, International Institute for Sustainable Development, Winnipeg (1999).
- Brown, Kevin. Recycling not always as green as it seems, in Financial Times (14 May 1999).
- Brown,L.R. et al. State of the World 1995, World Watch Institute, W.W. Norton, New York (1995) pp. 21-37.
- Brown,L.R. and H. Kane. Full House, World Watch Institute, New York (1994) pp. 96-102.
- Buiten,G. and M. de Haan.in: ESB (25-9-98) p. 727.
- Carlsson-Kanyama,A. Differences in Resource Consumption and Lifestyles - what are the implications for greening the North?,in: Kleijn R., Bringezu S., Fischer-Kowalski M., Palm V. (eds.),Ecologizing societal metabolism, designing

scenarios for sustainable materials management, Proceedings of the ConAccount workshop, November 21st 1998, CMP report 148, CML, Leiden University (1999).

- CREM. Dutch consumer patterns and their impact on biodiversity, Publicatiereeks SVS,no. 1998/35. Ministry of Housing, Spatial Planning and the Environment, The Hague (1998).
- CREM. Nederlands ruimtebeslag in het buitenland, Publicatiereeks Milieustrategie 1996/9, Ministry of Housing, Spatial Planning and the Environment, The Hague (1996).
- Davidson M.D. Liberale grondrechten en milieu, Het recht op milieugebruiksruimte als grondslag van een basisinkomen, in: Milieu 1995/5 pp. 246-249.
- EEA. Europe's Environment: the Dobris Assessment (1995).
- Ellenbroek,A. Nederlands ruimtebeslag in het buitenland,in: Ecologie en Ontwikkeling, (4) 2 (1996) pp. 5-6.
- ESB. Handel en ethische bezwaren, editorial (4-6-1999).
- Eurostat.Environmental Pressure Indices Project, on: http://www.telco.es/~tau/ The German Advisory Council on Global Change, World in Transition: the Threat to Soils, Annual Report 1994, Berlin (1994).
- Gleick, P.H. The World's Water 1998-1999: The Biennial Report on Freshwater Resources, Island Press, Washington/Covelo (1998).
- Heijungs, R., J.B. Guinée, G. Huppes et al. Environmental Life Cycle Assessment of Products, Guide October 1992, NOH/CML, Leiden (1992).
- Hodges,C.A. Mineral Resources,Environmental Issues and Land Use,in: Science, no. 268 (2 June 1995) pp. 1305-12.
- Huele, R.,R. Kleijn and E. van der Voet. Natural Resource Accounting, the search for a method. Publicatiereeks Milieustrategie 1993/3, Ministry of Housing, Spatial Planning and the Environment, The Hague (1993).
- Huele,R. et al. Ontkoppelingsindicator, Publicatiereeks Milieustrategie 1999/2, Ministry of Housing, Spatial Planning and the Environment, The Hague (1999).
- Interdepartmental Research Programme Sustainable Technological Development (DTO).DTO Visie 2040 - 1998, Technologie,sleutel tot een duurzame welvaart, Uitgeverij ten Hagen en Stam BV, The Hague (1997).
- Kleijburg, H. Van museumbezoek tot ondergoed, Met de billen bloot, Milieudefensie onderwerpt bekende Nederlanders aan een test die hun milieubelasting aan het licht brengt, in Milieudefensie 99-6 (1999) p.14.
- Kleijn,R., R. Huele and E. van der Voet. Dynamic Substance Flow Analysis: the delaying mechanism of stocks, with the case of PVC in Sweden,in: Ecological Economics (not yet published,1999).
- Kuijk, O. and H. Verbruggen (eds.). In search of indicators of sustainable development, Kluwer, Dordrecht (1991).

¬ Lange, V. de and C. Besselink. Het meten van biodiversiteitsbeslag, in:Ecologie & Ontwikkeling, (6) 2/3 (1998) pp. 3-5.
¬ Loo, F.A. van der, R. Huele and R. Kleijn. Duurzaam gebruik van milieuvoorraden: op zoek naar normstelling, Publicatiereeks Milieustrategie 1992/17, Ministry of Housing, Spatial Planning and the Environment, The Hague (1992).
¬ MAI versus RIO, report on symposium held on 22 October 1998 on the occasion of the 20th anniversary of the founding of the Centre for Environmental Studies, Leiden University.
¬ Meadows, D.H., D.L. Meadows and J. Randers. Beyond the limits, Confronting global collapse, envisioning a sustainable future, Earthscan Publishers, London (1992).
¬ Ministry of Housing, Spatial Planning and the Environment. Uitvoeringsnota Klimaatbeleid, SDU Uitgeverij, The Hague (1996).
¬ Ministries of Housing, Spatial Planning and the Environment; of Agriculture, Nature Management and Fisheries; of Economic Affairs; of Foreign Affairs;and of Finance. Nationaal Milieubeleidsplan 3 (Translated as Third National Environmental Policy Plan) The Hague (1997).
¬ National Advisory Council for Development Cooperation. Advies Technologie en ontwikkeling, NAR report no. 109, The Hague (1996a).
¬ National Advisory Council for Development Cooperation. Advies Zo niet nu … wanneer dan? Naar een politiek van duurzame ontwikkeling, Part II, NAR report no. 110, The Hague (1996b).
¬ Netherlands Committee IUCN. Investeren in duurzaam zoetwaterbeheer: kansen in het Mercosur-gebied, Amsterdam (1998).
¬ Netherlands Committee IUCN. The Netherlands and the World Ecology (poster map), Amsterdam (1997).
¬ Netherlands Committee IUCN. Mining in Tropical Regions: Ecological Impact and Dutch Involvement, Amsterdam (1996).
¬ Noorman, K.J. and T. Schoot Uiterkamp (eds.). Green Households? Domestic Consumers, Environment and Sustainability, Earthscan Publications Ltd., London (1998).
¬ Opschoor, J.B. Mondialisering en institutioneel verankerd internationaal milieubeleid, Een essay ten behoeve van het project 'Internationalisering van het milieubeleid', Ministry of Housing, Spatial Planning and the Environment (to be published).
¬ Council for the Countryside (RLG). Leven en laten leven, advies over kustvisserij en natuur in kustgebieden ,RLG 98/3, Amersfoort (1998).
¬ Environment Council (RMB). Advies Duurzame Consumptie, een reëel perspectief, RMB 96-07, The Hague (1996).
¬ Council for Nature Management. Proefboringen in de Waddenzee, advies in het

kader van de vergunningprocedures op grond van de Natuurbeschermingswet inzake de voorgenomen exploratieboringen naar aardgas in de Waddenzee, Utrecht (1996).
- RIVM. Leefomgevingsbalans, voorzet voor vorm en inhoud, RIVM report 408504001, Bilthoven (1998).
- Rommelse,A. Speurtocht naar duurzamheid, opinies over eco-technologische vernieuwing, in: Dijk, D.H. van and R.C.H Flipphi (eds.) Milieu als motor van de economie, Raad voor het Milieubeheer, (1996).
- Schmidt-Bleek, F. Ein universelles ökologisches Mass? Gedanken zum ökologischen Strukturwandel, Wuppertal papers 1/1992.
- Schrijver, N. Mondialisering en de rol van internationaal recht bij het bevorderen van duurzame ontwikkeling. Een essay ten behoeve van het project 'Internationalisering van het milieubeleid', Ministry of Housing, Spatial Planning and the Environment (to be published).
- Sociaal Economische Raad. Economie en milieu, Advice 91/18, The Hague (1991).
- Sociaal Economische Raad. Milieu en ontwikkeling, Advice 93/04, The Hague (1993).
- Spangenberg, J.H. and O. Bonniot. Sustainability indicators - A Compass on the Road Towards Sustainability, Wuppertal Paper No. 81, Wuppertal (1998).
- Spapens, P. SURE success in the Netherlands, in: Sustainable use of Resources in Europe (3) p. 4.(1999).
- Spapens, P. Towards sustainable Europe: A Summary, Friends of the Earth Europe, Brussels (1995).
- Spapens, P. Uit Balans: Sociale en ecologische gevolgen van de Nederlandse consumptie van metalen, Vereniging Milieudefensie, Amsterdam, (1998).
- Steg, L. Verspilde energie? Cahier Sociaal en Cultureel Planbureau no. 156, The Hague (1999).
- Stigliani, W.M. and S. Anderberg. Industrial Metabolism at the Regional Level: the Rhine Basin, IIASA working paper WP-92-10,Laxenburg, Austria (1992).
- Second Chamber, 1988-1989 session, 21 137, nos.1-2, Nationaal Milieubeleidsplan, Kiezen of Verliezen.
- Second Chamber, 1993-1994 session, 23 560, nos.1-2, Nationaal Milieubeleidsplan 2, Milieu als Maatstaf.
- Second Chamber, 1995-1996 session, 24 405, nos.1-2, Milieuprogramma 1996-1999.
- Second Chamber, 1998-1999 session, 26 575, nos.1-2, De WTO in de winkel, de consument en handelspolitiek: belangen en zorgen.
- UNCED. Declaration of Rio de Janeiro on environment and development, Rio de Janeiro (1992).
- UN Department of Economic and Social Affairs. Indicators for Sustainable Development (1998).

- Verbruggen,H. et al. Duurzame Economische Ontwikkelings-Scenario's (DEOS) voor Nederland in 2030, Ministry of Housing, Spatial Planning and the Environment, Publicatiereeks milieustrategie, no. 1996/1, The Hague (1996).
- Verbruggen,H. Globalisering, milieubeleid en handel, Een essay ten behoeve van het project 'Internationalisering van het milieubeleid', Ministry of Housing, Spatial Planning and the Environment (to be published 1999).
- Verbruggen,H., Jansen, H.M.A. and P. Vellinga. Terreinverkenning Mondiale Strategie, Publicatiereeks milieustrategie no. 1992/1, The Hague (1992).
- Voet, E. van der, L. van Oers, J.B. Guinée and H.A. Udo de Haes.SFA Indicators to Support Environmental Policy. Envir. Sci. Poll. Res. (6) 1 (1999).
- Vuuren, D.P. van,E.M.W. Smeets and H.A.M. de Kruijf. The Ecological Footprint of Benin, Bhutan, Costa Rica and the Netherlands, RIVM report 807005 004, Bilthoven (1999).
- VROM-raad. Advies voor het Nationaal Milieubeleidsplan (NMP3), advice no. 004, The Hague (1997).
- VROM-raad. Advies voor het Nationaal Milieubeleidsplan (NMP3), advice no. 007, The Hague (1998a).
- VROM-raad. Transition to a low-carbon energy economy, advice forth Climate Policy Implementation Document, advice no. 010E, The Hague (1998b).
- VROM-raad. Advies Leefomgevingsbalans, advice no. 12, The Hague (1999).
- Wackernagel,M. and W. Rees. Our Ecological Footprint, The New Catalyst Bioregional Series no. 9, New Society Publishers (1996).
- Weterings, R.A.P.M. and J.B. Opschoor. De milieugebruiksruimte als uitdaging voor technologie-ontwikkeling, Raad voor het Milieu- en Natuuronderzoek, Rijswijk (1992).
- Wetenschappelijke Raad voor het Regeringsbeleid. Duurzame risico's: een blijvend gegeven, Reports to Government no 44, SDU Uitgeverij, The Hague (1994).
- World Bank. Expanding the Measure of Wealth: Indicators of Environmentally Sustainable Development,Environmentally Sustainable Development Series and Monograph Studies no. 17, Washington DC (1997).
- World Trade Organisation. Trade and Environment in the WTO (1997), at: http://www.wto.org/wto/environ/environl.htm.

**Ministry of Housing,
Public Health and the Environment**

Rijnstraat 8,
P.O. Box 30945
2500 GX The Hague
tel.: +31 70 339 4666
fax.: +31 70 3391306

BIJLAGE 1 **Advice request**

Directorate-General Environmental Management
International Directorate Environmental Affairs
Global

To the Chairman and members of the
VROM Council
Postbus 30945
P.O. Box 30945
IPC 105
2500 GX The Hague

Chairman

The 1999 work programme of the VROM Council refers to one global and one European advice.

I hereby request you to orient the global advice towards the so-called 'ecological footprint', and the advice on European environmental policy towards the issue of a multi-speed Europe.

A more detailed specification of the issues to be tackled in these two advices are attached.

Please would you let me have your advices by 1 May 1999 (Global) and 31 December 1999 (Europe) respectively.

Yours faithfully
The Minister of Housing, Public Health and the Environment

J.P. Pronk

Request for advice on ecological footprint

1. Introduction

Consumption and production in the Netherlands have an impact which extends far beyond our own national territory. The increasing globalisation, involving as it does the movement of stocks of raw materials and the supplying of markets, but also the reduced influence of national states in decisions on this cross-boundary traffic, can mean that the impact had by the Netherlands on the environment and land use in other countries will rise further. This need not in itself be a problem: these countries can themselves benefit if use is made of their comparative advantages. Very major ecological problems can nevertheless occur in consequence, such as the depletion of essential resources like energy, biodiversity and a degradation of the spatial basis for sustainable development.

2. Background

Starting from the principle set forth in the Third National Environmental Policy Plan that the Netherlands also has a responsibility to promote global sustainability, and that it therefore must obviously also first itself look at what aspects of its own behaviour it might change, there is a need to gain insight into the footprint of the Netherlands in other countries, what possibilities there are to change this footprint, and to look at the consequences this has for national environmental policy.

The concept of the ecological footprint has not yet found direct practical application in policy. It will certainly be an essential element in a forthcoming policy document in which I intend to set forth a policy vision on ‘Economy and Environment International’. This document, which in the first instance will be the vision of the Ministry of VROM, is in no sense a strategy or action programme, will be ready in mid-1999, and will later play a role in the preparations for the Fourth National Environmental Policy Plan.

Amongst the early ideas influencing the forthcoming document is that reducing its ecological footprint is one of the ways the Netherlands can contribute to the quest for global sustainability. The one-sided dependence which Dutch consumption and production patterns creates on a large number of countries around the world has amongst its consequences extensive monoculture, profligate use of and contamination of water resources, unnecessary transport flows and the arrogation of land. It is my view that these aspects of the Dutch ecological footprint represent obstacles to worldwide sustainable development.

3. Advice request

So as to indicate to me the relevance of the problem outlined, I hereby request you to prepare an advice on how an appropriate modification of the ecological footprint can contribute to the advancement of global sustainability, and what an intention to modify the ecological footprint means for the content and the direction of environmental policy.

Please let me have your advice by 1 May 1999.

Annex 2: Composition of the VROM Council

The VROM Council consists of the following members:

Dr. T, Quené, Chairman
Mr. L.C. Brinkman
Ms. M. Daalmeijer
Professor J.W. Duyvendak
Professor R. van Engelsdorp Gastelaars
Mr. J.J. de Graeff
Professor W.A. Hafkamp
Ms. F.M.J. Houben
Professor J. de Jong
Ms. M.C. Meindertsma
Mr. P.G.A. Noordanus
Professor I.S. Sariyildiz
Professor J. van der Schaar
Professor W.C. Turkenburg
Mr. T.J. Wams
Ms. L.M. Wolfs-Kokkeler

Observers

Professor N.D. van Egmond, on behalf of RIVM (National Institute of Public Health and Environment)
Professor C. van Ewijk, on behalf of CPB (Central Planning Bureau)
Mr. T.H. Roes, on behalf of Social and Cultural Planning Office

General Secretary

Mr. W.A. Haeser

Annex 3: Preparation of advice

The advice was prepared by a Council working group together with the following external experts

Mr. R.J.M. Maas, RIVM
Professor J.B. Opschoor, Institute for Social Studies
Professor H. Verbruggen, Institute for Environmental Studies

Amongst the sources on which this advice is based were memoranda drawn up at the request of the VROM Council by the following external experts

Mr. P. Spapens, Vereniging Milieudefensie (Friends of the Earth, Netherlands)
Ms.Dr. E. van der Voet, CML (Centre for Environmental Studies Leiden)

Secretariat staff involved

Mr. R.C.H.Flipphi
Mr. D.H. van Dijk
Ms.A. Kwak
Mr. A.J.F. de Vries

Brainstorming

As part of the preparations for this advice, a brainstorming session was held on 15 July 1999, in Oininio, Amsterdam. Views were exchanged about the use of global environmental resources,how this is affected by trade, consumption and indicators for measuring these various parameters. Grateful use has been made of the results of this brainstorming session in drawing up the present advice. The following participants were involved.

Introductory presentations made by: Mr. J. Bakkes (RIVM, Bilthoven), Professor J.C. van Eijndhoven (Rathenau Institute, The Hague), J. Juffermans (De Klein Aarde, Boxtel), Professor L. Reijnders (University of Amsterdam, Interfaculty Department for Environmental Studies), Professor H. Verbruggen (Institute for Environmental Affairs, Amsterdam Free University).

Other participants:C. Besselink (IUCN members' contact, the Netherlands), Dr. J.J. Boersema (Centre for Environmental Studies, Leiden University),Mr. T. de la Court (Bureau Milieu en Samenleving, Haarlem),Ms.I.Dankelman (Nijmegen Catholic University, University Centre for Environmental Studies),Mr. T. Deelstra (International Institute for the Urban Environment, Delft),Mr. A.Engelberting (Global Action Plan Nederland, The Hague),Dr. W.T. Pelupessy, (Instituut voor Ontwikkelingsvraagstukken, Tilburg),Mr. H.A.Schönbeck (Van Hall Institute, Leeuwarden), Professor G.H. Vonkeman (Utrecht University, Faculty of Spatial Sciences,Environmental Studies Department) and Mr. D. van Vuuren (RIVM, Bilthoven).

Copies of minutes of the brainstorming sessions are obtainable on request from the Secretariat of the VROM Council.