

Finding Your Place: A History of the Management of Global Environmental Risks in the Netherlands

Josee van Eijndhoven with Gerda Dinkelman, Jeroen van der Sluijs, Ruud Pleune, and Cor Worrell¹

5.1 Introduction

The management of the global environmental issues of ozone depletion, acid rain, and climate change in the Netherlands shows an interesting pattern over time. Although relatively dependent on other nations in the ozone-depletion issue, the Netherlands played a leading role in the climate issue. This pattern may have evolved because of the Netherlands' specific political culture and institutions, general stance toward environmental issues, scientific establishment, and open economy—all of which led to strong interdependence between its policy and that of other countries. But the example of the Netherlands is also interesting because it shows how a small country can develop its own way of operating and thereby find its own role in managing interregional and global issues, given that it claims only a fraction of the world's specialists in any area and that its power base is clearly limited.

5.2 Global Environmental Issues: Background and Development

5.2.1 The Development of Dutch Environmental Policy

Until the end of the 1960s the most important legislation regarding the environment was the Dutch Nuisance Act of 1896. This act stated that activities that can cause nuisance need a license. The implementation of the Nuisance Act was in most cases in the hands of local government—the municipality—which had to grant Nuisance Act licenses.

At the national level, environmental policy was a limited activity within the policy area of the Ministry of Social Affairs and Public Health until 1970, when the Ministry of Public Health and Environmental Hygiene was established.² The first Environmental Policy Document of the newly formed ministry was the Priority Memorandum on the Environment of 1972 (*Urgentienota Milieuhygiene*) (Netherlands Tweede Kamer 1972–1973), which presented a general discussion of environmental issues and an overview of developing legislation for the various environmental categories

(water, air, soil, and noise). The general starting points for environmental policy laid down in this paper were “the polluter pays” and “abating the pollution at the source.”³

The Air Pollution Act of 1970 was the second of the new Environmental Acts (it followed the Act on Water Pollution). The first environmental laws were of a sectoral nature. They were directed toward air, water, soil, and some specific problem areas (waste, radiation, and noise). The Directorate General of the Environment (then of Environmental Hygiene) at the Ministry was set up along the lines of this split. An important negative effect of the compartmentalization was that the reduction of an environmental problem in one sector often led to the enlargement of problems in another.

A second recurring problem of environmental policy was the relationship between environmental policy and other policy areas. Water, for instance, was a policy area that came under the Ministry of Transport and Communications (Van Ast and Geerlings 1993, 165), and many environmental policy measures impinged directly on areas covered by the Ministry of Economic Affairs (which was also in charge of energy issues).

To reduce these problems it was decided to integrate environmental policy, internally and externally. The internal integration related to the change in the focus of environmental policy toward problem areas that cut through sectoral boundaries. External integration related to the coordination between various ministries with respect to environmental policy.

Before 1984 sectoral plans usually were augmented with a strategic integral environmental plan called an Indicative Environmental Multiyear Program (*Indicatief Meerjaren Programma Milieubeheer* 1985–1989) (Netherlands Tweede Kamer 1984–1985, 18, 602). After 1986 sectoral plans were no longer made but were replaced with a new environmental planning model in the frame of the new General Environmental Act (*Wet Algemene Bepalingen Milieuhygiene*). By 1992 a new environmental policy plan was required to be made every four years with a strategic plan for eight to ten years and an operational plan for four years at most. The first National Environmental Policy Plan was published in 1989, and the second in 1993.

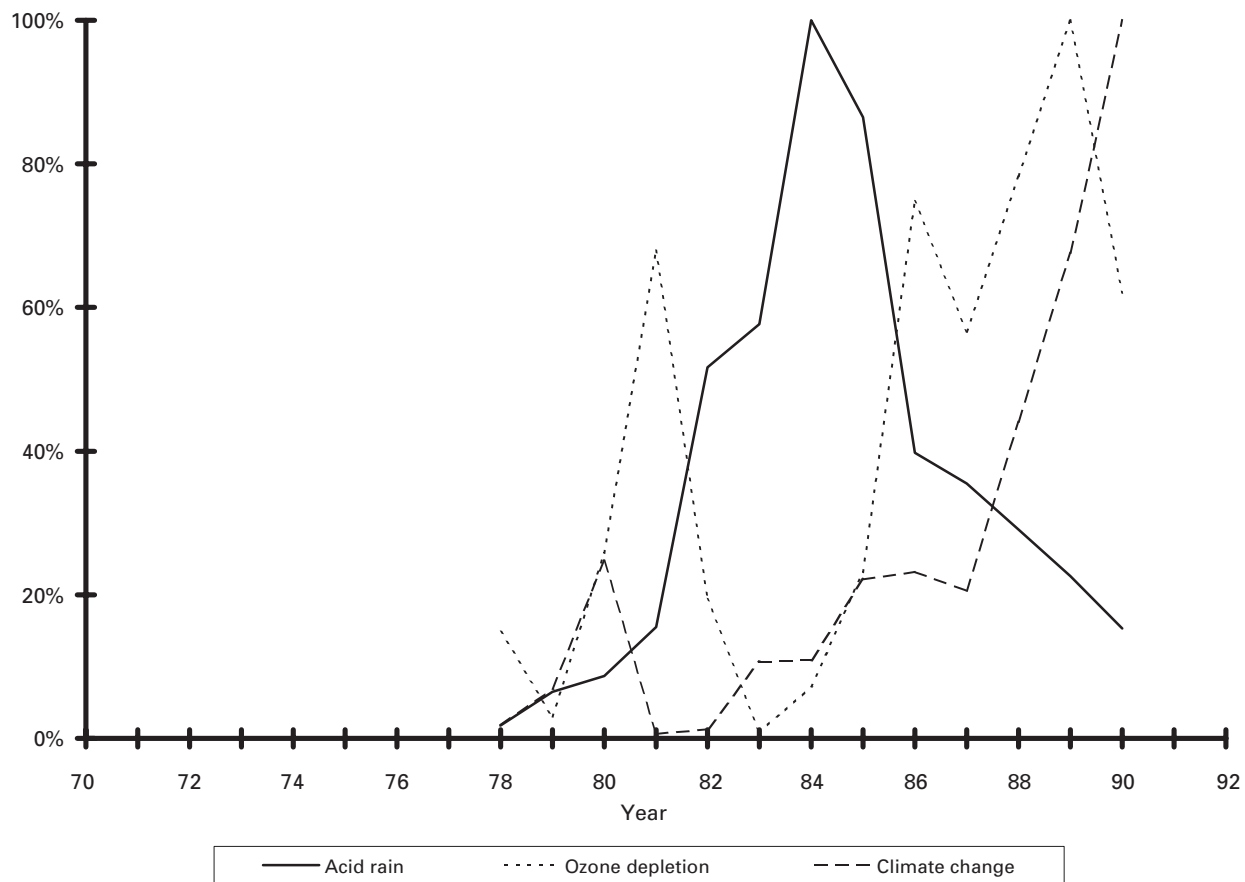


Figure 5.1
 Attention to global atmospheric issues in the Netherlands: Acid rain, ozone depletion, and climate change

Sources: The Central Council for Environmental Hygiene issues annual review reports on the environment (*Milieu van jaar tot jaar*). For 1978 to 1990, the number of lines were counted in the text explicitly dealing with acid rain, ozone depletion, and climate change. These were calibrated against the number of lines in the report. From these annual numbers the fraction of text of each report dealing with each of the issues was calculated. By dividing each fraction by the maximum fraction for the issue in the time series, the normalized attention figures were obtained. For the two years 1988 and 1989 only one report was issued.

The planning system was supported by monitoring and evaluation activities at the National Institute of Public Health and Environmental Protection (Rijksinstituut voor Volksgezondheid en Milieuhygiene) (RIVM). Every two years RIVM issued a National Environmental Exploration in which the “state of the environment” was evaluated against existing policy plans. The first of these studies, *Concern for Tomorrow*, (*Zorgen voor Morgen*) was published in 1988 (RIVM 1988), and the second in 1991 (RIVM 1991).⁴

The three global issues evolved against this shift from sectoral environmental policy to planned, integral environmental policy (thematically oriented policy) (Nelissen 1994), the strengthening relationship of environmental policy to other policy areas, and also the

growing importance of supranational environmental policy (especially European Community policy).

In figure 5.1 we show the development of attention paid to the three global environmental issues. The information was taken from the annual document *Milieu van Jaar tot Jaar*.⁵ The issue-attention cycles show that the ozone issues peaked twice, once before and once after the peak in attention paid to acidification, whereas climate change started to peak only after 1988.

5.2.2 Acid Rain

Until the time acid rain became an issue in the Netherlands, Dutch air-pollution policy was based on health problems and short-range transport of air pollution. Episodes of heavy air pollution in 1959 and 1962 led

to the development of an Air Pollution Bill in 1964 that was finally enacted in 1970. The main purpose of the Act was to reduce ambient air pollution to a level that no longer affected health. As a result many higher chimneys were built to reduce levels of pollutants at ground level.

Acidification of Scandinavian lakes was mentioned for the first time by the government in the five-year program air of 1976 (Netherlands Tweede Kamer 1976–1977), but acidification as an effect of long-range transport was still seen as debatable.⁶ Until about 1980 the acid rain issue was discussed as an sulfur dioxide (SO₂) problem, although in 1979 and 1980 (Netherlands Tweede Kamer 1979–1980, 15, 802; Netherlands Tweede Kamer, 1979–1980, 15, 834) emission standards were also proposed for nitrogen oxides (NO_x). During this period the Netherlands was involved in setting up an international monitoring program, the European Monitoring and Evaluation Program (EMEP), which the United Nations Economic Council of Europe (UNECE) established after the 1975 Helsinki conference on Safety and Cooperation in Europe (see Chapter 13, International Institutions and Social Learning in the Management of Global Environmental Risks). Then the Netherlands was involved in UNECE sulfur deliberations, the Protocol on Long-Range Transboundary Air Pollution (LRTAP).⁷

From 1978 until 1982 researchers and policy makers tended to speak of the sulfur problem. This problem definition referred both to human-health effects of air pollution and to acidification abroad. During this period it was held that the Dutch sulfur ceiling also took into account the export of acidification from the Netherlands.

After the vocal concern about German forest dieback (*Waldsterben*), acid rain was no longer exclusively viewed as a problem occurring abroad but came to be viewed as a domestic problem too. Attention in the Netherlands became focused on this phenomenon after a meeting of European environmental organizations in the spring of 1981 in Göteborg organized by Swedish environmental organizations and organizations of fishermen (Fransen 1981), the *Spiegel* article in the summer of 1981, and the ministers' conference in Stockholm in 1982.⁸ The acid rain issue in the Netherlands became a part of the political agenda when parliamentarian De Boois (Labor Party) issued a resolution in February 1983 in which she asked for (1) a broad research project to deliver an inventory of soil damage by acidification and (2) a program to design measures to combat the damage (Netherlands Tweede Kamer 1982–1983, 17, 600, XI, no. 84). As a result of this resolution the Dutch Priority Program on Acidification (Additioneel Programma Verzuringsonderzoek) was launched in the same year.

The third five-year Program Air 1984–1988 concentrated on air and soil acidification (Netherlands Tweede Kamer 1983–1984, 18, 100, no. 7). A maximal permissible level (a so-called critical load) of soil acidification was established. The concept of an acid equivalent was introduced to bring all acidic substances under one denominator. The Program specified a maximum permissible level of 1800 acid equivalents (a.e.). At the time the overall acid-deposition level in the Netherlands was estimated at 5800 acid equivalents. The program thus underscored the need to reduce soil-acidification levels by a factor of three to four (Gutteling, Galetka, and Wiegman 1995). The 1984 Memorandum on Acidification estimated the (then) current and projected (1985 and 1990) emissions of sulfur oxides (SO_x), nitrogen oxides, and ammonia as well as their potential impacts (Netherlands Tweede Kamer 1983–1984, 18, 225). In the parliamentary debate sulfur dioxide (SO₂), nitrogen oxides (NO_x) and ammonia (NH₃) emissions all played a role (Dinkelman 1995, 110–115). But when in 1984 research showed that SO₂ abatement was relatively cheaper, NO_x and NH₃ abatement goals were relaxed. SO₂ abatement, however, was not intensified to compensate for this relaxation (Dinkelman 1995, 115). In the five-year Program Air 1985–1989 (Netherlands Tweede Kamer 1984–1985, 18, 605) the maximum permissible level was heightened to 3000 because of a supposed threshold level for acidification by nitrogen compounds. As a consequence total deposition of acidifying compounds would have to be only halved instead of reduced by a factor three to four.

The interim results of the Dutch Priority Program on Acidification, supplied in 1987 to support evaluation of acidification policy, calculated critical loads for the Netherlands as being between 700 and 2100 a.e. The interim evaluation of the policy, on the other hand, showed that the deposition goal of 3000 in 2000 would not be reached. These conclusions were reconfirmed in *Concern for Tomorrow*, the first environmental survey of RIVM in 1988 (RIVM 1988).

The National Environmental Policy Plan (Netherlands Tweede Kamer 1988–1989) formulated an interim goal of 2400 a.e. in 2000, thereby accepting that critical levels would still not be attained at that time. The National Environmental Survey 1990–2010 (the second environmental survey of RIVM) (RIVM 1991) concluded that even the policy targets set for 2000 and 2010 would not be reached. Three causes were mentioned (in order of importance): the lagging behind of surrounding countries, the new assessments of NH₃ emissions, and the insufficiency of measures in domestic policy on intensive cattle breeding and freight transport. Of these, NO_x emissions from freight transport were considered to be the source

most difficult to deal with. In its reaction to the second environmental survey the government mentioned the international negotiations about sharpening the SO₂ and NO_x protocols and announced measures to reduce NH₃ emissions from cowsheds and sties and the development of instruments to reduce emissions from cars.

5.2.3 Ozone Depletion

Of the three issues discussed in this book ozone depletion was the first to reach the Dutch political agenda. In 1974 some mention was made of the possible effects of supersonic air transport, but the main issue quickly became spray cans after the publication of the Molina and Rowland article in 1974.

In the first stage (1974 to 1981), actions against the use of spray cans were initiated by the Politieke Partij Radicalen (PPR), a left-wing green socialist party, as a result of deliberations between green parties in Belgium, Denmark, Sweden, France, the United Kingdom, and the Netherlands⁹ and other groups, including environmental groups and consumer organizations. In February 1975 a boycott action was launched. During 1974 through 1977 the options preferred by the Dutch government shifted from awaiting further information on the risk of ozone depletion and the economic effects of an eventual ban to the mentioning of a ban as the preferred option to the labeling of spray cans. Scientists in the Netherlands were hardly involved in the ozone issue, although there was some debate in professional circles. In April 1980, the then Minister of Public Health and Environmental Affairs, Leendert Ginjaar, asked industry to reduce the use of chlorofluorocarbons (CFCs) as a propellant by 50 percent relative to 1976 before the end of 1980. Although the suggested reduction was larger than the ones proposed in Germany and the European Community at the same time (30 percent reduction), the line of reasoning closely followed those arenas.

As a result of the boycott of spray cans, sales in the Netherlands decreased by 17 percent in 1975 and 19 percent in 1976. However, the effect on production was much smaller, since exports far exceeded domestic use (Vonkeman 1977). The CFC-producing industries reacted with brochures in which the risk of ozone depletion was questioned (e.g., Du Pont 1977), whereas the spray-can industry reacted by shifting to non-CFC spray-cans, stressing meanwhile that not all spray cans impact the ozone layer.

The second period (1981 to 1985) was a quiet period in which almost no action was visible, although the Netherlands actively took part in international deliberations.¹⁰ These activities performed by officials of the ministry¹¹ were not reflected in political action.

The signing of the Vienna Convention in 1985, likewise, did not lead to direct visible effects in Dutch policy.¹² In 1986 Parliament (Netherlands Tweede Kamer 1986–1987 19, 707, no. 13) asked the government to promote a phaseout of the use of CFCs in spray cans, foam, and refrigeration installations as soon as alternatives were technically available. In June 1987 the then head of the Ministry of Public Housing, Physical Planning, and the Environment (VROM), Ed Nijpels, sent a letter to Parliament in which he referred to research results, the Vienna Convention, and international deliberations about a protocol to reduce CFC production (CRMH 1988, 144).¹³ Because they considered results of national and international deliberations insufficient, a group of cooperating nongovernmental organizations (NGOs) decided to start a consumer boycott against spray cans. After the start of the boycott action on November 17, 1987, quite a number of spray-can manufacturers reconsidered their strategy immediately. A number of companies using spray cans in their product range announced that they would stop the use of CFCs.¹⁴ A covenant between the Ministry of the Environment and the Netherlands Aerosol Association (NAV) was signed on January 5, 1988.

Other applications of CFCs also started to be discussed. In 1990 government, industry, and environmental organizations together established a CFC committee, in which representatives of the parties involved took part. To be able to monitor the phasing out of ozone-depleting substances it was agreed that annually before May 1 a report would be drawn up by an external accountant who was granted leave to inspect the books of producers, importers, and industrial consumers (CFC Action Program 1990).

Although the ozone issue was debated in scientific circles during the first as well as the third period, direct support of Dutch policy on the ozone issue by Dutch scientists was conspicuously absent. Administrators involved in the issue drew their knowledge from outside sources.¹⁵

5.2.4 Climate Change

Before the 1970s climate change was not a political issue. It was discussed, however, in popular scientific presentations. Local temperature change through thermal pollution became an issue before climate change was. The report to the Club of Rome titled *Limits to Growth* (Meadows 1972) was a bestseller in the Netherlands. In this report local thermal pollution was seen as a problem that possibly would lead to climate change.¹⁶ The possibility of climate change by carbon dioxide (CO₂) was mentioned too, but this was seen as a problem that would

vanish when the switch to nuclear energy was made. The Meadows report's mention of thermal pollution may be part of the reason this period saw an increase in attention paid to thermal pollution in the Netherlands.¹⁷ In this period, press coverage of the climate change issue paid almost as much attention to the possibility of global cooling as to warming.

From about 1974 the Royal Netherlands Meteorological Institute (KNMI) was of the opinion that the enhanced greenhouse effect was a larger risk than thermal pollution (Schuurmans 1974), and warming started to be seen as more probable than cooling (Rijkooft 1975), at least on a time scale relevant to policy. It was a viewpoint that was mainly presented in popular lectures by employees of the Institute.

Between 1978 and 1983 climate change was signaled as an issue by advisory councils, policy makers, and politicians (Wetenschappelijke Raad voor het Regeringsbeleid 1978; Lasom 1979; Commissie Vossers 1981; Gezondheidsraad 1983). It did marginally influence policy choices via its role in the sidelines of the energy debate.¹⁸ In 1982 the government expressed as its view that resources from the National Research Program on Coal could be used for research on the effects of carbon dioxide (Netherlands Tweede Kamer 1981–1982, 5).

The report by the Ad-Hoc Committee for Meteorological and Oceanographical Research in the Netherlands (Commissie Vossers 1981) chaired by Vossers, was an important first step to moving climate change higher up on the Dutch research agenda. Two reports by the Health Council (Gezondheidsraad 1983, 1986) were of major influence in putting “the CO₂ problem” on the political agenda.¹⁹ The initiative to install a carbon dioxide committee came from the Philosophy Committee on Radiative Protection (Filosofie Commissie Stralingshygiëne) of the Health Council. When this committee finished its task of drafting standards for exposure to ionizing radiation—mainly related to nuclear-energy production—it looked into new areas of interest. This led to the installation of the carbon dioxide committee in 1980. By lobbying this committee managed to evoke an official request for advice from Minister Leendert Ginjaar.²⁰ In response to this request the first report of the Committee was issued in 1983. The second report concluded that the main management problems related to climate change in the Netherlands would be coastal defense and water management and supply. Between the two Health Council reports climate change also became an issue on the national research agenda in the Netherlands.

In 1982 to 1983 the carbon dioxide debate in Parliament concentrated on the five-year Program Air. In this program

influences of other gases like CFCs, nitrogen dioxide, and aerosols were mentioned (Netherlands Tweede Kamer 1982–1983, 17, 600, XVII, no. 7, pp. 18–19). In 1984 climate change did not figure as an issue in the first general environmental five-year Program Air 1985–1989 (Netherlands Tweede Kamer 1984–1985, 18, 602, nos. 1–2), but it was the subject of an interdepartmental report on *Carbon Dioxide: Pointing Out a Policy Problem* (ICMH/CIM 1984) by the Interdepartmental Committee for Environmental Hygiene (IMHC) and the Coordination Committee for International Environmental Issues (CIM). This report was a policy reaction to the first report of the Health Council. During the years 1985, 1986, and 1987 the climate issue was denoted as being in the “signaling phase” in the five-year Programs on the Environment. In the five-year Program Air 1985–1989 (Netherlands Tweede Kamer 1984–1985, 18,605, nos. 1–2) the issue was discussed, and it was concluded that no support basis (*draagvlak*) existed internationally for putting the issue on the agenda and that therefore policy should be oriented toward international awareness raising, stimulation of research, and stimulation of (national) measures to reduce the emissions of climate-influencing gases. The first of these lines of action was substantiated among others by hosting a number of international conferences in Noordwijk (1987 and 1989) and the Hague (1989).

In the period 1987 to 1989 the climate issue finally secured a clear position on the policy agenda. In the policy document titled *Climate Change by Carbon Dioxide and Other Trace Gases* (Klimaatverandering door CO₂ en andere sporegassen) (Netherlands Tweede Kamer 1986–1987, 20, 047), research and consciousness raising were still seen as the main measures that needed to be taken. The need for policy action was a point of debate between government and Parliament in 1987. The priority of environmental issues skyrocketed on the policy agenda in 1989, after the presentation of *Concern for Tomorrow* in 1988 and the First National Environmental Policy Plan in 1989. In this plan climate change was the first of the central issues, although the announced measures other than those related to CFCs were not very specific. The measures announced in relationship to the greenhouse effect were still mainly directed at gaining international recognition of the problem. Additionally, energy conservation and reforestation would be stimulated. A national research program was announced. The importance of the National Environmental Policy Plan with respect to the climate issue also was that it was internationally the first policy document that posed a stabilization goal for carbon dioxide.²¹

One of the measures announced in the National Environmental Policy Plan was a cut in the tax-deductible

costs of commuter car use. Even before the Plan was published, this measure led to the downfall of the Christian Liberal government because parliamentarians of the liberal People's Party for Freedom and Democracy (VVD) did not accept this proposal of its own ministers.²² In the campaign leading to new elections, Prime Minister Ruud Lubbers, who also was the candidate for Prime Minister of the Christian Democratic Party, made promises to cut carbon dioxide emissions. The sharpened policy relative to greenhouse gases was taken up in the National Environmental Policy Plan Plus of 1990 (Netherlands Tweede Kamer, 1989–1990, 21, 570) of the new Christian-Labor coalition government. The reduction goal had to be achieved by efficiency measures, shifting fuels, and reuse of waste.

In September 1991 the Memorandum on Climate Change (Netherlands Tweede Kamer 1990–1991, 22, 232) was issued by the Dutch government. The document did not suggest new policy measures, although it became clear that carbon dioxide emissions would at best be stabilized in 2000. But this was the first policy document in which an “all-gases approach” became the basis for policy. Until that time greenhouse policy was mainly directed at reducing carbon dioxide emissions, although CFC-reduction measures were also implemented under the heading of climate change. A National Research Program was proposed and implemented in the period 1991 to 1994.

5.3 Shifting Roles of Actors

5.3.1 Industry

The general approach of industry to the issues discussed can be characterized as reducing commercial risk. The specific approach had two phases. In the first phase, the uncertainties were stressed, and the relative role of the sector in the problem was debated. In this phase research into alternative options for the challenged technology were scrutinized and executed. In the second phase industry cooperated in implementing measures. The route then preferred by industry was one of negotiations leading to voluntary agreements (covenants). In all three issues industry strongly stressed the importance of international trade positions and thereby the relationship between national and international policy measures.

Acid Rain The role played by production sectors in developing an acidification policy was discussed by Lieferrink (1995) in his dissertation on the interaction between Brussels and the Netherlands in the issue and also by Dinkelman (1995). The character of and shifts in the interaction between industry and Dutch environmental

policy in the acidification issue is perhaps best illustrated by the example of industrial emissions of large combustion plants.

Before 1980 plant emissions were considered a local problem, and accordingly emission reduction of plants was not regulated at the national level. Measures could be agreed on at the local and regional levels by industrial plant managers and the municipal or provincial government according to Nuisance Act licensing. In 1983 the first drafts of a Dutch Decree on Emission Requirements and Combustion Installations took form without much interaction with the industrial sectors involved. Dutch industry had not paid much attention to the parallel European Community initiative for a framework directive either, possibly as a result of the low level of communication between industry and the Ministry of the Environment. The Federation of Netherlands Industry and Employers (VNO) heard about this initiative via its umbrella organization, the Union of Industrial and Employers' Confederations of Europe (UNICE). The international route is likely to have informed the electricity generators and oil and petrochemical sectors (Lieferrink 1995), too. The emerging European Community framework, however, quickly showed itself to be harmless because all major obligations that remained after the original idea of including concrete emission standards had been dropped were already fulfilled in Dutch legislation.

Nonetheless, after that time a much closer cooperation between the national environmental authorities and industry started to take shape. Initially (1982), the electricity sector was the most affected sector and therefore was most involved in the discussions with the environmental ministry. The government tried to agree a covenant with the electricity producers on emission reduction in their plants, but this did not work out because at that time the provinces asked for stricter reductions. In the end the government decided in favor of less strict regulation of emissions than the regulation demanded by the provinces.

The oil sector pointed out to the Dutch government that the activities of the oil sector did not fit into the planned Decree and that it needed a specific regulation. The refinery part of the sector played the card of dependency on international markets with much enthusiasm, although about 50 percent (Maandstaat CBS 1984) of the refined oil was exported to Germany, and Germany's *Grossfeuerungsanlagenverordnung* was much stricter than the Dutch regulation (see chapter 3 on Germany). The argument of the sector was that refineries in the Netherlands were much larger than those in other countries and therefore would be unduly strictly regulated if they were not

treated as a special case. Such a special position was indeed effected in the five-year Program Air in 1984 (Netherlands Tweede Kamer 1984–1985, 18, 605).

Ozone Depletion The role of industry in the ozone issue has been discussed by Klok (1989) and Doorewaard (1990), but they did not specifically focus on the role of CFC producers. The aerosol industry (as CFC users) quickly shifted away from CFCs any time the pressure heightened, whereas the CFC-producing industry stressed the uncertainties of the ozone-depletion process much longer. It is remarkable that Dutch CFC producers (Du Pont and Akzo) followed the line of European CFC producers, even after Du Pont in the United States changed course. In the third period of the ozone issue the aerosol industry was quite early on (Doorewaard 1990) prepared in principle to reach an agreement (covenant) with the government, but the process quickened considerably when external pressure heightened.

Climate Change With respect to the climate change issue most industrial actors were in 1992 still stressing the uncertainties. Almost twenty branches of industry, however, had already signed covenants with the Ministry of Economic Affairs in which they promised to enhance energy efficiency by 20 percent by the year 2000. The Cooperating Electricity Producers (SEP) and the energy distribution companies were an exception to the general pattern. SEP founded Forests Absorbing Carbon Dioxide Emissions (FACE) in October 1990. The objective of the FACE foundation was to plant trees, anywhere in the world, to compensate for the emissions of carbon dioxide in the Netherlands (De Ligt 1993; see also National Environmental Policy Plan 2, Netherlands Tweede Kamer 1993–1994, 75). The activities of FACE were seen as a form of Joint Implementation (see chapter 18 on goal formulation and chapter 19 on implementation). SEP and the distribution companies, however, were in a special position because SEP had a monopoly on the Dutch electricity market, and the distribution companies were owned by local governments.

5.3.2 Environmental Organizations

Strategies of Dutch environmental organizations related to the issues of acid rain, ozone depletion, and climate change have been discussed in a thesis by Ruud Pleune (1997). From the history of the issues it is clear that an important function of environmental organizations was to monitor environmental policy in a number of respects. They played a role in international transfer: in the cases of ozone depletion (twice) and in the case of acidification they supported the transfer of an international issue onto

the national agenda. They also played a role in monitoring environmental quality and critically assessing the progress of implementation.²³ Monitoring was performed on the initiative of the environmental organizations themselves and occasionally of the ministry. The Krause project exemplifies this. This project was initiated by Dutch environmental organizations but financed by the Ministry of Housing, Physical Planning, and the Environment. The project's goal was to assess how much Western Europe could (and should) contribute to carbon dioxide reductions to attain a sustainable goal for global climate change policy and an equitable distribution of global energy use.²⁴

Other functions of environmental organizations included heightening public pressure (by actions like the boycott actions against spray cans) and developing remedial measures or the demonstration of alternatives (like nature area management and demonstrating environmentally friendly ways of living). The emphasis on lifestyle and the industrial structure of the Netherlands as important causative mechanisms of environmental problems was central to how the environmental organizations operated. For that reason in 1975 spray cans were a target of choice because already in earlier years spray cans had been exposed as examples of not so much harmful but useless products. In 1987 it was clear that spray cans were not the only culprit, but they still formed an easy target.²⁵

The explanation for the difference in how environmental organizations acted regarding the three issues most likely is their assessment of the effectiveness of action in the light of action taken by others. It may be speculated that environmental organizations are likely to take action when a concrete target is available (like spray cans in the ozone case), preferably a target that can act as a symbol of a lifestyle incompatible with what is now called *sustainability*. Calling attention to issues seems to have occurred in periods when an issue had not yet gained a firm place on the policy agenda, but actions were planned mainly when policy was lined up but not yet implemented. Examples of this way of operating were the boycott actions in the ozone case, the acidification weeks,²⁶ and the climate day held in 1989.

Finally, we observed that environmental organizations came in relatively slower in the climate issue partly because of the possible impetus climate action could give to nuclear energy but more important because the relevant people in the “gray” environmental organizations²⁷ were engaged in abating nuclear energy. For the nature-oriented environmental organizations the issue was seen as less directly impinging on them than, for instance, the

consequences of acidification did. In both cases we see how important the strong link to energy issues was for NGOs in taking up the climate issue.

5.3.3 Science

The difference among the roles played by science in each of the issues was even more remarkable than the differences among the roles played by environmental organizations. The most likely reason for this is related to the size of the research effort and to the relationships between research and policy.

Acid Rain In the acid rain issue the international visibility of the Netherlands was large because of the role the Netherlands and Dutch scientists played in the framing of the issue over time. A clear example was the Regional Acidification Information and Simulation (RAINS) model, which was set up to support international negotiations on acid rain and which was assisted by the strong participation of Dutch scientists.

In the early 1960s the first programs on air pollution were established. In the 1970s international cooperative efforts, first with Germany and later in the frame of EMEP, to measure air pollution led to a sustained research effort in that area. From the start the Netherlands was actively involved in these international activities, first in a group of senior advisors to the government of the UNECE (where the Netherlands was represented by Spaander) and later in a Steering Committee (presided over by Schneider of RIVM). The activities of the Steering Committee led to EMEP.²⁸ Moreover, these efforts took place in institutions traditionally linked to policy, like (predecessors of) RIVM.

As a result of the public attention to the acidification issue the Dutch Priority Program on Acidification was launched in 1983. The research was funded by the Ministries of Housing, Physical Planning, and the Environment, of Agriculture and Fisheries, and of Economic Affairs; the electricity companies (SEP); and the oil refineries (coordinated by Shell). According to Schulte Fishedick (1986) these latter actors had a major influence on the ultimate demarcation of research themes. In response to the extremely harmful effects of fertilizers (too much use of manure and the subsequent problems of emissions of, for example, ammonia, phosphates, and nitrates), the Dutch government also initiated a research program on manure and ammonia (Cramer, de Laat, and Schulte Fishedick 1990). According to Cramer, De Laat, and Schulte Fishedick (1990),²⁹ university scientists tended to be skeptical about participation in these policy-oriented research efforts at the start of the programs. However, they stated that the effects of these programs

relative to policy were positive. For example, in the evaluation report of the first phase of the priority program it was stated that “the program has yielded many results. Unlike several years ago the policy can now be aimed at levels of deposition based on research. This is true for the current deposition levels as well as for critical levels to prevent all or most serious effects” (cited in Cramer, de Laat, and Schulte Fishedick 1990, 24). We can conclude that the research effort not only generated the data that had been lacking but also led to ways of framing the acid rain problem.³⁰

As part of the Priority Program the Dutch Acidification System (DAS) model was developed. This model described the entire causal chain from emissions of acidifying components to their effects on a regional scale (De Leeuw and Van Jaarsveld 1992). The model was meant to integrate knowledge on the causes and effects of acidification and to support policy. It was developed in close cooperation with the International Institute for Applied Systems Analysis (IIASA) in Laxenburg, Austria, where the RAINS model was developed (Bresser 1985; Alcamo, Shaw, and Hordijk 1990). This model was developed with the explicit purpose of supporting international negotiations (Hordijk 1991). In the development of the RAINS model the Dutch economist Hordijk played a crucial role as the project leader at IIASA.³¹ In *Concern for Tomorrow* (RIVM 1988) the DAS model was used to calculate the effects of existing acidification policy. In the second National Environmental Survey of RIVM (1991) both RAINS and DAS results were used. Various government documents used results from DAS and RAINS to derive emission-reduction targets for the Netherlands.³²

Ozone Depletion In the ozone-depletion case the role played by Dutch science was almost nonexistent. Although the Dutch scientist Paul Crutzen (working in different positions outside the Netherlands) was of pivotal importance in the handling of the ozone issue, it is difficult to find any role played by Dutch science in the development of Dutch ozone-depletion policy. Although some scientists were involved in the international debate at some time, they do not seem to have had any direct influence on Dutch policy development.³³ Policy in this case explicitly relied on internationally gained data and on evaluations of the problem as developed in the United States. Some information on alternatives for CFC uses were being developed in the Netherlands, but Dutch science never played a prominent role, either internationally or nationally.

Climate Change In the climate case the role played by Dutch science was different again. In this case a national

research program (Dutch National Research Program on Global Air Pollution and Climate Change) was set up as in the case of acid rain and modeled after the Priority Program in the acid rain issue with respect to the organizational structure of the program. The organization of the National Research Program was shaped by an interdepartmental steering group (whose task was to develop policy-oriented research) and a project group (whose task was to coordinate the research). In this case, however, the program was integrated much less with already developed policy-related research in the area. Far fewer Dutch researchers than took part in the case of acidification initially joined the core of scientists developing the concepts that enabled the international community to conceptualize the issue.³⁴

In 1981 the Vossers Committee made the strategic choice not to develop a separate Dutch global circulation model (GCM) because of the costs involved and because of the areas Dutch climate research was involved in.³⁵ Climate researchers mainly figured in the popular scientific debate. The scientists most visible in the Dutch policy debate around climate were mostly not researchers of the climate system itself.³⁶ The Dutch were, however, relatively well presented on the response side. In the international climate debate the role of the Delft Hydraulic Laboratory³⁷ that developed the Impacts of Sea-Level Rise on Society (ISOS) model was particularly influential.³⁸ The approach followed in ISOS was later used by the Coastal-Zone Management Subgroup (CZMS) from the Intergovernmental Panel on Climate Change (IPCC) Response Strategies Working Group as a starting point for an operational common methodology to assess the vulnerability to sea level rise (see also chapter 13 on international institutions).

In the period before the IPCC was established, Dutch climate scientists were not strongly involved in the international scientific climate change debate. The main advisory activities, the two reports by the Health Council Committee, even showed a remarkable noninclusion of some of the internationally held views—for example, on the temperature effect of CO₂ doubling and the idea that other greenhouse gases should be considered (Van der Sluijs and Van Eijndhoven 1998). Until the middle of the 1980s Dutch climate scientists did not play a major role in bringing the results of international climate research to bear in developing climate policy.³⁹

It is only in the follow-up of the Villach conference that Dutch scientists became involved in the international climate debate. Vellinga played a key role in this process. The European conference of 1987 in Noordwijkerhout, where the effects of climate change for Europe were discussed, and the related West European Ministers

Conference in Noordwijk in 1987 further catalyzed the Dutch scientific involvement.⁴⁰ The late involvement of Dutch scientists in the policy orientation of climate science may at first sight be viewed as rather surprising in light of the fact that at the end of the 1970s several reports were issued in which attention was asked for climate research.⁴¹ But this may also be seen as proof that Dutch research in the area was still underdeveloped at the time.

5.3.4 Policy Actors

The varying roles of the actors discussed above were reflected and complemented in the various ways that policy actors operated.

Acid Rain Dutch acid rain policy started much later than Dutch policy activities internationally linked to the issue. It was only after 1982 that acid rain or acidification became a policy issue. The attention to sulfur dioxide and the strong relationship of sulfur dioxide to ambient air quality were important factors involved in shaping policy.

Before 1980 air-pollution policy was directed at ambient air quality (see Dinkelman 1995; Van der Straaten 1990). The main policy actors involved were local or regional, and the main issues centered around health. The shift in the location of environmental policy from the Ministry of Public Health and Environmental Hygiene to the Ministry of Housing, Physical Planning, and the Environment at the end of 1982, when Pieter Winsemius became the new minister, marked the transition from a health focus to an environmental focus. In practice this also marked a shift from a more locally oriented environmental policy to a more nationally oriented policy.

But although nationally the issue at hand was still viewed as a problem of pollution of ambient air until 1982, internationally Dutch policy actors had already long been involved with the acid rain issue as put on the agenda by Norway and Sweden. The Netherlands was as actively involved in the LRTAP negotiations as it was with EMEP. Willem Kakebeeke of the Ministry of Public Health and Environmental Hygiene was asked to preside over the negotiations from the second meeting on.⁴² And of course, the viewpoints presented by the Netherlands in the international negotiations were not completely different from the viewpoints and actions at the national level, although the national and international framing did not necessarily coincide.

The policy of the Netherlands was internationally often viewed as very proenvironment. One of the important factors here was that because of the importance of international trade to the Netherlands, the country often had a stake in promoting environmental measures

internationally. Nationally there was relatively strong pressure to take measures to protect the environment.⁴³ National environmental measures were felt to be much easier to implement when the same rules held internationally, thereby no longer creating a stumbling block for trade. The interaction between national and transnational policies can again well be illustrated by the development of regulations regarding large combustion plants.

The foundations of Dutch policy with regard to large combustion plants were laid down in the sulfur dioxide policy-framework plan (SO₂-beleidskaderplan, Netherlands Tweede Kamer 1979–1980, 15, 834) and the energy memorandum of the same year (Netherlands Tweede Kamer 1979–1980, 15, 802). Drafts of the German *Grossfeuerungsanlagenverordnung* (see chapter 3 on Germany) were used as the basis for a Dutch Decree on Emission Requirements and Combustion Installations (BEES). Although the pressure to reduce sulfur dioxide emissions was high, the availability of natural gas as an alternative fuel made it less urgent to take strict measures, and the formal procedural apparatus for establishing emission standards did not yet exist at the end of the 1970s (Dinkelman 1995, 82). It took until 1987 for the Decree to be finalized. In the European Community the Netherlands was actively promoting the EC Directive on Large Combustion Plants. But because the Netherlands pleaded a special position for its refineries, its usual proenvironment stand had a mixed record in this case (Lieverink 1995). As a consequence the Netherlands reduced its credibility in the negotiations and thereby its effectiveness.

The perception of the acid rain issue gradually shifted from a problem of air pollution to one of soil pollution (Dinkelman 1995). The solutions that had been implemented before then (such as tall chimney stacks) therefore no longer applied. The new ways of framing the issue led to the formulation of new solutions to the problem strongly supported by Dutch research in conceptualizing and quantifying the problem. In setting actual priorities for policy, these concepts were used, and the feasibility of the chosen implementation strategy clearly played a role. When additional research and implementation practice showed that even this solution-oriented choice was not attainable, a new strategy was chosen by introducing interim policy goals.

Implementation problems in the acid rain issue also led to a shift in the way implementation was viewed. Whereas in the earlier policy documents implementation was described as reaching preset levels of emissions, in later documents the emphasis shifted to reaching agreements (covenants) with specific groups of actors involved in the policy—the actor-oriented policy (*doelgroepenbeleid*).

This later turn had an influence on the implementation of CFC policy. Although not explicitly labeled as *doelgroepenbeleid*, the implementation of the CFC-reduction policy was modeled closely after the way acid rain policy had been implemented.

Ozone Depletion The ozone-depletion issue was discussed in Parliament early on, but influences external to the formal policy process were central in placing the issue on the policy agenda and in the consecutive shaping of the issue. The initial activities of the Dutch government were spurred by the aerosol industry, which was feeling the effects of the spray-can boycott. Time and again expected activities of foreign actors (the United States and the European Community) were mentioned as reasons to postpone action. This dependence was not argued primarily by the feasibility of intended policy (as was the case later in the climate change issue), but the Dutch government claimed dependency on the analyses conducted elsewhere. Reference was made to knowledge developed in the United States and to EC policy.⁴⁴ The role of developments in Germany was visible in policy choices, as, for instance, the shift to labeling CFC-containing spray cans instead of imposing a ban. Analyses supporting policy choices were drawn from international sources without reassessment until the National Environmental Policy Plan was published, and even then the assessments of the ozone issue consisted completely of secondary analyses of foreign reports.⁴⁵ No effort was made by the government to press the population to become aware of the issue, which is a clear contrast to both the acid rain and the climate change cases.

Climate Change Viewed internationally Dutch policy actors were slow in getting the ozone issue on the agenda, in tune with others in putting acidification on the agenda, but relatively quick in paying attention to the climate change issue. In view of the science-mediated nature of assessing the problem this is rather surprising because Dutch climate researchers (unlike those in the United States) were not specifically addressing the problem and, more generally, research in the area can be considered to have been underdeveloped.

The issue had already been discussed in the Dutch Parliament in 1978, related to the possible reintroduction of coal as a fuel (Netherlands Tweede Kamer 1978–1979, 15,300, 8, 6).⁴⁶ The Dutch government was relatively quick in asking policy advice on the issue (in 1981), prompted by the Health Council. Although the issue took (relative to other policy issues) exceptionally long to take off,⁴⁷ after it was first discussed in Parliament it returned regularly in policy debates, and it was the object of (requested) policy advice.⁴⁸

The first advice of the Health Council led⁴⁹ to the report (mentioned in section 5.3.3) by the Interdepartmental Committee for Environmental Protection (ICMH) and the Coordination Committee for International Environmental Issues (CIM). This report, for the first time, mentioned the three main policy lines that guided government action during the next few years—namely, (1) enhancing awareness, especially internationally; (2) enhancing research; and (3) enhancing measures.

These have long stayed the main lines of action, although their relative importance shifted. The first two were seen as necessary requisites because the Dutch government was of the opinion that Dutch climate policy should be viewed in an international context and more knowledge was needed to reduce uncertainties. The second line of action was taken up as part of the developing science policy but was later also argued to enable the Dutch role in the issue. The third line of action—until the United Nations Conference on Environment and Development (UNCED) of 1992—was, despite pressure of Parliament,⁵⁰ mainly enacted in the elaboration of CFC policy.

The first line of action was taken up vigorously, with the ultimate goal of getting the issue on the agenda of international organizations like the United Nations Environment Program (UNEP) and UNECE, which initially were primarily oriented toward other issues.⁵¹ Getting the issue on the agenda there would also enhance the position taken by the Ministry of the Environment.⁵² This line of action resulted in a number of workshops between 1985 and 1987⁵³ and the support of a number of international conferences. For example, Minister Ed Nijpels, who was responsible for environmental policy at the time, was involved in the organization of the 1988 Toronto Conference, with the express purpose of reorienting the Conference from a scientific direction to a more political direction.⁵⁴

5.3.5 Paths of Influence in the Three Issues

From the above narrative it can be inferred that there were clearly different mechanisms at work in the way in which the three issues became part of the political agenda. In the ozone issue there was no home base for the issue in the scientific world, and it was not connected to other policy issues. In the first period of action the general press took surprisingly little notice. Notwithstanding questions posed in Parliament by the left-wing PPR, the issue arrived on the agenda of Dutch government via the aerosol industry, which was asking for measures to take the impetus out of the boycott actions by environmental and consumer organizations. The involvement of bureaucrats in international deliberations did prepare the stage

for eventual quick implementation but did not influence the public or policy debate until the issue resurfaced after the discovery of the ozone hole in the wake of the Montreal Conference. It is likely that at that time the renewed boycott by environmental organizations quickened the Dutch policy response but did not influence implementation of international agreements very much otherwise.

In the acid rain issue the agenda-setting process can be seen as a shift in the terms of the air-pollution agenda into a more complex issue, combined with a heightening of attention, rather than as the addition of a completely new issue on the agenda. As a result the roles and influences of various actors were much more linked to previous relationships than they tended to have in the ozone issue. The issue led to a reorientation and enhanced attention to air-pollution research and soil research, but these changes were gradual because both areas of research already were closely related to policy and policy development. The main change was that these areas now became inter-related. It may well be that the success (also internationally) of marrying these efforts was also linked to the already existing relationship between science and policy in these areas of research.⁵⁵ On a number of occasions the importance of the link between national negotiations of government and industry and Dutch transnational policy was clearly demonstrated (Liefverink 1995).

In the climate-change issue the links between the actors were much less straightforward than in the acid rain issue, with the possible exception of industry. The roles of policy actors and of environmental organizations were different from the roles one tends to expect. Government officials took the lead in putting the issue on the agenda. Although climate change already had been debated for a long time in environmental organizations, it was clear that they felt some reluctance to take up the issue (as discussed in section 5.3.2).

The role played by policy actors, however, was more exceptional in this case than that played by environmental organizations. Parliamentarians with a scientific background kept paying attention to the issue. Much of the attention was related to the positions taken in the energy debate. This debate had been very fierce for a number of years, and although the greenhouse effect was not central in it, the fact that it was mentioned regularly in the frame of this debate guaranteed relatively permanent attention. The attention paid by parliamentarians to the carbon dioxide issue may in its turn have supported the attention paid to it by government. But it is also likely that the threat of a demise of Dutch energy policy sustained the appreciable effort devoted to the issue and the efforts at gaining international support. Energy policy in the Netherlands

was shaped very much by the energy crisis of 1973 and by the nonacceptance of nuclear energy by the Dutch.

After the discovery of large natural-gas resources in 1963 in Slochteren (in the northern part of the Netherlands), energy was considered a resource that would stay cheap, not only because abundant quantities of natural gas were available but also because nuclear energy was thought to become the energy source of the future (in this period also the Dutch coal mines were closed). This rosy outlook changed quite suddenly when the 1973 energy crisis hit the Netherlands particularly hard, even leading to a temporary ban on driving cars on Sundays. As a result the Dutch government started to develop a fuel-diversification policy. When nuclear energy became less and less acceptable to many Dutch people (culminating in a societal debate on energy use for electricity generation in 1981 to 1983), the policy emphasis shifted to new energy sources (like solar and wind energy) and energy efficiency.

The falling prices for oil and gas tended to frustrate the realization of this development. Economically no shortage of fossil fuels existed, against the expectation in the 1970s. As a result the goals of energy policy tended not to be reached because no immediate pressure was felt and energy problems stayed hypothetical, at least in the short run. When it was shown that the greenhouse effect was a much stronger reason to reduce energy use than economic shortage, this was taken over as the argument and pace-maker for energy reduction.

It is interesting to observe that—contrary to the direction in the ozone issue, where international conventions lay at the start of Dutch policy—the route to gain acceptance for greenhouse policy was the gearing up of international support to finally gain national support for specific measures. Also interesting was the growing role of science policy. In the climate case research was generated to support government policy internationally, whereas the ozone case and the acidification case initially were primarily aimed at supporting national policy.

5.4 The Netherlands as Part of the World

The main observation on how the Netherlands managed global environmental issues is that it played a different role in each of them. This is a contrast to the role of the United Kingdom or the United States, where in all three issues a strong tradition of scientific assessments was found, or of Japan, where implementation was relatively quick as soon as an issue finally reached the policy agenda. The small size of the country may be one of the explanations because the country will not in all cases have a research community that is large enough to

support government policy. Still, it is remarkable that the country made its dependence on other countries' science so explicit in the ozone case. This may have been related to the underdeveloped state of its science policy at the time and the nonexistent ties between relevant bodies of knowledge and relevant officials in government.

Another general observation is the important role international politics and trade play in environmental policy in the Netherlands. This is understandable again from the size of the country and the relative importance of its international trade. Viewed in that light it may even be seen as remarkable that the country tended to take a pro-environment stand on issues. But it must be remarked that the stand internationally was sometimes more proactive than nationally, as was the case when internationally the carbon dioxide reduction target for the Netherlands related to UNCED was stated to be 3 to 5 percent, whereas nationally only the lower goal was adopted. Furthermore, some of the national goals of the country reduced the possibilities for reaching strict environmental goals, like the choice to view the Netherlands as a distribution country with transport as an important economic sector.

Another peculiarity in the way the Dutch handled environmental issues was the way in which environmental organizations were involved. Environmental organizations organized a large share of the population.⁵⁶ Some environmental organizations (and sometimes independent environmental expertise) were being subsidized by the government, either on a semi permanent basis or in the form of subsidies for specific projects, like the Krause project. Usually representatives of environmental organizations also took part in committees overlooking covenants, like the CFC covenant. In many instances these representatives were paid for their activities. A critical view of the issues, a critical assessment of a policy plan, or a critical evaluation of an implementation process was therefore in many cases embedded in the process as a whole. From a critical perspective one can state that in this way environmental organizations were wedded to official policy. From the point of view of society as a whole the advantage is twofold. First, it is guaranteed that the environmental viewpoint is taken into account or at least heard during the development of policy and implementation. Second, the societal process is better controlled.

The way in which views of critics were invoked in the development of Dutch environmental policy may be seen as related to the political culture of the Netherlands that is often described as a consensus culture or a consultation culture. Parties involved in the results of a political decision are in most cases also involved in the deliberation leading to that decision. For instance, before a bill can be

passed, it should be discussed and commented on by a number of consultative bodies, including representatives of employers and trade unions. But to understand the relationship between actors something else has to be stressed too.

Dutch society was long considered to be a pillared society: various social groups (Protestants, Catholics, socialists) had their own organizations and their own leaders (Lijphart 1982). Socially these groups were widely separated, but their leaders were in contact with each other via the political system. Beginning in the 1960s these pillars became less important in social life. A new development partly parallels the development of global environmental issues and the roles played by the different actors but also shows interesting new features. Relatively close ties existed between the persons who operated on behalf of one or another of the groups. Even more so, one single person sometimes operated on behalf of one group and at a different time on behalf of another.⁵⁷ The actor groups are relatively permeable. Apart from the consensus culture that may enhance this permeability, the sheer size of the leadership groups involved in environmental issues in a small country like the Netherlands may be a causal factor. This is clearly different from the U.S. case (chapter 11), where the agencies involved in the three issues hardly overlapped and cross-case learning was limited. The reverse situation held in the Netherlands. Even when the differences between issues might have been a reason for involving different expertise, the same persons from various institutions tended to be involved.

A further peculiarity of environmental management in the Netherlands was the way in which a quantitative, rational approach was married to a qualitative, interactive approach. According to Idenburg and Van der Loo (1993), the general trend is toward goal rationality as the basis for government action, instead of earlier legitimization on traditional and ideological grounds.⁵⁸ As a result they see science and bureaucracy guide government action. Environmental policy indeed tended to be an area dominated by formal quantitative argumentation. As discussed earlier, the goals for the acidification policy were quantified and requantified in each successive policy document, as were the goals for CFC-depleting substances and carbon dioxide reduction. However, at the same time (but sometimes in different parts of the environmental ministry) consensus building was considered important, and in many instances this meant defining goals and directions less precisely.

The sometimes conflicting tendencies of participation versus rationalization were characteristic of the way policy actions in the Netherlands were designed and

developed. The implementation of an acid rain policy may serve as an example. As long as the officials or the politicians involved felt that the participation of target groups in the development of policy measures was leading to enough progress, the participatory (or consultative) track was taken. Otherwise, they imposed scientifically or economically underpinned measures. This threat of imposition challenged the consultation process and strengthened the wish to develop consensus.

The political culture of environmental policy was more goal-rationality oriented and less consensus seeking than other policy areas. On the one hand, this was a new area of policy that still needed to establish its position. Relative to other policy areas (like agriculture, internal affairs, and the social-economic policy area), its relationships with actor groups in society (with the possible exception of ties to environmental groups) were less established. Influence that was too direct and visible, however, might have delegitimized policy in the eyes of some other influential actors, especially industry. Interest-oriented ways of operating (involving corporatist structures) may therefore have been less effective than they had been in older policy areas. Communication between local and regional officials and national officials in this policy area was less well developed than in some others. As a result incentives to use a scientific rational approach were stronger in this ministry than elsewhere. On the other hand, participatory ideals were much ingrained in the personal culture of many of the officials working in this ministry. Therefore, they also had strong incentives to listen to actors in society but were constantly reminded that a goal-rational defense would be required for any decisions that were made.

The goal-rational tendency in Dutch policy led to a strong tradition of evaluating policy against the original targets and adapting policy according to the findings. Understandably, this held even more strongly for environmental policy than for policy in general. The establishment of National Environmental Policy Plans and the evaluation of those plans in National Environmental Surveys by RIVM were cases in point.

A final point of difference compared to other regions studied is Dutch coastal defense regarding the climate change issue. Whereas generally coastal defense as an issue was viewed as part of the climate-change agenda, coastal defense in the Netherlands was not primarily an environmental issue. Coastal defense was viewed as a permanent safety-management problem, with very strong and universally shared roots in Dutch society. Recently coastal defense has attained environmental connotations, but even then only in the sense that some parts of coastal-defense policy are seen as threatening environmental

quality.⁵⁹ As a result of this shift, parts of a coastal-defense policy were adapted. Relative to other countries the package of policy measures in the Netherlands related to changing climate may look relatively adaptive. For instance, a policy was developed to keep the 1990 coastline intact by beach nourishment, dike heightening, and other means of defense against the sea. This policy was developed side by side with measures to reduce carbon dioxide and other greenhouse gas emissions. But because Dutch coastal-defense policy is not part of environmental policy, Dutch environmental policy related to climate change therefore is as preventive as the same policy in Germany.

What, if any, of the above is specific to the management of global environmental risks in the Netherlands? Most of the observations hold for environmental policy in general and do not apply specifically to global issues. But there are some specifics for global risks. Understandably, the need for international cooperation is large in relationship to global issues, more so than for national environmental issues like soil pollution, an issue that is closely related to the very specific situation of soils in the Netherlands. But the international dependence was in many ways not very different from the interdependence in economic issues. Being a small and very internationally oriented country, interdependence is viewed as a fact of life, a fact that often is stressed in developing and prioritizing policy measures, especially in the climate issue but not necessarily in a different way than in issues related to international trade. Also the tendency to merge national scientific efforts related to acidification and climate change to enable the country to become internationally visible cannot be seen as particular for global environmental risks. The policy relevance and the international interdependence with respect to these issues only enhanced but did not occasion the thrust toward concentration and international cooperation.

Finally, in global environmental issues the country was seen as proactive. And because it is a country with a relatively weak power base, it was sometimes entrusted with roles (like chairs in EMEP) that it would not have been given had the country been a big power.

5.5 The Developing Process of Managing Global Risks in the Netherlands

What can we conclude about the lessons the Netherlands learned with respect to managing global environmental issues?

The Netherlands developed a rather elaborate environmental planning process. The development of this planning process ran parallel to the development of the three issues discussed in this book. Part of the peculiarities of

the development may be explained by the more general process of how Dutch environmental policy developed and how various actors participated in the process.

The ozone-depletion issue was the extreme example on the one side. After the publication of Molina and Rowland's paper in 1974, ozone showed up on the political agenda. Because it had no prior history, it had no clear relationship to specific issues that had appeared on the policy agenda before. At the time no overall policy existed for environmental issues. The result was that the ozone issue was handled as a single issue and therefore could become completely invisible on the political agenda during the years 1981 to 1985 (when Winsemius was responsible for environmental policy).

When it returned to the agenda in 1986, a number of things had changed. First, the perceived certainty of the problem had become much larger, it had become the subject of international deliberations in the frame of the Montreal Protocol, and therefore the embedding of a policy had become clear. Second, an integrated environmental policy had become a widely accepted goal in the Netherlands, and ozone depletion could be tied to a certain type of environmental issue: those of a global character. Third, the policy-development process for environmental policy had become a much more systematic planning process in which issues can change rank but are less likely to come up and vanish because of haphazard external influences. In this planning process the role of various actors in society had also become much more defined. An actor-oriented policy (*doelgroepenbeleid*) had started to gain importance as a mechanism for ensuring implementation, and the instrument of covenants had gained acceptance. Therefore, when the issue reentered the agenda, it could be fitted relatively easy into policy thinking and implementation strategy.

We can say that the ozone issue shows what the Netherlands learned with respect to environmental management during the 1980s. Relative to the ozone-depletion issue, the development of a policy for acid rain and climate change in the Netherlands was more clearly linked to Dutch environmental policy. These issues exemplify the way in which environmental policy changed character during the period these issues reigned supreme on the environmental agenda.

The acid rain issue was the major environmental issue in the period when Winsemius was the minister entrusted with environmental policy and when it was realized that setting goals for environmental quality and attaining those goals were two completely different things. Evaluations of environmental policy showed that procedures related to environmental measures were slow to be implemented and enforcement was weak. It became clear that

new ways of operating were needed: the stick of legislation had to be replaced at least partly by the carrot of generating incentives for implementing policy measures. Winsemius, who had been an advisor to industry, strongly promoted a different way of operating from the way that had been favored before. The actor-oriented policy (*doel-groepenbeleid*)—in which actors who generate pollution are addressed directly and take part in the deliberations on goals and strategies for implementation—became central.

Although acidification was—because of its cross-media character—a problem that clearly demonstrated the shortcomings of sectoral environmental policy, it was not the *cause* of the integration of that policy. Plans for integration already had come up in 1981. Frustrations with the old sectoral policy led to these plans. The acid rain issue, however, was important for the integration process because it offered many opportunities for trying out the new ideas.

The climate change issue was the overriding issue in the first National Environmental Policy Plan. It had the power to interconnect a number of other issues that for various reasons formed part of the environmental policy agenda, such as the ozone-depletion issue and energy policy. It was the issue that necessitated a global, integral view of the environment, and in that sense it was a god-send that it was there at the moment an integrated environmental plan was drafted. The global climate change issue also allowed an integrated environmental policy. Viewed from that angle the prominence of the Netherlands in the international climate debate and the development of integral policy plans reinforced each other.

Reviewing the development of the three issues over time, we see a clear difference in the way the issues were managed. Some differences can be viewed as systematic changes that could be allotted the label *learning*, but others have been occasioned by the peculiarities of the issues. These could include a larger knowledge base for one case as opposed to the others (such as more initial knowledge on acid rain than on ozone depletion), the specific industrial interests involved, and the peculiarities of the way actors influence ways of operating (such as the specific interests of CFC users versus CFC producers in the ozone-depletion issue).

The most interesting developments in the Dutch situation seem to be related to how environmental policy became part of a planning process and how an interrelationship developed between science and policy. The planning process for environmental policy developed roughly between 1974 and 1990. As a result an issue that has once been taken up is not likely to vanish from the agenda unnoticed. The complete vanishing and reentering of the ozone issue is difficult to imagine in the new system.

Comparing the three issues also reveals the developing role of science policy. It was nonexistent in the ozone-depletion issue but became crucial in both the acid rain and climate change issues. A policy-directed orientation for science clearly was successful in the acid rain issue and not only helped to orient research but also supported policy development appreciably. This specifically has been questioned in the United States (see the evaluations of the National Acid Precipitation Program (NAPAP) in chapters 11 and 20). The acid rain model was mirrored in the climate change case. Again it contrasts favorably to the situation in the United States, partly because of limitations in the size of the elites involved in the issues. However, in the Netherlands it is not clear whether the developing climate research was as well connected to policy measures as acidification research was. It may be that a successful model was copied but without the essential precondition of a positive interaction between the questions posed by policy and the kinds of answers that can be provided by science.

Appendix 5A. Acronyms

a.e.	acid equivalent
BEES	Besluit Emissie Eisen Stookinstallaties (Decree for Emission Requirements and Combustion Installations)
CFC	chlorofluorocarbon
CIAP	Climate Impact Assessment Program
CIM	Coördinatie Commissie voor Internationale Milieuvraagstukken (Coordination Committee for International Environmental Issues)
CMA	Chemical Manufacturers Association
CO₂	Carbon dioxide
CZMS	Coastal-Zone Management Subgroup (a subgroup of the Response Strategies Working Group of IPCC)
DAS	Dutch Acidification System
EC	European Community
ECMTWF	European Center for Medium-Term Weather Forecasting
EEB	European Environmental Bureau
EMEP	European Monitoring and Evaluation Programme
FACE	Forests Absorbing Carbon Dioxide Emissions
GCM	general circulation model

IIASA	International Institute for Applied Systems Analysis	UNEP	United Nations Environment Programme
ICMH	Interdepartementale Commissie voor de Milieuhygiene (Interdepartmental Committee for Environmental Protection)	UNICE	Union of Industrial and Employers' Confederations of Europe
IPCC	Intergovernmental Panel on Climate Change	VA	vulnerability assessment
ISOS	Impacts of Sea-Level Rise on Society	VMD	Vereniging Milieudéfensie (Dutch branch of Friends of the Earth)
IWACO	International Water Consultants	VROM	Volkshuisvesting, Ruimtelijke Ordening, en Milieuhygiene (Ministry of Housing, Physical Planning, and the Environment)
KNMI	Koninklijk Nederlands Meteorologisch Instituut (Royal Netherlands Meteorological Institute)	VNO	Verbond Nederlandse Ondernemingen (Federation of Netherlands Industry and Employers)
LRTAP	Long-Range Transboundary Air Pollution	VVD	Volkspartij voor Vrijheid en Democratie (People's Party for Freedom and Democracy)
NAPAP	National Acid Precipitation Assessment Program (U.S.)	WMO	World Meteorological Organization
NAS	National Academy of Sciences (U.S.)	WWF	World Wide Fund for Nature, until 1986, World Wildlife Fund
NASA (U.S.)	National Aeronautics and Space Agency		
NAV	Nederlandse Aerosol Vereniging (Netherlands Aerosol Association)		
NGO	nongovernmental organization		
NH₃	ammonia		
NM	Vereniging tot Behoud van Natuurmonumenten (Society for the Preservation of Nature in the Netherlands)		
NO_x	nitrogen oxides		
OECD	Organization for Economic Cooperation and Development		
PPR	Politieke Partij Radicalen (Radical Political Party)		
RAINS	Regional Acidification Information and Simulation (model)		
RIVM	Rijksinstituut voor Volksgezondheid en Milieuhygiene (National Institute of Public Health and Environmental Protection)		
SEP	Samenwerkende Elektriciteits Producenten (Cooperating Electricity Producers)		
SO₂	sulfur dioxide		
SO_x	sulfur oxides		
UNCED	United Nations Conference on Environment and Development		
UNECE	United Nations Economic Council of Europe		

Appendix 5B. Chronologies

(*Italic font denotes action entry; roman font denotes knowledge entry.*)

Appendix 5B.1. Chronology of the Acid Rain Issue in the Netherlands

1896 *Nuisance Act comes into force.*

1965 Sulfur dioxide emissions in the Netherlands reach a level of 1000 million kg.

1970 *The Air Pollution Act comes into force.*

1970 *Ministry of Public Health and Environmental Hygiene is established.*

1971 *The Directorate of Environmental Protection opens at the new Ministry of Public Policy and the Environment.*

1972 *The U.N. conference is held in Stockholm. Dutch government publishes the Priority Memorandum on the Environment.*

1975 *The Helsinki Conference on Safety and Cooperation in Europe is held.*

1975 The EMEP Steering Committee is formed.

1976 The five-year Program Air 1976–1980 is published, establishing a sulfur dioxide ceiling of 500 million kg per year.

1979 *The Geneva Treaty on Long-Range Transboundary Air Pollution (LRTAP) is signed.*

1981 The first publications appear on describing forest dieback (*Waldsterben*).

1981 *The Conference of Environmental Organizations is held in Göteborg.*

1982 *The United Nations Economic Council of Europe Conference is held in Stockholm.*

1983 De Boois asks for research.

A survey is made on Dutch acidification research.

The first overview of the vitality of Dutch forests (*Staatsbosbeheer*) is made.

An acid rain conference is held in 's Hertogenbosch.

The third five-year Program Air 1984–1988 concentrates on air and soil acidification.

1984 *An integral Multiyear Program Air includes an agreement with refineries.*

1984 *A Memorandum on Acidification plans to adapt acidification policy.*

1985 Additional Program Acidification Research begins.

1985 *The Sulfur Dioxide Protocol is included in the Treaty of Geneva (Helsinki).*

An Interim Evaluation Acidification Policy is established.

1987 The first Phase of the Additional Program ends.

1988 *The Nitrogen Oxide Protocol is included in the Treaty of Geneva (Sofia).*

1988 The Final Report of the Additional Program is published. *Concern for Tomorrow* is published.

1989 *The National Environmental Policy Plan is published.*

1989 *An Abatement Plan on Acidification is presented.*

1990 *A covenant is signed with SEP on sulfur dioxide and nitrogen oxide emissions.*

1991 The final report on the second phase of the Additional Program agrees with policy goals but ranks ammonia as more important.

1991 The Second National Environmental survey is published by RIVM.

1992 *Ammonia policy is evaluated.*

Appendix 5B.2. Chronology of the Ozone-Depletion Issue in the Netherlands

1974 The first articles in Dutch papers mention stratospheric-ozone depletion.

1975 *The PPR, a left-wing party, asks the government for a CFC ban. With NGOs it starts a consumer boycott of spray cans.*

1975 *Chemisch Weekblad (Chemical Weekly)*, a professional journal, publishes a review article based on U.S. publications.

1976 Questions in Parliament reveal that the government requires more research results before measurements can be taken.

The consumer boycott ends.

1976 In *Elseviers Magazine*, the Dutch scientist Paul Crutzen (then at the U.S. National Oceanic and Atmospheric Administration) poses that there is convincing proof that ozone is potentially broken down in the stratosphere.

1977 *A Draft Decree to label spray cans is passed.*

1978 *A ban is prepared.*

1978 *A decree to label spray cans is signed.*

1980 *Minister Ginjaar asks industry to reduce its use of CFCs as a propellant before the end of 1981.*

The European Community decides on CFC reduction as a goal.

1980 *Chemisch Weekblad* publishes articles claiming that evidence of ozone depletion is insufficient (based on the *New Scientist* of July 17 and on statements made by Brasseur before the European Commission).

1982 *Secretary of State Lambers announces that she would prefer a total ban of CFC propellants in the European Community.*

Deliberations on an international convention begin.

1984 The NAS report is completed.

1985 *The Vienna Convention is signed.*

1986 Dutch newspapers publicize the discovery of the ozone hole.

The Dutch Parliament asks the government for a phaseout of CFCs in spray cans, foams, and refrigerator installations.

1987 *NGOs ask the aerosol industry to ban CFCs, but the aerosol industry declines.*

NGOs start a second consumer boycott against spray cans.

1987 Minister Nijpels sends a letter to Parliament referring to research results, the Vienna Convention, and international deliberations on a protocol.

1988 *The Ministry of the Environment signs a covenant with the Netherlands Aerosol Association (NAV) to reduce CFCs to 95 percent of 1976 levels by 1990.*

The Vienna Convention is signed by the Upper House of Parliament.

1989 *The Montreal Protocol becomes operational.*

1990 *The CFC action program is published. Producing and importing hard CFCs and halons are banned from 1998 on.*

Appendix 5B.3. Chronology of the Climate Change Issue in the Netherlands

1953 After a flood disaster in which 1800 people are killed, a member of Parliament refers to the melting of polar ice.

1963 Gas is discovered in the northern part of the Netherlands.

1972 A Dutch translation of *Limits to Growth* is published.

1973 *The oil crisis leads to carless Sundays.*

1974 An Energy Memorandum (the first integrated policy document on energy policy) mentions the carbon dioxide problem as an argument for energy conservation.

1978 Report on *Climate Fluctuations, Causes, and Possible Consequences (Wetenschappelijke Raad voor het Regeringsbeleid)* is completed.

1978 The government's decision to use more coal for electricity production leads to questions in Parliament about the carbon dioxide problem.

1980 The National Research Program on Coal includes carbon dioxide research.

1981 A report is published by the Ad-Hoc Committee for Meteorological and Oceanographical Research in the Netherlands (Vossers Committee).

1981–1983 Societal debate on energy occurs.

1983 The Health Council issues the first assessment report on the carbon dioxide problem.

1984 *Carbon Dioxide: Pointing out a Policy Problem* is published by the ICMH and the CIM.

1985 KNMI starts a climate change research program.

1986 RIVM starts development of the IMAGE model.

1986 Delft Hydraulic Laboratory starts development of the ISOS model.

1986 VROM publishes the five-year Program Air 1986–1990, mentioning the carbon dioxide problem for the first time.

1986 The Health Council issues a second assessment report on the carbon dioxide problem.

1987 *Parliament members ask for a plan outlining measures and costs of carbon dioxide abatement.*

1987 *A conference (Noordwijk) of West European ministers calls for action.*

1988 *The Concern for Tomorrow* study is published by RIVM.

1988 A Climate Division is created at the Directorate for the Environment (for the preparation of the Noordwijk Ministers' Conference in 1989).

1989 *The Conference of Ministers in The Hague calls for the formation of a U.N. environment organization.*

1989 *The first National Environmental Policy Plan is published.*

1989 The Greenhouse effect is a central issue in the elections. The Christian Democratic Party promises to mitigate carbon dioxide emissions by 2 percent per year.

1989 *A government agreement (Regeeraccord of cabinet Lubbers III) sets a goal of stabilization of carbon dioxide emissions within four years.*

1989 *The International Climate (Ministers) Conference is held in Noordwijk.*

1990 *The National Environmental Policy Plan Plus is published.*

1990 A Memorandum on Energy Conservation is presented.

1990 The National Research Program begins.

1990 *A Policy document discusses coastal defense after 1990.*

1990 *SEP founds Forests Absorbing Carbon Dioxide Emissions (FACE).*

1991 *Memorandum on Climate Change (Nota klimaatverandering) is published by the government.*

1993 *The second National Environmental Policy Plan is published.*

Notes

1. Many people were involved in generating and critically assessing the information contained in this chapter, especially at the Department of Science, Technology, and Society at Utrecht University. We want to mention Gunther Nieuwdorp, Jos Dekker, Kaat Schulte Fischeidick, Ellis Toxopeus, Hanneke Maasland, Sigrid Berk, Sander Toet, Patrick Blom, Ewald Korevaar, Willem Kakebeeke, and Toni Schneider. Without their help and support this chapter would have been less comprehensive. Of course, the final result is completely the responsibility of the authors.

2. The name indicates that environmental hygiene became more central in policy but also that environmental policy was no longer exclusively seen as directed toward human health (Tellegen and Tommel 1984). In 1982 environmental policy was split from health issues when the Directorate General for Environmental Management became tied to Housing and Physical Planning in the Ministry for Housing, Physical Planning, and the Environment.

3. In these starting points it is apparent that environmental policy derived from efforts to deal with local pollution problems and thus was not particularly applicable to later transboundary issues.

4. The third was published in 1993.
5. It is difficult to find one good measure for attention to environmental issues in the Netherlands for any actor because no Dutch scientific journal or single authoritative newspaper is available over the entire period. Therefore, we took the annual overview report of a relatively longstanding advisory committee to the government as the measure of attention paid to these issues. This may have led to some bias in stressing political and governmental attention.
6. "The acidification of rain is caused by large quantities of sulfur dioxide and possibly also nitrogen oxides, which, it has been suggested, originate partly from industrial areas in western and eastern Europe" (Netherlands Tweede Kamer 1976–1977, 52) (translated by, J.v.E.).
7. T. Schneider of RIVM became chair of EMEP. W. Kakebeeke of the Ministry became chair of the committee that prepared the Protocol.
8. The conference in Goteborg took an unexpected turn when the then Minister of Agriculture of Sweden, who had just returned from a visit to Germany, told the conference that the first proofs of damage to trees in Germany had become available. As a consequence it was agreed that the European Environmental Bureau (EEB) would disseminate this news throughout Europe (interview Jan Franssen of The Netherlands Society for *Nature and Environment*, February 25, 1991; *Report of the European Conference on Acid Rain* 1981).
9. Interview S. Brokerhof of the PPR (November 25, 1987); see also the newspapers *Volkscrant*, June 25, 1975, and *NRC-Handelsblad*, May 16, 1975.
10. In the deliberations leading to the Vienna convention, the Netherlands chaired the negotiations starting from the second session. The chair was held by W. Kakebeeke, an official of the ministry responsible for environmental affairs.
11. During this period the ministry changed names. Until the end of 1982 it was the Ministry of Public Health and Environmental Hygiene, and after that it became the Ministry of Housing, Physical Planning, and the Environment, with Pieter Winsemius as the first minister.
12. According to Kakebeeke (interview, June 1995) the departmental head did not consider this issue a priority issue, and it did not prove possible to put the issue on the agenda. At the time acidification was a top-priority issue.
13. Kakebeeke states that it did not prove possible to get the issue on the agenda directly after the Vienna Convention. It was only when the preparations for the Montreal Protocol were in a final stage that it was decided to present the complete package to Parliament.
14. Letters to the NGO Natuur en Milieu (Nature and Environment), e.g., by Indola Cosmetics, May 4, 1987, Beyersdorf NV, May 11, 1987, and GABA Almere, July 1987.
15. Kakebeeke mentions NASA and Norwegian sources, plus Brasseur (who also informed the European commission). He also mentions that the Ministry of Economic Affairs based itself in part on the conclusions of the Coalition for Friendly Use of CFCs, which was related to the Chemical Manufacturers Association (CMA) in the United States.
16. This report discussed two energy options: a fossil fuel option and a nuclear option. The first option would lead to local thermal pollution and climate change; the second to nuclear waste and local thermal pollution. As a result reduction of energy use was considered the only positive option.
17. E.g., in publications by the Dutch branch of Friends of the Earth (Vereniging Milieudefensie) (VMD 1972) and by the Netherlands Society for Nature and Environment (Stichting Natuur en Milieu) (Vonkeman 1974; Hekstra 1978) and in the Energy Memorandum of 1974 (Netherlands Tweede Kamer 1974–1975).
18. From 1981 to 1983 a broad societal debate was organized around future electricity generation in the Netherlands. The underlying issue in this debate was the use of nuclear energy as a fuel for electricity generation.
19. The Health Council (Gezondheidsraad) was a standing committee that advised the government on health issues. It usually operated via subcommittees consisting of invited experts for the issue under consideration. The Health Council was a very influential body.
20. Personal communication, Schuurmans, 1991.
21. The goal formulated on page 130 of the plan was "for the moment stabilization of CO₂ emissions on the average level of 1989 and 1990, which is estimated at 183 million tons CO₂ per year."
22. The VVD is a conservative liberal party. The Minister of Housing, Physical Planning, and the Environment (Nijpels) and the Minister of Transport and Communications (Smit-Kroes) both belonged to this party, and both did not accept changes in their proposal.
23. In the case of the CFC covenant this was mainly done from within the committee controlling the covenant. With respect to acidification, the Society for the Preservation of Nature in the Netherlands (NM) performed vitality research on trees. Vitality inspections were also conducted by a government research institution. These parallel activities regularly led to diverging interpretations of the vitality of the trees.
24. The project also exemplified the hesitations of the environmental organizations and marks their conversion relative to the carbon dioxide issue. From the preface of the report (Krause, Bach, and Koomey 1989) it can be inferred that in 1987 the greenhouse effect was not planned to have the central role in the project that it finally did. Stimulating energy reduction was initially much more central than climate change, especially because of the effects of acidification and the limitations of resources. But gradually it became clear that the greenhouse effect necessitated much more severe energy reductions than resource problems.
25. It is remarkable that in analyses of Dutch policy and of the reactions to the two boycotts the role of environmental groups is downplayed (Van der Heijden and Hisschemoller 1983; Doorewaard 1990) and the active role of government and industry is stressed. However, in 1976 as well as in 1987 changes in the behavior of industry immediately followed the start of the boycott action by a large number of groups in which environmental organizations played a central role. This change in the behavior was not mediated via the general media (at least not the written media), since these reported surprisingly little on the actions (Van Heusden 1990). Van Heusden studied publications on the ozone-depletion issue in *De Volkscrant* in the period 1974 to 1990. *De Volkscrant* is a national newspaper that has been shown to pay relatively more attention than other papers to environmental risks (Gutteling and Calje 1993). We cite from Van Heusden's summary: "We found that *De Volkscrant*, when the ozone issue was not long known, published mainly research done in other countries and not about events in the Netherlands. To be sure, Dutch government and industry did behave as expected relative to the ozone issue. But no articles were published about environmental groups that had started actions against spray cans. Even more remarkable, whereas spray-can producers were several times given the opportunity to present their views, it was only in 1980 that somebody from an environmental organization was cited" (Van Heusden 1990, 3).

26. The first of these international weeks was held in April 1985, at a time when snow with accumulated acid was melting in Scandinavia. During international weeks several actions exerted pressure on both industry and government, and activities were undertaken to educate the population. The most visible actions were guided acid rain tours in forests and cities and actions by the Dutch branch of Friends of the Earth (VMD) against Shell, the “biggest acidifier in the Netherlands” (Berk 1994).

27. In the Netherlands the environment-oriented NGOs (as opposed to green-nature-oriented NGOs) are called *gray* environmental organizations.

28. Interview with T. Schneider, RIVM, September 23, 1995.

29. Citing Bovenkerk (Ministry of Housing, Physical Planning, and the Environment) and Schneider (RIVM).

30. A much more critical view on the role of the Additional Program is provided by Hajer (1995, 220), who concludes that the program led to the periodical reinforcement of a legitimization crisis for acidification policy. Our view is that the framing forced by the additional program enabled the further development of acid rain policy at the time.

31. The RAINS model was partially sponsored by the Dutch Ministry of Housing, Physical Planning, and the Environment. Eight percent of the funds of the Priority Program were devoted to developing the DAS-model (Stuurgroep Verzuringsonderzoek 1985).

32. In the negotiations on the 1994 Sulfur Dioxide Protocol, RAINS results were used as the source of data. A task force led by Hordijk (then at the Wageningen Agricultural University) did the calculations, and RIVM mapped the critical depositions in Europe (Kakebeeke 1994). In his thesis Hordijk (1991) discussed the criteria that a model has to fulfil to support negotiations and concluded that RAINS in principle fulfilled those conditions but had not yet been the basis for an agreement.

33. The name of Van der Leun, a professor of dermatology at Utrecht University, was the only name we found mentioned. Van der Leun stated (interview, May 9, 1994) that he chose to play the role of a researcher instead of somebody who influences policy. Nonetheless, he formed part of the international scientific community involved in assessing the risks of ozone. For instance, he became the chair of the subgroup on the effects of the Climatic Impact Assessment Program (CIAP) of the U.S. Department of Transportation that reported in 1975 (see chapter 11 on the United States). It was only at the UNEP conference in Munchen in 1978 (see chap. 3/13, Germany/II) that he first encountered an official from the Environmental Department (Van Beckhoven). Afterwards he became a member of the Coordination Committee for UNEP (see the list of persons involved in UNEP activities in chapter 13 on international institutions). The research of Van Der Leun did influence UNEP reports, but, according to Van der Leun, in policy documents this research was not cited because international reports were considered more authoritative.

34. The exception was the Delft Hydraulic Laboratory (Vellinga). Although a number of persons and groups were involved in climate research and the international networks around climate research, those were not specifically related to the type of research that was most central in the debate of the climate change issue—global circulation models. However, other types of climate research were done—for example, the Royal Netherlands Meteorological Institute gathered data on the development of the climate (Schuermans 1974), work was done on the development of ice caps, glaciers, and sea-level rise (Oerlemans), and the carbon dioxide cycle was also a subject of research (Goudriaan).

35. The fact that in the 1970s the Royal Netherlands Meteorological Institute was one of the latest meteorological services in Europe to have a new, powerful computer facility to its disposal contributed strongly to this relatively backward position. Instead, the Vossers Committee recommended joining the European Centre for Medium-Term Weather Forecasting model for GCM research. For Dutch climate research they recommended continuing the reconstruction of time series of past climate and intensifying the development of simplified parameterized climate models and specially coupled ocean atmosphere models.

36. Böttcher was a retired chemistry professor, Turkenburg an energy researcher, and Vellinga originally an hydraulic engineer. Goudriaan was the exception.

37. Vellinga was located there before he became an official in the Ministry of Housing, Physical Planning, and the Environment. At the end of our research period he was a professor of Environmental Science at the Free University in Amsterdam.

38. In 1986 the Delft Hydraulic Laboratory started an international research project called Impacts of Sea-Level Rise on Society (ISOS) with funds from UNEP and the Dutch government. The aim of the project was to enhance international awareness of the impacts of sea-level rise and to develop response strategies (Wind 1987). Initially three case studies were worked out: for Bangladesh, the Maldives, and the Netherlands. In 1988 a first attempt was made to compile a global inventory of areas at high risk from sea-level rise. That study was carried out for UNEP. ISOS was applied in the so-called vulnerability assessment (VA) case studies initiated by CZMS. This group, chaired by New Zealand and the Netherlands, involved participants from seventy countries (fifty developing countries). It assessed the costs of the defense measures necessary to be able to cope with a sea-level rise of 1 meter. As of 1992 VA studies had been carried out for twenty-four countries using the Dutch approach (Tidal Waters Division 1992).

39. And it can even be stated that the contrary was true. International reports were sent to the Dutch Parliament directly from the Ministry of Housing, Physical Planning, and Environmental Hygiene in 1982, including *Climate Change and Society* (Kellogg and Schware 1981), *Energy and Climate* (Bolin 1985), and *Food-Climate Interactions* (Bach, Pankrath, and Schneider 1981). The same happened to the results of the 1985 Villach conference. The results of this meeting were entered into the deliberations of the Health Council Committee by the ministry member of the Committee, Hekstra, but barely played a role there (Van der Sluijs and Van Eijndhoven 1998).

40. Trouw, Zorg over “broeikas,” Europese milieuministers willen maatregelen, October 27, 1987; Trouw, Paar graadjes warmer heeft grote gevolgen, October 22, 1987.

From 1988 until the first IPCC report was published fourteen Dutch scientists were involved in IPCC Working Group I. This can be seen as the moment at which Dutch scientists started to become part of the international community involved in the climate issue.

41. In 1979 the Royal Netherlands Meteorological Institution (KNMI) mentioned a need for heightened attention to the possibly deleterious effect of climate change and the need for research (KNMI 1979, 8). This mention was caused by World Meteorological Organization (WMO) plans to start a world climate program. Two reports produced as parts of an effort initiated by the Ministry of Education and Science to program research in the environmental area mentioned the need to enhance the Dutch research effort with respect to the relationship between climate and environment (Ester and Schreurs 1978, 18; Lubach and Van Juchem 1979, 19–22).

42. Interview with T. Schneider, RIVM, September 23, 1995.
43. Reasons often given for this are the dense population (and associated pollution) of the Netherlands, the large industrial sectors that contribute to pollution (oil and petrochemical industries but also agribusiness), and the large numbers of people who were members of environmental organizations.
44. E.g., by Kakebeeke, interview, August 1995.
45. In *Zorgen voor Morgen (Concern for Tomorrow)* (RIVM 1988, 73), however, RIVM calculated the expected CFC concentrations in the atmosphere related to four CFC-reduction scenarios.
46. The answers of Minister Ginjaar mention an IIASA Conference on Carbon Dioxide, Climate, and Society in February of the same year.
47. It is striking how long the issue was considered to be in its “signaling phase.” Pieter Winsemius, Minister of the Environment between 1982 and 1986, described the policy process as a four-stage cycle with the signaling phase as the first phase. Since then this way of describing the development of environmental policy has almost become the standard in the Netherlands (Winsemius 1986).
48. See Dinkelman (1995) for more details.
49. Apparently the fact that the Health Council advised the Minister of Health instead of the Minister for the Environment led to some debate about the way in which the activities of both committees should be related (Dinkelman 1995).
50. E.g., in the frame of the debate on the electricity plan for the years 1987 to 1996 the standing Committee for Economic Affairs accepted a resolution in which it asked for a plan of measures (Netherlands Tweede Kamer 1986–1987, 19, 948, no. 7). This was reiterated during the debate on the policy document *Climate Change and Other Trace Gases* in January 1988 (Netherlands Tweede Kamer 1987–1988, 20, 047, no. 5, p. 7).
51. Desertification for UNEP and acid rain in the case of UNECE.
52. Deliberations between the Directorate General for the Environment and the Health Council, March 29, 1983.
53. One on the West Antarctic Ice Cap on May 6–8, 1985; one on the Impacts of Sea-Level Rise on Society, August 27–29, 1986; one on Bioclimatic and Land-Use Changes, December 15–19, 1986; and one on the Melting of Glaciers and Ice Caps, 1987.
54. Words of Nijpels during the debate on the document *Climate Change by Carbon Dioxide and Other Trace Gases* in January 1988 (Netherlands Tweede Kamer 1987–1988, 20, 047, no. 5, p. 9).
55. This development has stayed unparalleled until now in the climate issue. There is, however, a parallel to the situation in Dutch agriculture more generally, where research in governmental institutions is very much geared toward the solution of practical problems in agriculture. Recent developments in that area, however, also show the disadvantages of too strong entrenchment.
56. The membership of VBN rose from close to 300,000 in 1989 to more than 700,000 at the end of 1993, donors of World Wide Fund for Nature (WWF) Netherlands rose from about 300,000 in 1989 to 600,000 in 1994, the national membership of VMD rose from 1989 to 1993 from 21,000 to 33,000, and the donors of Greenpeace numbered 600,000 in 1993. These numbers should be compared to the total population of the Netherlands of almost 16 million (De Graaf 1994).

57. Examples are numerous. Winsemius was the Minister of Environmental Affairs from 1982 to 1986. Before and after he was an advisor for industry. He also became the chair of the board of VBN, one of the nature-oriented environmental organizations. Also more generally, the boards of environmental organizations consist of people holding positions in society—for instance, as university teachers or professors, officials in ministries, or (former) parliamentarians. Hekstra was an official in the Ministry of Housing, Physical Planning, and the Environment and as such was involved in international deliberations, but he also was one of the first to draw attention to climate change in publications of environmental organizations. A number of parliamentarians (especially those in the Upper House) involved in the energy debate at the same time held positions at universities.

One might tend to conclude from this observation that an actor analysis is not suitable because of these overlapping constituencies. It is, however, clear that different rules apply for the adequate behavior of a person in different roles and therefore that one can still analyze the actions of different actors. Of course, the fact that a single person has to marry the different roles limits the width of the variation in behavior that is still credible.

58. Idenburg and Van der Loo (1993) explain this by stating that in the process of “depillarization” a need was felt to legitimize government action socially. The vacuum was filled by a very strong tendency toward goal rationality.

59. It must, however, be mentioned that the threat of sea-level rise was used as a way to make people aware of the climate change issue, especially by the VMD in its climate actions in the period 1989 to 1991. For example, a bucket full of water—symbolizing sea-level rise by the greenhouse effect—was delivered to the head of the Governmental Committee for Economic Affairs (Buitenkamp 1989), and during an action day called “In Sea/At Sea” on May 25, 1991, that took place in thirty-two towns, the names of the municipalities were extended with “in sea” or “at sea,” depending on their location relative to the future coastline (De Rijk 1991).

References

- Alcamo, J., R.W. Shaw, and L. Hordijk. 1990. *The RAINS Model of Acidification: Science and Strategies in Europe*. Dordrecht: Kluwer.
- Bach, Wilfried, Juergen Pankrath, and Stephen H. Schneider. 1981. *Food-Climate Interactions*. Proceedings of an International Workshop held in Berlin (West). Dordrecht: Reidel.
- Berk, S.I.M. 1994. Management van de zure regenproblematiek door Nederlandse milieuorganisaties. NW&S Report 94028, Contribution F20 to SL-project. Department of Science, Technology and Society, Utrecht.
- Bolin, Bert. 1985. *Energy and Climate: A Summary of Our Knowledge about Those Mechanisms That Determine the Climate of the Earth and the Possibility That Man May Directly or Indirectly Influence the Climate*. Stockholm: University of Stockholm.
- Bresser A.H.M. 1985. Het RIVM-onderzoek aan zure regen, In *Berichten uit het RIVM* (pp. 200–202). Bilthoven: RIVM.
- Buitenkamp, M. 1989. Ook “zachte” ozonvreters dragen bij aan broeikas effect. *Milieudefensie* 18(1): 13. Vereniging Milieudefensie, Amsterdam.
- CFC Action Program. 1990. The Hague, June 21.

- Commissie Vossers. 1981. *Nieuwe wegen in het fysisch onderzoek van zee en atmosfeer*. Report of the Ad-hoc Committee for Meteorological and Physical-Oceanographical Research in the Netherlands. The Hague: Staatsuitgeverij.
- Cramer, J., B. de Laat, and C. Schulte Fishedick. 1990. *Responsiveness of Scientific and Technological Institutes to Environmental Change in the Netherlands*. Report prepared by the TNO Centre for Technology and Policy Studies on behalf of the Ministry of Economic Affairs as part of a comparative cross-national study coordinated by the Organization of Economic Cooperation and Development, Apeldoorn, August 24.
- CRMH. 1988. *Milieu van Jaar tot Jaar 1987*. 's Gravenhage: Staatsuitgeverij.
- De Graaf, H. 1994. *Geld en idealen: Financiering van de idealen van vijf natuurbeschermings- en milieuorganisaties, etc.* NW&S Report 94065. Department of Science, Technology and Society, Utrecht.
- De Leeuw, F.A.A.M., and J.A. Van Jaarsveld. 1992. *Bepaling van Bron-receptor relaties voor verzurende componenten*. RIVM-report. Bilthoven: RIVM.
- De Ligt, J.M. 1993. Face Foundation finances afforestation to compensate for Dutch carbon dioxide emissions. *Change, Research, and Policy Newsletter on Global Change from the Netherlands* 17: 3–5.
- De Rijk, P. 1991. Actie in zee aan zee groot succes. In *Nieuwsbrief Broeikas-Informatiebulletin voor lokale groepen* 4 (October): 3–4. Amsterdam: Vereniging Milieudefensie.
- Dinkelman, G. 1995. *Verzuring en Broeikas-effect, De wisselwerking tussen Problemen en Oplossingen in het Nederlandse Luchtverontreinigingsbeleid (1970–1994)*. Utrecht: Jan van Arkel.
- Doorewaard, M.E.M. 1990. *Milieuwetgeving en het Bedrijfsleven; de Paradoxe rol van Belangenorganisaties*. Groningen: Wolters-Noordhoff.
- Du Pont de Nemours Nederland. 1977. Focus op Zon. Brochure, July.
- Ester, P., and L.J.M. Schreurs. 1978. Prioriteiten voor milieu-onderzoek. Een onderzoek naar milieuimplicaties van maatschappelijke ontwikkelingen en prioriteiten voor milieu-onderzoek. In *LaSOM, Signalering en Evaluatie Van Oorzaken en Effecten van Milieuverandering*. Amsterdam: IVM, VU.
- Fransen, J. 1981. Zure regen: Effecten, aanpak van het probleem. *Natuur en Milieu* 7–8: 14.
- Gezondheidsraad. 1983. *Deeladvies inzake CO₂ problematiek*. 's Gravenhage: Gezondheidsraad.
- Gezondheidsraad. 1986. *Advies inzake CO₂ problematiek*. 's Gravenhage: Gezondheidsraad. Published in English as Health Council.
1987. *Carbon Dioxide Problem: Scientific Opinions, and Impacts on Society: Second Advice*. 's Gravenhage: Gezondheidsraad.
- Gutteling, J.M., and J.F. Calje. 1993. De invloed van het milieu in het nieuws: Mondiale risico's en risico's dicht bij huis. *Milieu* 1: 14–19.
- Gutteling, Jan, Mirjam Galetska, and Oene Wiegman. 1995. The Netherlands: Elite newspaper reporting on the acid rain issue from 1972 to 1992. In William C. Clark and Nancy M. Dickson, eds., *The Press and Global Environmental Change: An International Comparison of Elite Newspaper Reporting on the Acid Rain Issue from 1972 to 1992*. CSIA Discussion Paper 95-12, Kennedy School of Government, Harvard University, December.
- Hajer, M.A. 1995. *The Politics of Environmental Discourse, Ecological Modernization, and the Policy Process*. Oxford: Clarendon Press.
- Hekstra, G.P. 1978. Gevolgen voor klimaat en ecosystemen van energieproductie en -gebruik. *Natuur en Milieu*. Stichting Natuur en Milieu, 's Graveland 2(3): 3–16.
- Hordijk, Leendert. 1991. An integrated assessment model for acidification in Europe. Thesis, Amsterdam.
- ICMH/CIM Committee on Research. 1984. Kooldioxide, signalering van een beleidsvraagstuk. VROM/DGM. September.
- Idenburg, P.A., and H.R. Van der Loo. 1993. De staarten van de rattenkoning: Opmerkingen over de vervlechting van wetenschap, politiek en bureaucratie. *Beleidswetenschap* 2: 125–140.
- Kakebeeke, W.J. 1994. Wordt de hemel nog Blauwer: retrospectief van een Nederlandse luchtbeschermer. *Lucht* 2 (June): 48–51.
- Kellogg, William W., and Robert Schware. 1981. *Climate Change and Society: Consequences of Increasing Atmospheric Carbon Dioxide*. Boulder: Westview Press.
- Klok, P.J. 1989. *Convenanten als Instrumenten van Milieubeleid*. Enschede: Faculteit der Bestuurskunde, Universiteit Twente.
- KNMI. 1979. *Flitsen uit het KNMI, 125 jaar flitsen uit het Koninklijk meteorologisch instituut, 1854–1979*. Den Haag: Staatsuitgeverij.
- Krause, F., W. Bach, and J. Koomey. 1989. Energy Policy in the Greenhouse. Volume 1, *From Warming Fate to Warming Limit: Benchmarks for a Global Climate Convention*. El Cerrito, Calif.: International Project for Sustainable Energy Paths.
- Lasom. 1979. *Signalering en Evaluatie van oorzaken en effecten van milieuverandering*. Delft: Lasom.
- Liefferink, J.D. 1995. Environmental policy on the way to Brussels: The issue of acidification between the Netherlands and the European Community. Thesis, Landbouw Universiteit Wageningen.
- A. Lijphart. 1982. *Verzuiling, pacificatie en kentering in de Nederlandse politiek*. Amsterdam: De Bussy.
- Lubach, J., and J. Van Juchem. 1979. Milieueffecten op het gebied van het klimaat. In Lasom, ed., *Signalering en evaluatie van oorzaken en effecten van milieuveranderingen* (appendices to Vervolgrapport, nos. 5 and 6). Delft: Lasom.
- Maandstaat CBS. December 1984. Den Haag: CBS.
- Meadows, D.L. 1972. *Rapport van de Club van Rome*. Utrecht/Antwerpen: Het Spectrum.
- Molina, Mario, and F. Sherwood Rowland. 1974. Stratospheric sink for chlorofluoromethanes: Chlorine atomic catalyzed destruction of ozone. *Nature* 249: 810–812.
- Nelissen, N.J.M. 1994. Het themagericht milieubeleid. In P. Glasbergen, ed., *Milieubeleid, een beleidswetenschappelijke inleiding* (4th ed., pp. 59–77). The Hague: VUGA.
- Netherlands Tweede Kamer. 1972–1973. Urgentienota Milieuhygiene, 11,906, nos. 1–2 (letter and white paper), 3 (questions), 4 (comments), 5 (answers), 7 and 8 (comments).
- . 1974–1975. Energienota, 13, 122, nos. 1–2.
- . 1976–1977. Indicatief Meerjarenprogramma Lucht 1976–1980, 14, 314, nos. 1–2.

- . 1978–1979, 15, 300, XVII, no. 8.
- . 1979–1980, 15, 834, nos. 1–2, SO₂-Beleidskaderplan (Frame for SO₂ Policy).
- . 1979–1980. Nota Energiebeleid, Part 2, Kolennota (Memorandum on Coal), 15, 802 nos. 6–7.
- . 1981–1982, 15, 802, no. 47.
- . 1982–1983, 17, 600, XI, no. 84.
- . 1982–1983. Indicatief Meerjaren Programma Lucht 1981–1982, 17, 600, XVII, no. 7.
- . 1983–1984. Indicatief Meerjaren Programma Lucht 1984–1988, 18, 100, XI, no. 7 (September).
- . 1983–1984. Notitie inzake de problematiek van de verzuring, 18, 225, nos. 1–2 (January).
- . 1984–1985. Indicatief Meerjarenprogramma Milieubeheer 1985–1989, 18, 602, nos. 1–2.
- . 1984–1985. Indicatief Meerjaren Programma Lucht 1985–1989, 18, 605, nos. 1–2 and 63.
- . 1986–1987, 19, 707, no. 13.
- . 1986–1987. Klimaatverandering door CO₂ en andere sporegassen, 20, 047, nos. 1–5.
- . 1986–1987, 19, 948, no. 7.
- . 1987–1988, 20, 047, no. 5.
- . 1988–1989. Nationaal Milieubeleidsplan, 21, 137, nos. 1–2.
- . 1989–1990. Nationaal Milieubeleidsplan plus, 21, 137, no. 20.
- . 1989–1990. Nota Energiebesparing, 21, 570, nos. 1–2.
- . 1990–1991. Nota Klimaatverandering, 22, 232, nos. 1–2.
- . 1991–1992, 22, 497, nos. 1–2 (January).
- . 1993–1994. Nationaal Milieubeleidsplan 2, 23, 560, nos. 1–2.
- Pleune, Ruud. 1997. *Strategies of Dutch Environmental Organizations, Ozone Depletion, Acidification and Climate Change*. Utrecht: International Books.
- Report of the European Conference on Acid Rain*. 1981. Goteborg, May 9–11.
- Rijkooft, P.J. 1975. *Statistische beschouwingen van enkele aspecten van temperatuurreeksen in verband met mogelijke klimaatschommelingen*. De Bilt: KNMI.
- RIVM. 1988. *Zorgen voor Morgen (Concern for Tomorrow)*, Nationale Milieuverkenning 1985–2010. Alphen aan den Rijn: Samson H.D. Tjeenk Willink.
- . 1991. Nationale Milieuverkenning 2 1990–2010. Samson H.D. Tjeenk Willink b.v.: Alphen aan den Rijn.
- Schulte Fishedick, C. 1986. Het additioneel programma verzuringsonderzoek (Dutch Priority Programme on Acidification). In A. Rip, R. Hagendijk, and H. Dits, eds., *Implementatie van Prioriteiten in het Wetenschappelijk Onderzoek Bestudeerd aan de hand van enkele case Studies. Part II, Case Studies* (pp. 104–118). Department of Science Dynamics, University of Amsterdam.
- Schuermans, C.J.E. 1974. Eenvoudige klimaatmodellen en hun toepassing voor de berekening van temperatuurveranderingen als gevolg van het toenemend wereldenergieverbruik, synopsis of a symposium by KNMI. Paper, October 8.
- Stuurgroep Verzuringsonderzoek. 1985. *Additioneel Programma Verzuringsonderzoek*. Den Haag: VROM.
- Tellegen, E., and D.K.J. Tommel. 1984. Milieuactie en milieubeleid. In J.J. Boersema, J.W. Copius Peereboom, and W.T. de Groot, eds., *Basisboek Milieukunde* (pp. 55–74). Boom: Meppel/Amsterdam: Boom.
- Tidal Waters Division. 1992. *Analysis of Vulnerability to the Impacts of Sea Level Rise: A Case Study for the Netherlands*. Report DGW-93.034.
- Van Ast, J.A., and H. Geerlings. 1993. *Milieukunde en Milieubeleid, een Inleiding*. Alphen aan den Rijn: Samson H.D. Tjeenk Willink.
- Van der Heijden, H.A., and M. Hisschemoller. 1983. *Naar een Lange Termijn Milieubeleid*. Final report of a research project on behalf of the Dutch Committee for Long-Term Environmental Policy, Amsterdam.
- Van der Sluijs, Jeroen P., and Josée C.M. Van Eijndhoven. 1998. Closure of disputes in assessments of climate change in the Netherlands. *Environmental Management* 22(4): 597–609.
- Van der Sluijs, Jeroen, Josée Van Eijndhoven, Simon Schacklay, and Brian Wynne. 1998. Anchoring devices in science for policy: The case of consensus around climate sensitivity. *Social Studies of Science* 28: 291–323.
- Van der Straaten, J. 1990. *Zure regen, Economische theorie en het Nederlandse Beleid*. Utrecht: Jan Van Arkel.
- Van Heusden, K.J. 1990. De Ozonlaag, Wat moet je daar nu over zeggen. Een onderzoek naar publicaties over de ozonproblematiek in de media. Internal Document, Chemistry and Society, Utrecht.
- VMD (Vereniging Milieudefensie). 1972. Blauwdruk voor Overleving. *Milieudefensie* 1(1–2) (June–July). Vereniging Milieudefensie, Amsterdam.
- Vonkeman, G.H. 1974. Grondstoffen en Energiedragers, Grenzen in zicht. *Natuur en Milieu* 55–63. Amsterdam.
- . 1977. Alarm voor de spuitbus, Verbod mag niet langer worden uitgesteld. *Natuur en Milieu*. 1(10) (October): 3. Stichting Natuur en Milieu, 's-Graveland.
- Wetenschappelijke Raad voor het Regeringsbeleid. 1978. Klimaatveranderingen, oorzaken en mogelijke consequenties. Paper written on behalf of the Commissie Algemene Toekomstverkenning of the Wetenschappelijke Raad voor het Regeringsbeleid, KNMI, De Bilt, January.
- Wind, H.G. Ed. 1987. *Impact of Sea Level Rise on Society. Report of a project-planning session/Delft 27–29 August 1986*. Rotterdam/Brookfield: Balkema.
- Winsemius, Pieter. 1986. *Gast in eigen Huis, Beschouwingen over Milieumanagement*. Alphen aan den Rijn: Samson H.D. Tjeenk Willink.

