



Adaptation to climate change: national strategy and policy





Adaptation to climate change: national strategy and policy

Original title

Algemene Rekenkamer (2012). *Aanpassing aan klimaatverandering: strategie en beleid*. Tweede Kamer, vergaderjaar 2012-2013, 33 470, nr. 2. ISBN 9789012576277. Den Haag: Sdu.



Inhoud

Part I	Conclusions, recommendations and government response	1
1	About this audit	2
1.1	Background	2
1.2	Context	2
1.2.1	Climate change	2
1.2.2	Response to climate change: mitigation and adaptation	3
1.2.3	Climate policy	3
1.3	Audit question, audit approach and structure of this report	4
2	Conclusions and recommendations	6
2.1	Main conclusion	6
2.2	Secondary conclusions	6
2.2.1	Insight into risks and vulnerabilities	7
2.2.2	Adaptation strategy and policy	8
2.2.3	Coordination, monitoring and evaluation	9
2.2.4	Costs and benefits	10
2.2.5	Climate adaptation in Europe	12
2.3	Recommendations	14
3	Response of the government and the Court of Audit's afterword	15
3.1	Response of the government	15
3.1.1	General	15
3.1.2	Insight into risks and vulnerabilities	15
3.1.3	Coordination, monitoring and evaluation	17
3.1.4	Adaptation costs	17
3.1.5	European policy and policy in neighbouring countries	18
3.2	Court of Audit's afterword	18
Part II	Audit findings	22
1	Introduction	23
1.1	Context	23
1.1.1	Climate change	23
1.1.2	Response to climate change: mitigation and adaptation	25
1.1.3	Climate policy	26



1.2	Previous audits by the Netherlands Court of Audit	28
1.3	Relevant developments	29
1.4	Audit definition	29
1.5	Structure of part II	30
2	Insight into risks and vulnerabilities	32
2.1	Analyses made for the government	32
2.2	Findings of the analyses	35
2.3	Quality and utility of the analyses	36
3	Adaptation strategy and adaptation policy	39
3.1	Spatial Planning and Climate Adaptation Programme (2006-2010)	39
3.1.1	National adaptation strategy	40
3.1.2	National adaptation agenda	41
3.1.3	Termination of the Spatial Planning and Climate Adaptation Programme	42
3.2	Adaptation policy since 2010	44
3.2.1	Actions by the Ministry of I&M	44
3.2.2	Actions by the Ministry of EL&I	45
3.2.3	Actions by the Ministry of VWS	46
3.2.4	Policy coverage of risks and vulnerabilities	47
4	Coordination, monitoring and evaluation of adaptation policy	49
4.1	Coordination of adaptation policy	49
4.1.1	2006-2010	49
4.1.2	2010 to date	50
4.2	Monitoring and evaluation of adaptation policy	52
5	Costs and benefits	53
5.1	Estimated costs and benefits of adaptation actions	53
5.2	Climate adaptation expenditure and budget	56
6	Climate adaptation in Europe	58
6.1	European policy	58
6.2	Policy in other European countries	59
Appendix 1	Abbreviations	62
Appendix 2	Audit methodology	63
Appendix 3	Audit standards	67
	Literature	70



Part I Conclusions, recommendations and government response



1 About this audit

2

The Netherlands Court of Audit audited the policy implemented by successive Dutch governments in recent years to make the Netherlands less vulnerable to climate change.

1.1 Background

The audit was carried out at the request of the Working Group on Environmental Auditing of EUROSAI, the European Organisation of Supreme Audit Institutions. It asked us to take part in a coordinated audit of adaptation to climate change in European countries. As the thematic area matches the Court's audit programme for 2010-2015, we decided to participate in the project. From a national perspective, an audit of adaptation to climate change is relevant owing to the issue's significant social importance and the international agreements to which the Netherlands has committed itself, for example by signing the United Nations Framework Convention on Climate Change (UNFCCC). The theme is also relevant as there is a risk that government expenditure on climate policy may place greater pressure on public finances in the future.¹

1.2 Context

1.2.1 Climate change

It has been known for several decades that the climate on earth is changing. Average temperatures have increased worldwide. The average temperature in the Netherlands has risen by 1.7 degrees Celsius in the past 100 years (CBS, PBL & Wageningen UR, 2012) and is expected to rise even further.

The higher temperature will trigger many changes, such as higher sea levels, the melting of glaciers, higher (and sometimes lower) river levels and more extreme weather (for example more and heavier rainfall in the

¹ See our report, *Risks to public finances, insight and control* (Netherlands Court of Audit, 2012).



winter and more heat waves and drought in the summer). This will have serious consequences for people, plants and animals. The consequences of the higher temperatures will differ from one region to another.

3

1.2.2 Response to climate change: mitigation and adaptation

It goes without saying that the problems caused by climate change have to be addressed. Worldwide, the issue is being addressed by means of mitigation (reducing the problem) and adaptation (anticipating the consequences). Mitigation consists of measures to prevent or limit further climate change. They are directed chiefly at reducing the emission of greenhouse gases, for example by reducing energy consumption and generating renewable energy. Adaptation consists of measures to make nature, society and the economy less vulnerable to climate change. Adaptation measures include strengthening coastal defences, creating more room for rivers, modifying the infrastructure and buildings, connecting natural habitats so that plants and animals can relocate, introducing vaccination programmes to prevent new diseases, providing health advice, for example in heat waves, and breeding crops that grow better in the changing conditions.

If greenhouse gas emissions are not adequately reduced, the temperature on earth will rise further and the need for adaptation will be greater. The adaptation options, however, are limited. Most organisms and ecosystems are poorly equipped to adapt to climate change. Mitigation will therefore remain necessary. In other words, adaptation and mitigation measures reinforce each other and both approaches are necessary.

1.2.3 Climate policy

International agreements

International agreements have been made to address the problems of climate change. The most important one is the 1992 UN Framework Convention on Climate Change (UNFCCC). It lays down that climate change must be limited and the signatories must implement appropriate climate policies. The Netherlands ratified the UNFCCC in 1993. The adaptation agreements in the UNFCCC are not as specific as the mitigation agreements and are not binding. The UN, however, urges the signatories to carry out risk and vulnerability analyses, develop and implement adaptation and climate change plans, monitor their progress and evaluate the measures taken. The UN convention to coordinate the UNFCCC supports the signatories by means of the Nairobi Work Programme. The agreements in the UNFCCC and the recommendations



of the Nairobi Work Programme are not binding but they are accepted as frameworks for adaptation policy.

4

European agreements and European policy

Agreements have also been made in Europe to tackle climate change. They are concerned chiefly with cutting the emission of greenhouse gases: carbon emissions must be 20% lower in 2020 than in 1990. The European Union introduced an adaptation policy in the white paper *Adapting to Climate Change* (European Commission, 2009). A European adaptation strategy is being developed.

National climate policy

Policy in the Netherlands is directed at reducing greenhouse gas emissions in accordance with the agreements made within the EU and the UN. The Netherlands has also introduced policy in recent years to reduce its vulnerability to climate change. A national adaptation strategy was prepared in 2007; its implementation commenced in the same year. As a signatory to the UNFCCC, the Netherlands also supports the climate adaptation actions being taken in developing countries.

In the Netherlands, the main political stakeholders in the field of climate change are the ministers and state secretaries for infrastructure and the environment (I&M), economic affairs, agriculture & innovation (EL&I), health, welfare & sport (VWS) and foreign affairs (BuZa).

1.3 Audit question, audit approach and structure of this report

The key question in this audit was: how has the national climate adaptation policy introduced by the fourth Balkenende government in 2007 been implemented to date? The audit was designed to provide an insight into the organisation and progress of the policy.

Our audit consisted of five parts:

- *Analysis of risks and vulnerabilities*
We investigated whether the political stakeholders had carried out climate change risk and vulnerability analyses; whether the analyses were of satisfactory quality and what the results of the analyses were.
- *Adaptation strategy and policy*
We then looked at the national adaptation strategy and the national adaptation policy. Key questions were: to what extent has the strategy



been put into practice? Are the risks and vulnerabilities specified in the strategy covered by the policy? **5**

- *Coordination, monitoring and evaluation*

We audited the coordination of the respective ministries' climate adaptation policies and whether the policies were monitored and evaluated.

- *Costs and benefits*

We audited the expenditure and budget for adaptation policy and the estimates made of the costs and benefits of climate adaptation.

- *Climate adaptation in Europe*

To put the situation in the Netherlands into perspective, we looked at how other EU member states have developed and implemented national adaptation policies. We also looked at the state of the European adaptation policy introduced by the European Commission.

In chapter 2 of part I, we present our conclusions and recommendations for each of these five parts. The joint response of the ministers and state secretaries for I&M, EL&I, VWS and BuZa and our afterword are presented in chapter 3.

Part II of this report contains the findings underlying our conclusions and recommendations.

Appendix I lists the abbreviations used. Appendix II explains the audit structure and audit methodology. Appendix III explains the audit standards.



2 Conclusions and recommendations

6

2.1 Main conclusion

Successive governments have taken measures to prepare the Netherlands for climate change in recent years but the policy displays little coherence and does not cover all vulnerable areas. There is therefore a risk of the Netherlands being ill prepared for the consequences of climate change. Furthermore, it is highly likely that the cost in many areas will be far higher if action is not taken on a timely basis. The Netherlands might also have difficulty remaining in step with EU policy and the policies of other EU member states.

2.2 Secondary conclusions

Our main conclusion is based on the following five secondary conclusions:

- Successive governments have not had a full understanding yet of the risks presented by climate change in a number of areas. Furthermore, the political stakeholders have to date had scant regard for the relationship and interaction between the risks.
- The 2007 national adaptation strategy has never been worked out into concrete actions with a time path and an allocation of responsibilities in accordance with the former government's undertakings to the House of Representatives. Policy has been developed in several areas that are vulnerable to climate change (as illustrated by the Delta Programme) but it does not cover all risks and vulnerabilities facing the Netherlands.
- Climate adaptation policy as a whole is not coordinated, monitored or evaluated.
- Adaptation to climate change becomes more difficult and more expensive if timely measures are not taken. The adaptation cost to the Netherlands has to date been estimated chiefly with regard to flood safety, spatial development and spatial planning.



- Adaptation to climate change is enjoying greater priority in European policy. Member states, including the Netherlands, will increasingly be urged to take measures and make investments. Some European countries facing similar challenges as the Netherlands are already implementing broad and coherent national adaptation policies.

7

We consider these secondary conclusions in sections 2.2.1 to 2.2.5.

2.2.1 Insight into risks and vulnerabilities

Successive governments have not had a full understanding yet of the risks presented by climate change in a number of areas. Furthermore, the political stakeholders have to date had scant regard for the relationship and interaction between the risks.

Successive governments have had risk and vulnerability analyses carried out to identify weaknesses in the Netherlands' resilience to climate change. New analyses are also being prepared. The impact of climate change in a number of areas has nevertheless not been studied in detail. This is particularly true of the potential impact on health, energy, transport and recreation/tourism. Little is known about how big the impacts will be or how soon they will occur. There is therefore no proper insight into the precise nature of the risks and vulnerabilities in these sectors.

Insight into the *relationship* between the various impacts of climate change is also lacking. The Netherlands has not carried out a national risk and vulnerability analysis of the relationship. A variety of knowledge and research institutions carry out separate analyses of the impact of climate change. However useful these studies might be by themselves, the interaction between the problems (do impacts reinforce each other: what consequences does adaptation action in sector x have for sector y?) is often overlooked. If climate policy is based solely on individual analyses there is a danger of certain risks and vulnerabilities not being covered by policy.

The fact that the Netherlands has not analysed climate risks and vulnerabilities in the round also has the disadvantage that earlier findings are not regularly updated. Research findings must be regularly reviewed precisely because climate change is a long-term process with many uncertainties.



2.2.2 Adaptation strategy and policy

8

The 2007 national adaptation strategy has never been worked out into concrete actions with a time path and an allocation of responsibilities in accordance with the former government's undertakings to the House of Representatives. Policy has been developed in several areas that are vulnerable to climate change (as illustrated by the Delta Programme) but it does not cover all risks and vulnerabilities facing the Netherlands.

National adaptation strategy

The Spatial Planning and Climate Adaptation Programme was launched in 2006. The government of the time developed a national climate adaptation strategy as part of the programme in 2007. The strategy gives priority to spatial adaptation to protect natural habitats, biodiversity and the economy. Under the strategy, non-spatial actions including health measures (such as new vaccination programmes for new diseases) 'will be addressed in other policy pathways'.

Policy implementation

The House of Representatives was informed in 2008 that the adaptation strategy would be worked out into a national adaptation agenda with concrete actions, a time path and an allocation of responsibilities. However, this has never been done. The additional programmes proposed in the strategy for specific sectors (e.g. health) have also not been worked out. Work on the adaptation agenda came to a halt when the Spatial Planning and Climate Adaptation Programme was terminated in 2010.

Although the government stated on several occasions in 2007 and in subsequent years that it preferred an integrated approach to climate adaptation, the Netherlands currently does not have a national programme for all policy fields requiring climate adaptation actions. The climate adaptation strategy was intended to provide long-term guidance but it has not been used for several years.

Some of the actions in the adaptation strategy are being implemented as part of the Delta Programme launched in 2010. The programme is designed to protect the Netherlands from flooding, to secure the supply of fresh water and to climate-proof urban development.

Policy has also been developed for other vulnerable sectors since 2010 but the policy intensity differs significantly from one sector to another. In accordance with the strategy, priority has been given to spatial



adaptation to climate change. The Netherlands has formulated little if any policy to moderate the impact of climate change on nature, energy and transport networks and public health. As noted above, the risks and vulnerabilities in a number of these areas have not been analysed in detail. Policy therefore does not cover all the risks and vulnerabilities identified in the strategy. And as already noted, the relationship between climate problems is uncharted territory. 9

2.2.3 Coordination, monitoring and evaluation

Climate adaptation policy as a whole is not coordinated, monitored or evaluated.

Policy coordination

With the exception of the Delta Programme, national climate adaptation policy is currently not coordinated. A minister has not been designated with responsibility for coordinating climate adaptation policy. The ministers concerned are responsible for policy in their own fields. There is no systematic overview of the actions taken by the individual ministries, the relationship between them or the allocation of tasks and responsibilities.

Some ministries do work together in certain areas (for example in the Delta Programme) but the greater part of policy is developed and implemented separately. There is no interministerial consultation on all sectors requiring adaptation actions. There is some infrequent interministerial consultation on issues relating to climate adaptation. Systematic interministerial consultation is held only to agree the Dutch position in international and EU negotiations of environmental issues.

The lack of coherence and coordination of the various aspects of national climate adaptation policy harbours a number of risks. One, for example, is that actions and measures will overlap or have undesirable side effects in other areas. The construction of ponds and water features in urban areas, for example, might bring welcome relief from heat waves and serve as stores of excessive precipitation. But such apparently smart measures can have undesirable side effects for public health because climate change also brings the risk of more waterborne diseases. Cyanobacteria, for example, flourish in warm standing water. Standing water can also be a breeding ground for insects. Bites from certain exotic insects can spread viruses and infections among people. Lack of coordination can also lead to certain matters being overlooked. Many aspects of climate change overlap ministerial policy fields. The



climate impact on health, for example, is a matter for both the Ministry of VWS and the Ministry of I&M.

10

If policy actions are not coherent, policy as a whole might not be effective. There is a danger that opportunities will be lost. Cross-sectoral measures can reinforce each other and raise climate adaptation policy as a whole to a higher level. Measures to prevent flooding in combination with measures to improve spatial quality, for example, can be beneficial for recreation and tourism. This can already be seen in several flood safety projects.

Policy monitoring and evaluation

The government announced in its 2007 adaptation strategy that it would set up a system to actively monitor and evaluate the adaptation process (House of Representatives, 2007a). The intention, however, has not been put into practice. Our audit found that climate adaptation policy as a whole is currently not monitored or evaluated.

Policy monitoring and evaluation is frustrated by lack of a national climate adaptation programme with targets and actions that can be used to track implementation.

2.2.4 Costs and benefits

Adaptation to climate change becomes more difficult and more expensive if timely measures are not taken. The adaptation cost to the Netherlands has to date been estimated chiefly with regard to flood safety, spatial development and spatial planning.

Benefits of timely policy

Effective climate adaptation decisions cannot be taken without an insight into the costs and benefits. Such an insight helps the government select adaptation options and set priorities. National and international studies of the costs and benefits of climate change to society show that taking timely adaptation actions can save a lot of money. Delays make adaptation to climate change more difficult and more expensive. This can be illustrated by two examples:

- Infrastructure (buildings, roads, railways, energy and sewersystems) lasts for tens of years and are expensive to replace. Adaptation to climate change should therefore be taken into account now (EEA, 2010).



- The spatial development and organisation of urban areas is not very flexible. The high cost of redesigning and redeveloping urban infrastructure can be reduced by systematically anticipating climate change (PBL, 2009).

11

The benefits of timely action to address climate change more than outweigh the cost of inaction, as shown by the influential study *Review on the Economics of Climate Change* by the UK economist N.H. Stern (Stern, 2006). If global measures are not taken in the near future, Stern put the public cost of climate change at at least 5% of global gross domestic product (GDP). In the worst case scenario, it might even be as high as 20% of GDP.

The EU ClimateCost project studied the impact and cost of inaction to climate change (Watkiss, 2011). It found that the social and economic consequences of climate change for the member states could be enormous. Without mitigation, the cost to Europe might be 4-10% of GDP in 2100. Measures could reduce the cost to 0.5-1% of GDP.

ClimateCost also found that the cost of adaptation was relatively low (especially in relation to the potential cost of climate change) and the benefits were relatively high (Watkiss, 2011). National studies have also found that climate adaptation need not be overly expensive provided the policy is integrated into or linked to other policy and is implemented smartly and in good time (PBL, 2011; Sedee & Pijnappels, 2010).

Estimated cost to the Netherlands

Adaptation costs for the Netherlands have to date been estimated chiefly with regard to flood safety, spatial development and spatial planning. In 2008, the Veerman Committee put the average additional annual cost of flood safety at between € 1 and € 1.5 billion (House of Representatives, 2008a).

The Knowledge for Climate research programme is currently carrying out several projects to determine the costs and benefits of adaptation policy. A reliable estimate of the costs cannot be made until the preferred adaptation options are known and the associated measures have been specified.

The ministries generally do not have a good insight into climate adaptation expenditure and budgets. What is clear is that expenditure has been concentrated on research. Climate adaptation expenditure and budgets are difficult to calculate because there is no comprehensive



overview of the government's climate adaptation actions. Furthermore, climate adaptation actions often coincide with other actions, as does, in consequence, their financing. A separate budget and a special fund, the Delta Fund, have been earmarked for the Delta Programme only.

12

2.2.5 Climate adaptation in Europe

Adaptation to climate change is enjoying greater priority in European policy. Member states, including the Netherlands, will increasingly be urged to take measures and make investments. Some European countries facing similar challenges as the Netherlands are already implementing broad and coherent national adaptation policies.

European policy

The European Commission placed climate adaptation high on the EU agenda in 2009 when it issued a white paper on the subject (European Commission, 2009). The white paper presents a framework for the EU and its member states to anticipate the consequences of climate change. Key issues are the development of expertise on the impact and consequences of climate change for the EU, the integration of climate adaptation into various areas of European policy, the creation of a financial and organisational footing to take adaptation actions and to strengthen international cooperation on climate adaptation.

The white paper does not contain legislative proposals and is therefore not binding on the member states. The Commission hopes the member states will take the white paper into consideration when developing their policies.

In 2009 the Dutch government informed the House of Representatives that it found the white paper to be a good basis for effective climate adaptation in Europe (House of Representatives, 2009a). It called for an integrated and broad-based approach to climate adaptation because it affected many policy fields.

The European Commission wants the EU and the member states to give climate adaptation higher policy priority in the years ahead and has announced a European adaptation strategy (European Commission, 2011). The strategy is scheduled for publication in March 2013. It will probably urge all member states to adopt a national adaptation strategy (House of Representatives, 2012). The Commission is seeking to spend a larger proportion of the EU budget on climate adaptation – directly by financing adaptation projects and indirectly by integrating adaptation into the expenditure criteria for other objectives. The Commission wants



Europe to be climate-proof. Climate adaptation targets are expected to be incorporated into European financial instruments and the Multiannual Financial Framework 2014-2020 (House of Representatives, 2012).

13

An EU climate adaptation policy can have consequences for the Netherlands. Formally, the Netherlands already has a national adaptation strategy but as explained in section 2.2.2 it has been only partially translated into concrete measures. Furthermore, it is no longer being implemented. If the Netherlands wishes to make optimal use of the European funding available for climate adaptation, the government will have to prepare a coherent national climate adaptation policy with a clear implementation pathway in the near future.

Policy in other European countries

Five EU member states facing similar challenges as the Netherlands – the United Kingdom, France, Germany, Denmark and Belgium – have formulated their national climate adaptation policies differently from the Netherlands. Their policies cover all sectors vulnerable to climate change. They have all carried out risk and vulnerability analyses, or are doing so, and some coordinate their analyses nationally. The five have also adopted broad-based adaptation strategies and have already or almost worked them out into national adaptation programmes.

A comparison of the approach to climate change in these five countries with that in the Netherlands reveals that the neighbouring countries' preparation and implementation of adaptation policy is highly top-down in nature. The United Kingdom has coordinated policy nationally since the introduction of the Climate Change Act 2008. The Act requires the government to formulate an adaptation programme and analyse the risks of climate change every five years. It also requires the institution of a special government committee to oversee the adaptation programme so that the UK responds effectively to climate change.

A comparison with neighbouring countries also reveals that their adaptation policies are coordinated with the local authorities' policies. The local authorities have accepted each other's strategies and have prepared and implemented regional and local adaptation plans for the years ahead. The Netherlands does not have an overview of the plans prepared and implemented regionally and locally.



2.3 Recommendations

14

We recommend that the government periodically analyse the climate change risks and vulnerabilities in all policy sectors. The relationships between the sectors should not be overlooked. The government should integrate and evaluate the results of such analyses so that comprehensive and government-wide decisions can periodically be taken on the need to revise climate adaptation policy.

We also recommend that the government develop and implement a national climate adaptation programme in the near future. The programme should consist of a coherent package of actions, projects and activities and cover all policy fields requiring adaptation to climate change. All current activities, such as the Delta Programme, could be included in the programme and other policies could be adapted to it.

We further recommend that the government establish effective interministerial cooperation. To this end, the national adaptation programme should be firmly embedded in the public sector. The government should also have the adaptation policy periodically monitored, evaluated and, if necessary, revised.



3 Response of the government and the Court of Audit's afterword

15

We received a response to our draft report from the State Secretary for I&M on 17 October 2012. The state secretary also responded on behalf of his counterpart at EL&I and the Ministers of VWS and BuZa. We have summarised the government's response below. The full text can be read on our website, www.rekenkamer.nl.

3.1 Response of the government

3.1.1 General

The State Secretary for I&M wrote that the government recognised its role in our chronological description: acknowledgement of the climate problem and initial broad-based approach, followed by concentration on the Delta Programme. This conscious decision, according to the state secretary, had led to the selection and assessment of the main challenges facing the Netherlands. Further systematic study would identify deeper risks and opportunities. However, it had not been demonstrated, he wrote, that such study was necessary. The state secretary disagreed that the Netherlands might not remain in step with European policy and developments in other EU member states. He wrote that the Netherlands was actively participating in the European debate of national and EU adaptation strategies.

The state secretary then considered our secondary conclusions and recommendations in more detail.

3.1.2 Insight into risks and vulnerabilities

The state secretary acknowledged that not all climate change risks and vulnerabilities facing the Netherlands had been systematically analysed in all sectors. He agreed with the priorities set by the Netherlands Environmental Assessment Agency (PBL) in its 2009 report (PBL, 2009).



Nevertheless, he thought the Delta Programme covered the most serious risks and vulnerabilities. Our conclusion that not all risks were covered by policy, he observed, did not apply in the themes and sectors covered by the Delta Programme. In response to our recommendation that risks and vulnerabilities should be analysed comprehensively, the state secretary wrote that he would consult the PBL on the need for and utility of more comprehensive analyses.

16

The state secretary agreed with our conclusion that climate change might have health consequences for the Netherlands. He wrote that the government was paying specific attention (in both the Knowledge for Climate programme and the Delta Programme) to the development of urban heat islands during heat waves and the resultant sharp increase in mortality among the over-60s. According to the state secretary, other health effects should be studied at European level in view of their transnational character. He wrote that Europe was working on a system to monitor the spread of vector-borne and water-borne infectious diseases. The relationship between climate change and health, according to the state secretary, may be considered in the European adaptation strategy expected in March 2013.

The Minister of VWS, according to the state secretary, agreed with our conclusion that the Ministry of VWS's policy had concentrated on heat stress and infectious diseases in recent years and had not covered all the health consequences of climate change. The broad spectrum of health consequences in combination with limited capacity made it necessary to set priorities. The National Heat Plan had proven its worth in recent years, according to the minister. It included information on heat risks and risk groups and presented concrete measures to adapt care to climate change. According to the Ministry of VWS, practical experience had shown that there were currently no urgent reasons to update or extend the Heat Plan. The importance of the ministry's measures against vector-borne diseases and zoonoses was clearly explained in our report, according to the state secretary. Owing to their importance and the potential health risks, it had been decided to include measures against infectious diseases in the ministry's regular tasks. They would be implemented partly for climate adaptation purposes. The Ministries of VWS and EL&I were working closely together to address vector-borne infectious diseases and zoonoses, wrote the state secretary. In response to our comment that no long-term policy had been developed for the health consequences, the state secretary wrote that policy indeed had not been developed specifically in response to climate change. The long-term health effects



of climate change were included in the Ministry of VWS's regular policy, according to the state secretary.

17

In response to our finding that the influence of climate change on energy, nature/ biodiversity, transport and recreation/tourism had not been recognised in specific policy measures, the state secretary noted that, where relevant, they would be covered by the Delta Programme and he gave a number of examples of how the effects of climate change on the transport sector were being considered in the policy preparations.

According to the State Secretary for I&M, the Minister and State Secretary for Economic Affairs, Agriculture and Innovation (EL&I) endorsed our analysis of the development of the broad policy field of climate adaptation. It was up to the new government, according to EL&I, to revise policy or not.

3.1.3 Coordination, monitoring and evaluation

In response to our conclusion that climate adaptation policy as a whole was not coordinated, monitored or evaluated, the state secretary wrote that this was not so in the case of the Delta Programme. He also referred to a number of climate-related reports that had been issued. Systematic evaluation of the relatively young policy field of climate change, according to the state secretary, was still in its infancy throughout Europe. The indicators that should be used to monitor and evaluate climate adaptation were already being discussed and the European Environment Agency in Copenhagen was working on a list of indicators that might be presented at the same time as the European adaptation strategy in March 2013. Whether the government's climate adaptation policy should be widened from its current focus on the Delta Programme depended, according to the state secretary, on the outcome of further study and future agreements in Europe.

3.1.4 Adaptation costs

The state secretary agreed with our conclusion that the cost of climate adaptation to the Netherlands had to date been chiefly estimated in respect of flood safety, spatial development and spatial planning. He agreed that the cost could not be properly estimated until it was known what adaptation options would be selected. The costs could then be weighed against future costs and risks, as was being done in the Delta Programme, according to the state secretary.



3.1.5 European policy and policy in neighbouring countries

18

The state secretary did not agree with our fear that the Netherlands might not remain in step with European developments and climate adaptation policy in other EU member states. He noted that the European Commission and many EU member states, including neighbouring countries, thought the Netherlands was at an advanced stage in its strategic and practical approach to climate adaptation. In view of the specific vulnerabilities facing the Netherlands owing to its location on a river delta, he observed, it was generally understood why the Netherlands had prioritised the Delta Programme. According to the state secretary this was in keeping with the general consensus that climate adaptation had to be tailored to specific situations. Countries used their own discretion to address the risks and impacts that were most important to them. He wrote that the concept of the Delta Programme fitted seamlessly into this line of thought. The state secretary gave a number of examples to show how the Netherlands was closely involved in the development of knowledge in Europe.

According to the state secretary, it was a misunderstanding that all the neighbouring countries we referred to had prepared comprehensive national climate adaptation strategies and had worked them out into national adaptation programmes or had nearly done so. Germany, he wrote, still needed to debate the issue and take decisions on, for example, applicable indicators. And the United Kingdom would not issue a national adaptation plan until 2013. Against this background, the state secretary thought the Netherlands was certainly not lagging behind European decision-making or developments in neighbouring countries. Our assumption that the Netherlands would have to formulate a coherent national climate adaptation policy in the near future, including a clear implementation pathway, in order to make optimal use of European funding for climate adaptation, he observed, was also based on a misunderstanding. The conditionality we suggested – the need to have a coherent national adaptation policy – according to the state secretary, did not exist.

3.2 Court of Audit's afterword

We are pleased the government agrees with our analysis and most of our conclusions. The government, however, will not carry out our recommendations. It prefers to wait for further studies and future



European agreements and states that policy revision is a matter for the new government.

19

We hope the government's undertaking to consult the PBL will result in a comprehensive analysis of the climate change risks and vulnerabilities facing the Netherlands. A comprehensive, government-wide decision can then be taken on the utility and need to revise climate adaptation policy. Such a decision is necessary to reduce the risk of the Netherlands being ill prepared for the consequences of climate change.

As shown in our report, we recognise that the Delta Programme addresses a considerable proportion of the climate change risks and vulnerabilities. We hope the new government will also consider risks and vulnerabilities in areas that are barely if at all covered by adaptation policy. We also hope the new government will consider the relationship between the various parts of the national climate adaptation policy. Since climate adaptation is a complex policy issue that cuts across national boundaries, tiers of government and policy sectors, we believe an integrated and coordinated national approach is essential.

We agree with the government that the Netherlands is currently in step with climate adaptation policy in the EU and in other EU member states. We refer in our report only to the risk that the Netherlands might have difficulty remaining in step if measures are delayed in many areas. We are pleased the response to our report shows that the government is taking measures to remain in step with policy in the EU and other European countries.



Main conclusions, recommendations and undertakings

Section in part I	Conclusion	Recommendation	Undertaking
Main conclusion			
2.1	Successive governments have taken measures to prepare the Netherlands for climate change in recent years but the policy displays little coherence and does not cover all vulnerable areas. There is therefore a risk of the Netherlands being ill prepared for the consequences of climate change. Furthermore, it is highly likely that the cost in many areas will be far higher if action is not taken on a timely basis. The Netherlands might also have difficulty remaining in step with EU policy and the policies of other EU member states.		
Secondary conclusions			
2.2.1	Successive governments have not had a full understanding yet of the risks presented by climate change in a number of areas. Furthermore, the political actors have to date had scant regard for the relationship and interaction between the risks.	Map out risks and vulnerabilities in all policy sectors, including the relationships between the sectors. Integrate and evaluate the results so that a comprehensive and government-wide decision can be made on the need to revise climate adaptation policy.	State secretary of I&M will consult the PBL on the need for and utility of more comprehensive analyses.
2.2.2	The 2007 national adaptation strategy has never been worked out into concrete actions with a time path and an allocation of responsibilities. Policy has been developed but it does not cover all risks and vulnerabilities facing the Netherlands.	Develop and implement a national adaptation programme that covers all policy sectors requiring adaptation to climate change.	No undertaking given. Whether the government's climate adaptation policy should be widened depends, according to the state secretary of I&M, on the outcome of further study and future agreements in Europe.



Section in	Conclusion	Recommendation	Undertaking
part I			
2.2.3	Climate adaptation policy as a whole is not coordinated, monitored or evaluated.	Establish effective interministerial cooperation. To this end, the national adaptation programme should be firmly embedded in the public sector. The adaptation policy should be periodically monitored, evaluated and, if necessary, revised.	No undertaking given. State secretary of I&M indicates that the indicators that should be used to monitor and evaluate climate adaptation were already being discussed and the European Environment Agency was working on a list of indicators that might be presented at the same time as the European adaptation strategy.
2.2.4	Adaptation to climate change becomes more difficult and more expensive if timely measures are not taken. The adaptation cost to the Netherlands has to date been estimated chiefly with regard to flood safety, spatial development and spatial planning.		
2.2.5	Adaptation to climate change is enjoying greater priority in European policy. Member states will increasingly be urged to take measures and make investments. Some European countries facing similar challenges as the Netherlands are already implementing broad and coherent national adaptation policies.		



Part II Audit findings



1 Introduction

Part I of this report presented our conclusions and recommendations regarding national policy to adapt the Netherlands to climate change. Part II presents the audit findings underpinning the conclusion and recommendations. We first provide introductory information on climate change, its potential consequences and ways to prevent or limit them. We also discuss previous audits conducted by the Netherlands Court of Audit and relevant developments in the field.

1.1 Context

1.1.1 Climate change

The climate on earth is changing.² Average temperatures worldwide have risen by 0.8 degrees Celsius since the industrial revolution (EEA, 2010). The average temperature in the Netherlands has risen by 1.7 degrees Celsius in the past 100 years (CBS, PBL & Wageningen UR, 2012).

There is a consensus on the direction in which the climate is changing. The pace of climate change and the ramifications of the changes, however, are uncertain. The potential effects have been mapped out in scenario studies. The United Nations Intergovernmental Panel on Climate Change (IPCC³) expects the average global temperature to increase by between 1.8 and 4.0 degrees Celsius by the year 2100 relative to 1990 (IPCC, 2007). The increase in Europe may be as high as 5.5 degrees Celsius (IPCC, 2007; EEA, 2008).

The greater part of observable global warming in the past 50 years is very probably due to the increase in greenhouse gases such as carbon dioxide, methane and nitrous oxide emitted by human activity (Van Hove, 2007; CBS, PBL & Wageningen UR, 2009). The temperature on earth is

² 'Climate change': every structural change in the climate that is attributable to natural variation or human activity (Van Hove, 2007).

³ The IPCC is an intergovernmental organisation of the United Nations that provides policymakers with the available, objective scientific, technical and socioeconomic information on climate change. It also analyses the consequences of climate change for the environment and society.



determined largely by the presence of greenhouse gases in the atmosphere trapping heat re-radiated from the earth. The increase in temperature by 2100 will depend on the volume of greenhouse gases emitted and on the precise reaction brought about by increased concentrations of greenhouse gases. Nothing can be said with certainty at present.

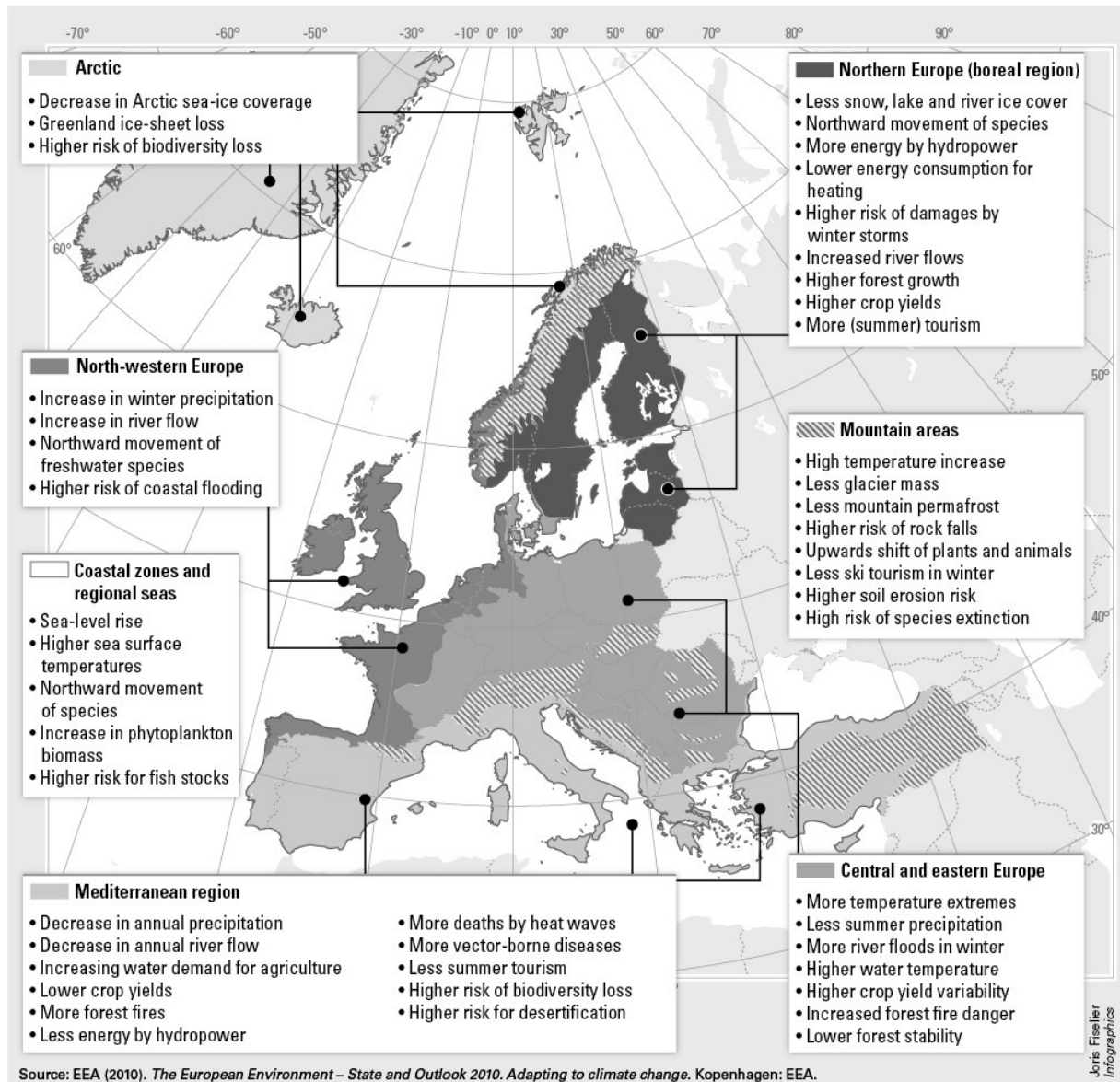
24

Global warming will entail many changes, such as an increase in sea levels, the melting of glaciers, higher or even lower river levels and more extreme weather (for example more and heavier precipitation in the winter and more heat waves and drought in the summer). Certain events that can already be observed might be the consequence of climate change. One is the melting of the sea ice at the North Pole.

Global warming will have serious consequences for people, plants and animals. The actual impact will differ from one area to another. Figure 1 shows the consequences for various areas in Europe.



Figure 1 Key past and projected impacts of climate change and effects on sectors for the main bio-geographical regions of Europe



Climate change is generally considered one of the greatest and most complex challenges facing the world today. It is a global, long-term problem whose effects are not directly visible or observable but emerge gradually and are shrouded in uncertainty.

1.1.2 Response to climate change: mitigation and adaptation

It is clear that action must be taken to address climate change. Worldwide, the problem is being addressed by means of mitigation (reducing the problem) and adaptation (anticipating the consequences).



Mitigation consists of actions to prevent or limit further climate change. The actions are directed chiefly at reducing the emission of greenhouse gases, in part by consuming less energy and generating renewable energy.

26

Adaptation consists of actions to make nature, society and the economy less vulnerable to climate change. Such actions include strengthening coastal defences, creating more room for rivers, adapting infrastructure and buildings, connecting natural habitats so that plant and animal species can relocate, using vaccination programmes to prevent new diseases, providing public health information (for example during heat waves) and breeding crops that grow better in the changed circumstances.

If the emission of greenhouse gases is not adequately reduced, the temperature on earth will rise further and the need for adaptation will be greater. Adaptation options, however, are limited. Most organisms and the ecosystem are poorly equipped to adapt to climate change. Mitigation will therefore remain necessary. In other words, adaptation and mitigation are complementary and both approaches are necessary.

An average temperature increase of 2 degrees Celsius is generally accepted as the critical limit (EEA, 2010). If the increase is greater, global warming might become uncontrollable.

Adaptation actions can sometimes have negative side effects that aggravate the climate problem. To give one example, drought in southern Europe means salt water increasingly has to be converted into fresh water. The high-energy conversion process emits additional CO₂. In this case, adaptation and mitigation undermine each other.

The probability of climate-related problems actually occurring is highest in poorer regions, which lack the resources and opportunities to take far-reaching spatial planning, medical care and social behaviour adaptation actions.

1.1.3 Climate policy

International agreements

International agreements have been made to address the problems caused by climate change. The most important one is the UN Framework Convention on Climate Change (UNFCCC) of 1992. It requires countries to implement policies to mitigate climate change. Industrialised countries



and developing countries have common but different mitigation responsibilities. The industrialised countries must take steps to reduce their greenhouse gas emissions and help developing countries meet their commitments. The Netherlands ratified the UNFCCC in 1993. It must periodically report to the UN coordinating convention on the state of its national climate policy. Its reports are reviewed by the UN Climate Convention.

27

The UNFCCC also comprises adaptation agreements. They are more limited in scope and less specific than the mitigation agreements. They are also not binding. The UNFCCC helps the signatories take adaptation actions by means of the Nairobi Work Programme, which was set up in 2006. The agreements in the UNFCCC and the recommendations of the Nairobi Work Programme are not binding but they are looked upon as frameworks for adaptation.

The United Nations' four essential adaptation components

The Nairobi Work Programme of the UNFCCC identifies four essential components in the adaptation process: assessment, planning, implementation, and monitoring and evaluation. The UNFCCC recommends that countries carry out continuous risk and vulnerability analyses, plan their adaptation to climate change, implement those plans, monitor their progress and evaluate the actions taken. The UNFCCC recommends that new insights should continuously be incorporated into policy (source: UNFCCC, 2011a).

Further to the UNFCCC, the industrialised nations signed the Kyoto Protocol in 1997. The protocol (treaty) is concerned specifically with reducing greenhouse gas emissions. The Netherlands undertook to reduce its emission by 6% by 2012 relative to 1990.

European agreements and European policy

Climate change agreements have also been made in Europe. They are concerned chiefly with cutting greenhouse gases. The European ambition is to limit the increase in the global average temperature to 2 degrees Celsius relative to the pre-industrial age (EEA, 2010). The EU introduced adaptation policy in the *Adapting to Climate Change* white paper (European Commission, 2009). A European adaptation strategy is being developed. We consider European policy further in chapter 6.

National climate policy

In accordance with the EU and UN agreements, the Netherlands has a policy to reduce greenhouse gas emissions. It has also introduced policy



in recent years to reduce its vulnerability to climate change. In 2007, for example, a national adaptation strategy was prepared and its implementation set in motion.

28

The main government actors are currently the ministers and state secretaries at the Ministry of Infrastructure and the Environment (I&M), the Ministry of Economic Affairs, Agriculture and Innovation (EL&I), the Ministry of Health, Welfare and Sport (VWS) and the Ministry of Foreign Affairs (BuZa).

In accordance with the UNFCCC, the Netherlands supports adaptation in developing countries. We consider the national climate adaptation policy further in chapter 3.

1.2 Previous audits by the Netherlands Court of Audit

The Netherlands Court of Audit has published several audits of measures taken to mitigate climate change in recent years:

- European CO₂ emissions trading system and its implementation in the Netherlands (November 2007).
- European CO₂ emissions trading system and its implementation in the Netherlands, Impact Assessment 2009 (October 2009).
- Sustainable energy production schemes (MEP and SDE); Impact Assessment 2010 (March 2010).
- Energy saving: ambitions and results (October 2011).

We have also published audits that touch upon both the mitigation of and adaptation to climate change:

- Cost of the weak links in the coastal defence programme (November 2009).
- The environmental impact of road transport (March 2009).

A recent audit briefly considered the growing potential impact on public finances of expenditure on climate policy:

- Risks to public finances; insight and control (June 2012).

Supreme audit institutions in other countries have also audited climate change. INTOSAI, the International Organisation of Supreme Audit Institutions, published the findings of a joint audit of climate change in November 2010 (INTOSAI, 2010a). The audit was carried out by the supreme audit institutions of 14 countries: Australia, Austria, Brazil,



Canada, Estonia, Finland, Greece, Indonesia, Norway, Poland, Slovenia, South Africa, the United Kingdom and the United States.

29

1.3 Relevant developments

The Netherlands Environmental Assessment Agency (PBL) published a report entitled *Effects of climate change in the Netherlands 2012* in July 2012. The report is an update of *The effects of climate change in the Netherlands* that the precursor of the PBL (the MNP, also known in English as the Netherlands Environmental Assessment Agency) had issued in 2005. The PBL concluded that climate change and its effects were expected to continue in the centuries ahead. The effects on the Netherlands would remain controllable at the current rate of change, according to the PBL (PBL, 2012).

More climate adaptation studies and publications will be issued in the coming period:

- The Platform Communication on Climate Change (PCCC) has announced that the next State of the Climate will look at the relationship between research themes, operational projects and the development of climate adaptation policy in the Netherlands (van Dorland, 2011).
- The IPCC will issue its fifth assessment report in 2013. The Royal Netherlands Meteorological Institute (KNMI) will subsequently issue a new generation of climate scenarios in 2013.

The House of Representatives commissioned a study in December 2011 to strengthen its understanding of the costs and effects of climate and energy measures. Publication is planned for March 2013. The study will not consider climate adaptation actions.

1.4 Audit definition

This audit is part of a joint audit project on climate adaptation conducted by a number of European supreme audit institutions.⁴ It was an initiative of the Working Group on Environmental Auditing of EUROSAI, the European Organisation of Supreme Audit Institutions

⁴ As well as the Netherlands Court of Audit and the European Court of Auditors, the SAIs of the following countries are participating in the project: Austria, Bulgaria, Cyprus, Malta, Norway, Russia and Ukraine. See appendix 2.



Our national audit was based on the audit questions set for the joint audit. They audit questions were grouped into five areas of climate adaptation policy:

30

1. risk and vulnerability analyses;
2. national adaptation strategy;
3. coordination of adaptation policy;
4. implementation of policy;
5. results and impact of policy.

As the implementation, results and impact of adaptation policy in the Netherlands cannot yet be audited properly, we concentrated on the first three areas in the period 2005 to mid-2012. We further considered two areas we thought were of specific relevance to the Netherlands: the financial aspects of national adaptation policy (expenditure, budget, costs and benefits) and the status of adaptation policy in a number of neighbouring countries and in the EU.

A more detailed description of the audit methodology is presented in appendix 2.

1.5 Structure of part II

We present our audit findings in the following chapters of part II.

Chapter 2 discusses the analyses made in recent years on behalf of the political actors in successive governments. The analyses look at the climate change risks and vulnerabilities facing the Netherlands. We identify the sectors for which such analyses have been made (or have not been made), their outcomes and their quality and utility.

In chapter 3 we describe the background to the Dutch climate adaptation strategy and its implementation to date.

Chapter 4 considers the ministries' coordination of climate adaptation policy and how the policy is monitored and evaluated.

Chapter 5 considers the financial aspects of climate adaptation policy. We look at the estimated cost of climate change as calculated in national and international studies, and the costs and benefits of adaptation. We also established whether the relevant ministries have an insight into government expenditure and the budget for climate adaptation.



To put the situation in the Netherlands into perspective, chapter 6 looks at how a number of neighbouring countries have formulated their national adaptation policies and at their current status. We also look at the state of the EU adaptation policy being prepared by the European Commission.



2 Insight into risks and vulnerabilities

32

Insight into the Netherlands' exposure to climate change risks and vulnerabilities is a prerequisite for an effective adaptation policy. Before it can take effective measures, the government must know where the country needs protection. Comprehensive risk and vulnerability analyses can identify and assess the risks of climate change.⁵ Targeted adaptation measures can then be prepared or revised.

Estimating climate change risks is difficult because climate change is shrouded in uncertainty. In view of the long-term nature of the process, and thus of the adaptation to it, risk analysis must be a continuous, ongoing process that is periodically updated. It should also consider the overlaps between policy sectors. Otherwise, there is a danger of certain risks and vulnerabilities not being covered by policy.

We identified the policy sectors in which the government had analysed the national climate change risks and vulnerabilities. We looked at the results of these risk and vulnerability analyses and assessed their quality and utility.

2.1 Analyses made for the government

A large number of climate change risk and vulnerability analyses have been carried out for the government since 2005. The main ones are summarised in table 1.⁶

⁵ Risk and vulnerability analyses identify threats and calculate their probability in order to work out the potential costs should the risk occur so that targeted adaptation measures can be prepared or revised.

⁶ Earlier analyses have been made of climate change in the Netherlands, e.g. in the National Air Pollution and Climate Change Research Programme I (1989-1995) and II (1995-2001).



Table 1 Main risk and vulnerability analyses made for the government since 2005*			
Year	Title	Author	Policy sectors
2005	The effects of climate change in the Netherlands	Netherlands Environmental Assessment Agency (MNP)	All sectors
2006	Towards a climate-proof Netherlands – Roadmap summary:** a study of the impact of climate change	Climate for Spatial Planning research programme, Life with water, Habiforum	All sectors (focus on spatial planning)
2007	The Netherlands later; two sustainability surveys	Netherlands Environmental Assessment Agency (PBL)	All sectors (focus on spatial planning)
2008	The Netherlands in view; water and spatial development in the Netherlands: the diagnosis	Rijkswaterstaat Centre for Water Management, Deltares, H+N+S landscape architects	Water, spatial development
2008	Impact of climate change on transport; policy implications	Netherlands Institute for Transport Policy Analysis (KIM)	Transport
2008	Working together, living together; Delta Committee findings 2008	Veerman Committee	Water
2008	Global environmental change and public health: state of the art	RIVM	Health, environment
2009	White swans, black swans, report on proactive adaptation to climate change	Council for Transport, Public Works and Water Management	Infrastructure
2009	Pathways to a climate-proof Netherlands	Netherlands Environmental Assessment Agency (PBL)	Spatial planning
2009	Impact of climate change on Dutch agriculture	Knowledge for Climate research programme	Agriculture
2010	Emerging zoonoses;*** Early warning and surveillance in the Netherlands	RIVM	Agriculture, health
2011	Consequences of climate extremes for Dutch agriculture	Wageningen University and Research Centre-Alterra	Agriculture
2011	Climate change impacts on inland transport systems	Climate for Spatial Planning research programme	Transport (focus on inland shipping and commuting)
2011	Climate change and habitat fragmentation; impacts and adaptation strategies	Climate for Spatial Planning research programme	Nature
2011	Knowledge montage: Heat and climate in the city	Climate for Spatial Planning research programme	Spatial planning
2011	A fresh look at warm water, the influence of climate change on aquatic ecology and how to combat the negative consequences	STOWA (in collaboration with the Knowledge for Climate planning research programme, WUR)	Water
2011	A changing delta	PBL (in collaboration with the Knowledge for Climate and Climate for Spatial Planning research programmes and Deltares)	Water, agriculture, urban areas



Year	Title	Author	Policy sectors
2012	Effects of climate change in the Netherlands 2012	PBL (in collaboration with KNMI, Deltares, WUR, RIVM)	Water, nature, agriculture, urban areas, public health

* We have interpreted 'analysis' widely and also included reports that consider risks and vulnerabilities. The table makes no attempt to be exhaustive but presents only the most important analyses.

** 'Roadmap project': this project is the 'research pathway' of the Spatial Planning and Climate Adaptation Programme (see chapter 3, section 3.1).

*** Zoonoses are diseases transmitted to humans from animals (see chapter 3, section 3.2.3).

The analysis carried out by the Netherlands Environmental Assessment Agency (MNP) in 2005, *The effects of climate change in the Netherlands*, was the first to present a broad overview of the policy sectors in the Netherlands that will be affected most by climate change: water, nature, agriculture, health, transport, energy and recreation/tourism. When the report was published, there was little understanding of the consequences of climate change for the Netherlands. The analysis was comprehensive and was intended as a step towards more in-depth analyses of each sector. The MNP recommended that attention be devoted to spatial planning, with river basins being seen as the most urgent areas.

Following the publication of the MNP report, more in-depth analyses were made of the consequences of climate change in specific policy sectors, especially the water sector. In general, the analyses highlighted the spatial consequences of climate change. We found no in-depth risk and vulnerability analyses of the energy and recreation/tourism sectors.⁷ The transport and health sectors were analysed to a limited extent. Several exploratory analyses of the health sector concluded that further study was required of the impact of climate change on public health (Huynen, 2008; Health Council of the Netherlands, 2009; Schram-Bijkerk, 2010).

New analyses are currently being prepared. As part of the Knowledge for Climate research programme launched in 2007, risk and vulnerability analyses are being prepared for specific hotspots in the Netherlands.⁸ Analyses are also being prepared for the Delta Programme (see chapter 3, section 3.2.1).

The government can also use international studies such as those carried out by the European Environment Agency to gain an understanding of the climate change risks and vulnerabilities.

⁷ A policy preparation report on the consequences of climate change in the recreation/tourism sector was prepared for the Ministry of Economic Affairs (de Jonge, 2008).

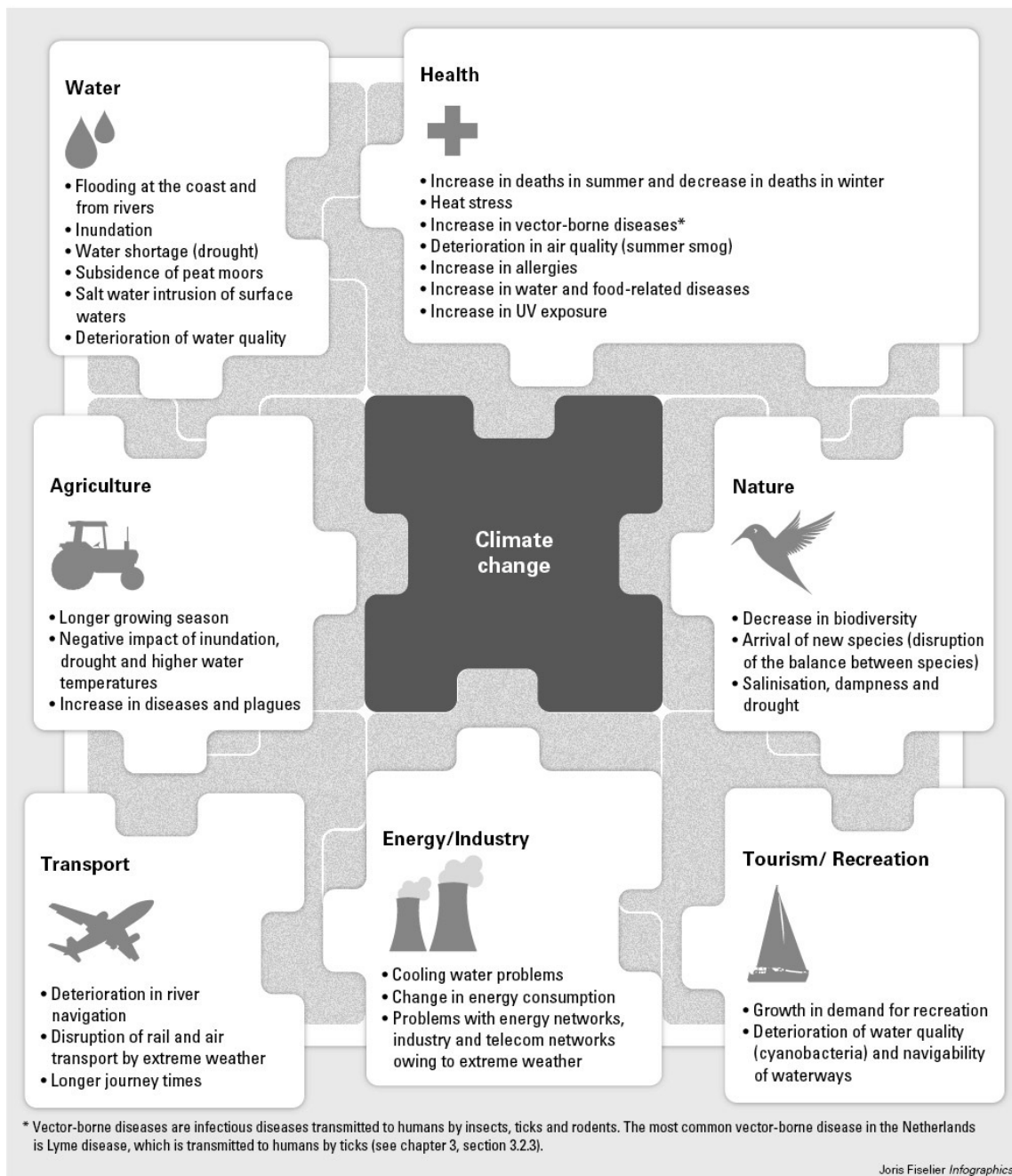
⁸ 'Hotspots' are specific locations in the Netherlands that are vulnerable to the consequences of climate change, such as Schiphol Airport, The Hague region, dry rural areas and the Wadden Sea.



2.2 Findings of the analyses

The risk and vulnerability analyses listed in table 1 reveal the diverse effects that climate change can have on the Netherlands. The most important effects are shown in figure 2 (main sources: MNP, 2005; van Drunen, 2006; PBL, 2012).

Figure 2 Potential effects of climate change in the Netherlands, by policy sector





As shown in figure 2, climate change will have positive as well as negative effects. The higher temperature may increase the Netherlands popularity as a tourist destination (longer summer season and more pleasant springs and autumns). Higher temperatures can also create new opportunities for agriculture if new crops can be grown.

36

2.3 Quality and utility of the analyses

We assessed the quality and utility of the risk and vulnerability analyses carried out for the Dutch government. An important aspect of their quality and utility is how often the analyses are updated and revised in response to new insights and research findings.

Quality assurance

The analyses listed in table 1 were carried out by well-respected institutions that relied in turn on information from such institutions as the Royal Netherlands Meteorological Institution (e.g. for climate scenarios). Internal and external reviews usually form part of the quality assurance at such institutions.

The analyses prepared in the period 2006-2007 were of satisfactory quality and utility, and were in any event sufficient to support the development of national adaptation strategy.

High priority for the water sector

We found that many analyses had been made since 2005 of the climate risks to the water sector. One of the most important analyses was presented in the report issued by the Veerman Committee in 2008 to protect the Netherlands from flooding in the next 100 years. The government established the Delta Programme in response to this report (see chapter 3, section 3.1.3).

Still gaps in knowledge, especially about health effects

The Netherlands has not yet analysed some effects of climate change in detail. Little research has been carried out of the seriousness and extent of the health effects of climate change. According to virtually all the staff interviewed at the ministries and experts at knowledge institutions, the health effects of climate change deserve more attention. Others have noted that the health effects of climate change are not yet high on the policy agenda because there is uncertainty about their seriousness (Schram-Bijkerk, 2010).



In late 2009/early 2010 the then Ministries of VROM, VWS, LNV, V&W and OCW held talks on developing an interministerial research programme to study the health effects of climate change. The programme would form the basis for effective climate adaptation policy in the field of health. The programme, however, never saw the light of day.

37

In its *Adapting to climate change* white paper (see chapter 1 and chapter 6), the European Commission called for more attention to be paid to the health effects of climate change (European Commission, 2009). The PBL has also called for further research into the effects on health and on recreation and tourism in order to fill in the knowledge gaps in this area (PBL, 2012).

Few cross-sectoral studies

Most of the analyses carried out since 2005 are sector or thematic rather than cross-sectoral. There has therefore been little consideration of the relationships between sectors. The MNP's 2005 study and the 2006 Roadmap studies (see table 1) consider the relationship between and within certain policy sectors. Cross-sectoral studies are important because the policy measures in one sector can conflict with those in another.

An example of an adaptation action that can have undesirable side effects is the use of ponds and water features to cool urban areas and store excessive rainfall. They might represent a health risk, however, owing to the greater risk of water-borne diseases, such as cyanobacteria infections.⁹ Standing water can also be a breeding ground for insects. Bites by certain exotic insects can transmit infectious diseases such as dengue fever and the West Nile virus to humans. Exotic mosquitoes such as the tiger mosquito are currently very rare in the Netherlands but might become more common if climate change makes the country more habitable for them. The Netherlands is already vulnerable to diseases spread by vectors (such as mosquitoes, ticks and rodents) on account of the population density, the many transport movements and exports. The same is true of diseases transmitted by animals to humans such as Q fever and avian influenza.

The Netherlands Environmental Assessment Agency (PBL) highlighted the close relationship between policy sectors in 2009. It stressed the importance of aligning adaptation actions to the objectives of other policy areas such as nature, agriculture, urban development, transport and sustainability (PBL, 2009).

⁹ Cyanobacteria are small organisms that flourish in warm standing water.



No periodic updates

38

We found that the Netherlands does not prepare or periodically update a national analysis of the impact of climate change but works with separate analyses made by individual research institutions. The government has not taken measures to periodically update existing risk and vulnerability analyses in response to new insights. In July 2012, the PBL released an updated study for the Ministry of I&M of the Effects of climate change analysis originally issued by the MNP. In general, though, the parties concerned make new analyses rather than update existing ones.



3 Adaptation strategy and adaptation policy

The UN Framework Convention on Climate Change maintains that adaptation to climate change requires a systematic, national approach (UNFCCC, 2011a). After the risks and vulnerabilities have been identified a decision must be taken on where action is needed: what is most urgent and what has priority? Adaptation actions must be put forward and compared with each other. The UN advises countries to set out adaptation actions in an adaptation plan (e.g. a strategy). By signing the UNFCCC, the Netherlands undertook to develop such a plan.

This chapter considers the preparation of the Netherlands' climate adaptation strategy and its quality and implementation to date: what is the status of the actions announced in the strategy?

3.1 Spatial Planning and Climate Adaptation Programme (2006-2010)

The Netherlands prepared a national adaptation strategy in 2007 (House of Representatives, 2007a). It was the first policy product of the Spatial Planning and Climate Adaptation Programme. This programme was prompted chiefly by the Lemstra motion of March 2005 (Senate, 2005a). In the motion, the Senate proposed that the government take greater account of climate change in its investment decisions and formulate a long-term vision of future developments in the Netherlands. The motion also stated that strategic memorandums on spatial planning, transport, energy and rural policy had so far adopted a short time horizon and spatial investments did not fully recognise the significances of the consequences of climate change, such as higher sea levels and river discharges. The Minister of VROM stated in November 2005 that she would implement the motion by setting up the Spatial Planning and Climate Adaptation Programme (House of Representatives, 2005b).

The Spatial Planning and Climate Adaptation Programme comprised the development of:



- a national adaptation strategy;
- a national adaptation agenda;
- a 'research pathway', the Roadmap.

40

The Roadmap (see chapter 2 of this report) included a baseline measurement of the Netherlands' climate resilience and a study of the available knowledge. The Knowledge for Climate research programme was also launched in 2007.

The former Ministries of Housing, Spatial Planning, and the Environment (VROM), Transport, Public Works and Water Management (V&W), Agriculture, Nature and Food Quality (LNV) and Economic Affairs (EZ) were represented in the Spatial Planning and Climate Adaptation Programme, as were the umbrella organisations for the municipalities, provinces and water authorities (the Association of Netherlands Municipalities, the Association of Provincial Authorities and the Association of Regional Water Authorities). In practice, the Ministry of VROM (Directorate-General for Spatial Planning) headed the programme.

3.1.1 National adaptation strategy

The national adaptation strategy, *Make space for climate!*, was issued in 2007 (House of Representatives, 2007a). It outlines the main points of the approach necessary to climate-proof the Netherlands. Parliament completed its debate of the strategy in 2008 (House of Representatives, 2008c).

We assessed the quality of the national adaptation strategy against the criteria formulated by INTOSAI¹⁰ (INTOSAI, 2010b). An adaptation plan or strategy must be consistent with, for example, the risks and vulnerabilities identified and must cover all policy sectors that will be affected by climate change. The strategy must also name and prioritise the measures (preferably in SMART¹¹ terms), and state the cost of the measures and the allocation of responsibilities to ministries and other stakeholders.

The national adaptation strategy largely satisfies these criteria. The strategy was prepared using the risk and vulnerability analyses available at the time: those made by the MNP and those made for the Roadmap. It gives priority to *spatial* adaptation and is consistent with the conclusion drawn by the MNP in 2005 on the most urgent risks (MNP, 2005). It also

¹⁰ INTOSAI: International Organisation of Supreme Audit Institutions.

¹¹ SMART: specific, measurable, agreed, realistic and time-bound.



explains how the KNMI's scenarios should be taken into account in spatial decisions and how uncertainties could be dealt with. The strategy looks forward one hundred years. This is the same time horizon as that used by the KNMI and the IPCC in their climate scenarios.

41

The strategy names all sectors in which climate change adaptation is necessary in the Netherlands. It also stresses the need for an integrated and cross-sectoral approach owing to the nature of the subject (House of Representatives, 2007a). The strategy focuses on spatial adaptation to climate change. The main social issues requiring spatial adaptation are safety, the environment, biodiversity and the economy. The strategy states that non-spatial measures, such as health actions (e.g. new vaccination programmes for new diseases) are no less important than spatial measures but will be addressed 'in other policy pathways'. A time horizon can also be derived from the strategy, albeit a limited one. The strategy announced that the national adaptation agenda would be issued in 2008, with the aim of making climate adaptation 'an integral part of policy by 2015' (House of Representatives, 2007a).

The strategy does not satisfy a number of quality criteria. The objectives, for example, are not formulated in SMART terms. Its main objective is described as 'to climate-proof spatial planning in the Netherlands'. Furthermore, the strategy does not name concrete, measurable measures. It does no more than mention a number of activities that will take place in the near future. Our audit found that a deliberate decision had been taken not to include concrete objectives, measures and a time path in the strategy as they had not been thought feasible or opportune. An appendix lists potential adaptation measures in the fields of water and spatial planning. Furthermore, the strategy does not consider the allocation of tasks and responsibilities to ministries and other stakeholders. It refers in only general terms to a shared responsibility and states that the scale of adaptation measures is chiefly local or regional. Our audit found that this, too, was a deliberate choice. It was thought at the time that detailing the tasks and responsibilities was neither feasible nor opportune. The primary goals were to raise awareness and 'build up momentum'. The strategy does not consider the cost of adaptation measures either.

3.1.2 National adaptation agenda

The government announced in 2007 that the main points and leading principles of the national adaptation strategy would be translated into a coherent package of concrete measures known as the national adaptation



agenda that would be issued in spring 2008. The agenda was postponed in 2008 until 2009, but was ultimately never published (see also section 3.1.3 below). The non-spatial measures announced in the strategy, such as health actions, were also not implemented.

42

3.1.3 Termination of the Spatial Planning and Climate Adaptation Programme

The steering group for the Spatial Planning and Climate Adaptation Programme decided to end the programme at the beginning of 2010. The main reason was the development of the Delta Programme on the recommendation of the Veerman Committee (see box). The main planks of the adaptation programme (flood safety and fresh water security) were already being addressed in the Delta Programme.

Veerman Committee report and the Delta Programme

On 7 September 2007 the then State Secretary for Transport, Public Works and Water Management (V&W) installed the Sustainable Coastal Development Committee under the chairmanship of former minister Cees Veerman. The Veerman Committee's remit was to advise the government on how the Netherlands could improve flood safety and secure the supply of fresh water in the century ahead with a view to changes in the climate and society. The committee issued its report on 3 September 2008 (House of Representatives, 2008a). Its main recommendation was to introduce a Delta Act to provide for a Delta Fund to finance the Delta works. The Act would also provide for the appointment of a Delta Commissioner with responsibility for the implementation of an annual Delta Programme. The Delta Bill was submitted to the House of Representatives on 1 February 2010. It was passed unanimously on 28 June 2011. The Senate passed the Delta Act unanimously on 29 November 2011. The Delta Act came into force on 1 January 2012 (Delta Act for flood safety and fresh water security).

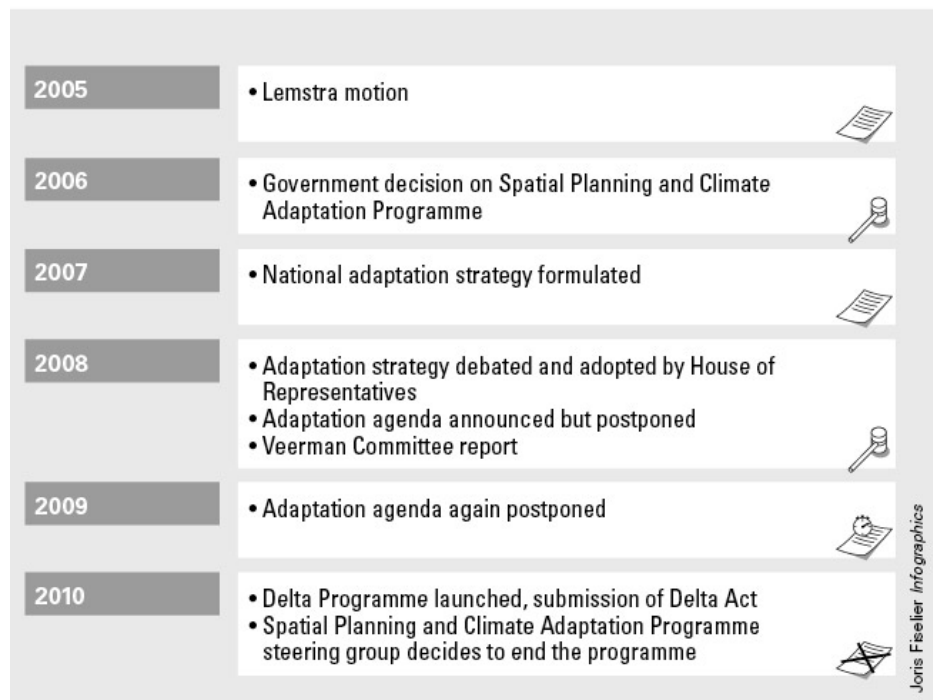
Following the decision to terminate the Spatial Planning and Climate Adaptation Programme, its 'climate and built environment/urban development' measures were transferred to the Delta Programme.¹²

¹² Several activities and projects initiated under the Spatial Planning and Climate Adaptation Programme produced results after the programme was terminated. The Nature Adaptation Strategy commissioned by the Ministries of VROM and LNV, the Netherlands Environmental Assessment Agency (PBL) and Wageningen University, for example, was released in 2010 (Vonk, 2010). The strategy was designed to supplement the national adaptation strategy. *Klimaatwijzer*, a guide for a timely response to the consequence of climate change in spatial planning processes, was published in 2012. At provincial level, climate atlases have been produced to explain the consequences of



The government intended to inform the House of Representatives of the state of climate adaptation policy by means of a policy letter in late 2009/early 2010 but failed to do so. The House of Representatives was therefore not informed separately of the decision to terminate the Spatial Planning and Climate Adaptation Programme. The government referred to the Spatial Planning and Climate Adaptation Programme in its memorandum of reply to the consultation on the draft National Water Plan (House of Representatives, 2009b). The explanatory notes to the Delta Act for flood safety and fresh water security also referred to the adaptation programme. It stated that achievement of the programme's flood safety and fresh water security goals would be integrated into the Delta Programme. It referred to the 'joint implementation of the Spatial Planning and Climate Adaptation Programme' (House of Representatives, 2010a).

Figure 3 Main policy decisions and policy documents, 2005-2010





3.2 Adaptation policy since 2010

44

Termination of the Spatial Planning and Climate Adaptation Programme marked a turning point in the Netherlands' climate adaptation policy. The national adaptation strategy was not operationalised as originally intended or as promised to the House of Representatives in 2007. The strategy seems to have withered on the vine. Policy documents were still referring to it in about 2009 (see above) but subsequent ones did not. Since 2008 no publications have been added to the parliamentary papers series for the national adaptation strategy (under which the products of the Spatial Planning and Climate Adaptation Programme and related documents were published). The programme's website is no longer available.

At present there is no national, cross-cutting climate adaptation plan with concrete measures for all sectors exposed to climate change. The Delta Programme is a national programme but is concerned chiefly with flood safety, fresh water security and climate-proofing urban development. It does not consider all sectors that are vulnerable to climate change, such as health.

The ministries concerned are taking climate adaptation actions but there is no systematic overview of the actions or the relationship between them. The Netherlands outlines its development of adaptation actions in its National Communications to the UN Climate Convention (VROM, 2009).

To what extent do these actions cover the risks and vulnerabilities identified in the analyses and the adaptation strategy? To answer this question, we mapped out the actions, looking not only at climate adaptation actions but also at ongoing policy related to climate adaptation. Climate adaptation policy is not an isolated policy but is interwoven with other policy. We considered both long-term and near-term actions. We would note that the following summary considers only the main actions and makes no attempt to be exhaustive.

3.2.1 Actions by the Ministry of I&M

The Ministry of Infrastructure and the Environment (I&M) is taking climate adaptation measures chiefly in the fields of water, the environment and urban development.

- *Delta Programme*. The Minister of I&M has final responsibility for the Delta Programme. The Delta Programme consists of nine sub-programmes that address long-term needs. Five delta decisions are



being prepared for the Delta Programme. They will be submitted to the government in 2014. The decisions relate to flood safety, fresh water security, water level management in the IJsselmeer region, the Rhine-Meuse delta and spatial adaptation. The existing dyke and coastal strengthening and Room for the River programmes have also been transferred to the Delta Programme.

45

- *Spatial Planning*. The Minister of I&M also shares responsibility under the I&M budget for 'climate-proofing spatial reservations, the main energy infrastructure such as large-scale wind energy and climate proofing the Netherlands' (House of Representatives, 2011a). To this end, the Ministry of I&M co-finances the Natural Climate Buffers Incentive Programme to anticipate future climate change by means of natural and landscape forming processes.
- *Air quality*. The Ministry of I&M implements air quality policy but it is not aimed specifically at the effects of climate change, such as the increase in summer smog.
- *Environment and health*. The Ministry of I&M also works with several other ministries in the National Environment and Health Action Plan 2008-2012. The plan includes a series of goals including the healthier design and construction of the physical environment and the identification and monitoring of environmental and health problems (House of Representatives, 2008b). It therefore touches on a number of health and environmental effects of climate change.

3.2.2 Actions by the Ministry of EL&I

The Ministry of Economic Affairs, Agriculture and Innovation (EL&I) has not conducted a specific climate adaptation policy since 2010.¹³ The ministry is currently developing climate-related actions in the fields of nature and agriculture.

- *Delta Programme*. The Ministry of EL&I is participating in the sub-programmes of the Delta Programme for the Wadden area and fresh water security. Climate change may reduce the supply of fresh water available for agriculture and horticulture.
- *National Ecological Network*. The Rutte/Verhagen government decided to review the policy on the National Ecological Network and transfer its implementation to the provinces. As a result, it is uncertain whether wildlife corridors will still be constructed. The corridors are important because climate change will lead to the relocation of animal species.

¹³ Between 2009 and 2010, the former Ministry of LNV worked on a ministry-wide climate programme to develop a climate agenda consistent with other LNV policy and the national adaptation strategy. Work on the agenda was stopped following the fall of the government in 2010.



The National Ecological Network was put back on the political agenda in the Spring Agreement 2012.

46

- *Biodiversity*. The Ministry of EL&I is responsible for nature and biodiversity policy. The policy is based on European and international agreements such as the EU Bird and Habitat Directives and the UN Convention on Biodiversity. The Convention includes climate change goals.
- *Animal diseases*. The Ministry of EL&I is currently initiating research into the consequences of climate change in relation to the emergence of animal diseases, especially those that can have consequences for people (House of Representatives, 2011b). The Ministry of EL&I is working in this area with the Ministry of VWS.
- *Energy and transport*. The Ministry of EL&I implements energy and transport policy but the policy is not directed specifically at the effects of climate change on energy and transport networks. Energy policy is directed at such issues as energy saving and reducing reliance on fossil fuels. The Ministry of EL&I also considers cleaner forms of transport in the agriculture and fisheries sectors but not how to climate-proof transport systems. Moreover, no specific policy is in place for recreation and tourism.

3.2.3 Actions by the Ministry of VWS

The Ministry of Health, Welfare and Sport (VWS) has taken climate change actions in recent years relating to heat and infectious diseases.

- *Heat*. Following the hot summer of 2006, which caused deaths throughout Europe, the Ministry of VWS developed a National Heat Plan in collaboration with the Red Cross and the National Institute for Public Health and the Environment (RIVM). The Ministry of VWS said at the time that a long-term strategy was needed in addition to the Heat Plan (House of Representatives, 2007b; Report on the Hitte de Baas conference, 2006). Protection against the consequences of a heat wave should be a permanent policy feature. The design of care institutions, for example, should include heat-proofing. Regulations on the construction of care homes have already been tightened up but there is still no long-term heat policy. The National Heat Plan has not been revised or updated since 2007.
- *Infectious diseases*. One of the Ministry of VWS's policy priorities is to reduce infectious diseases (House of Representatives, 2011c). The ministry is particularly concerned about infectious diseases that can be transmitted from animals to humans (zoonoses such as Q fever, avian influenza and SARS) and vector-borne diseases (such as Lyme disease which is transmitted by ticks to humans). Climate change, especially



global warming, is expected to increase the incidence of such diseases. 47
The Ministries of VWS and EL&I developed a policy on zoonoses following an outbreak of Q fever in 2007 (House of Representatives, 2011e). With regard to vector-borne diseases, the Ministry of VWS has set up a study of innovative methods to combat diseases transmitted by ticks and rodents. Measures have also been taken to prevent or reduce infectious diseases caused by mosquito bites, for example by checking imported goods for the presence of exotic mosquitoes. The Netherlands is vulnerable to vector-borne diseases and zoonoses owing to its high population density, many transport movements and substantial exports.

3.2.4 Policy coverage of risks and vulnerabilities

We compared the ministries' policy actions with the outcomes of the risk and vulnerability analyses to determine whether the actions were directed at the appropriate sectors: water, nature, agriculture, health, energy, transport, tourism and recreation. We also compared the actions with the national adaptation strategy to determine whether the priorities set to address the risks and vulnerabilities were actually pursued in practice. Our findings for each policy sector are presented below.

Water

The ministries devote far more attention to water-related issues than to other sectors. Virtually all the risks and vulnerabilities identified in the fields of flood safety and fresh water security are covered by policy. Many actions are being taken in these fields, both in current projects and policy and as part of the Delta Programme. Water quality risks are not covered in full by policy. It is partially covered by the Delta Programme. Further to the Lucas motion¹⁴ (House of Representatives, 2010c), the freshwater security sub-programme concentrates on salt and does not consider all problem substances.

Nature

The effects of climate change on nature are not fully covered by policy. A final decision has not been taken, for example, on wildlife corridors in the National Ecological Network to enable animal species to relocate in response to climate change. We found that there is less capacity for nature and biodiversity at the Ministry of EL&I than in the past. This is

¹⁴ The Lucas motion, passed in December 2010, called on the government to make a clear distinction in the Room for the River, Flood Protection and Delta Programmes between flood safety and fresh water security projects on the one hand and ambitions in other policy areas on the other, and to give priority to the former.



due to a significant (42%) retrenchment in the Nature and Biodiversity Department and the decentralisation and abolition of tasks pursuant to the coalition agreement.

48

Agriculture

The water-related effects of climate change on agriculture are covered largely by the Delta Programme.

Health

Not all health effects of climate change are covered by the current policy. On the basis of analyses, including the RIVM's Public Health Survey, the Ministry of VWS has given priority to heat (particularly in urban areas) and infectious diseases.

Energy

The effects of climate change on the energy sector are not covered by policy.¹⁵ The national adaptation strategy points out that the energy sector is vulnerable to climate change. Energy networks can be disrupted by flooding and extreme weather and power stations will have difficulty discharging cooling water if river temperatures rise and river levels fall.

Transport

The effects of climate change on the transport sector are not covered by government policy even though analyses and the national adaptation strategy indicate that the sector is vulnerable to climate change. Transport networks, like energy networks, can be disrupted by flooding and extreme weather.

Tourism and recreation

The effects of climate change on the tourism and recreation sector are not covered by policy. They are, however, not named as priority sectors in the national adaptation strategy.

We found that not all risks and vulnerabilities in each sector are covered by policy. Relatively more policy attention is paid to spatial adaptation to climate change (especially in the water sector). It is also a priority in the adaptation strategy.

¹⁵ I.e. policy to adapt energy networks and the energy sector to climate change. There is policy directed at mitigating climate change (see section 3.2.2).



4 Coordination, monitoring and evaluation of adaptation policy

49

Adaptation to climate change is a complex policy issue that cuts across boundaries, not only between countries but also between tiers of government and policy sectors. A proper understanding of all the stakeholders and their tasks and responsibilities is therefore required and climate adaptation policy must be coordinated nationally (INTOSAI, 2010b).

Given the complex and long-term nature of climate change, the UNFCCC advises countries to monitor their adaptation plans and periodically evaluate and, if necessary, revise them in order to guarantee the effectiveness, efficiency and adequacy of policy (UNFCCC, 2011a).

We investigated whether the Dutch government coordinated climate adaptation policy in the Netherlands and whether climate adaptation policy as a whole was monitored and evaluated.

4.1 Coordination of adaptation policy

4.1.1 2006-2010

Between 2006 and 2010 climate adaptation policy was coordinated by the government. The former Ministries of VROM, V&W, LNV and EZ were represented in the Spatial Planning and Climate Adaptation Programme, as were the associations of municipalities, provinces and water authorities. The programme team and the steering group met periodically between April/May 2006 and the end of January 2010. We learnt from interviews that failed attempts had also been made to include the Ministry of VWS in the talks. It also emerged from the interviews that the Ministry of EZ was formally involved in the Adaptation Programme but not actively involved in practice. The Ministries of VROM, V&W and LNV were therefore at the centre of the coordination. Emphasis was accordingly placed on spatial adaptation to climate change. The Ministry of VROM took the lead in the Adaptation Programme.



As noted above, a deliberate decision was taken not to include a clear allocation of tasks and responsibilities in the adaptation strategy. This was thought unfeasible at the time. The tasks and responsibilities would be laid down in the adaptation agenda. The agenda, however, never saw the light of day.

50

Our audit found that the Spatial Planning and Climate Adaptation Programme steering group and programme team regarded the period between the Veerman Committee's report (House of Representatives, 2008a) and the start of the Delta Programme in 2010 as a period of inaction as attention shifted to the development and launch of the Delta Programme. There was no national coordination of adaptation policy as a whole during this period.

4.1.2 2010 to date

Responsibility for international policy

After the abolition of the Ministry of VROM in 2010, decisions were taken on the allocation of tasks for national and international climate and environment policy (House of Representatives, 2010b). The Minister of BuZa was given responsibility for coordinating European and international environment policy in general, including sustainability and biodiversity, climate and environmental aspects of water management, and the State Secretary for BuZa was made responsible for the development dimension. The State Secretary for I&M was charged with the environment (including sustainability), water, aviation and KNMI portfolios. Responsibility for the achievement of European objectives in these areas (including the reduction of greenhouse gas emission) lies with the State Secretary of I&M, who is also responsible for substantive input into European and international environment and climate policy and its scientific and social underpinning.

Responsibility for national policy

Responsibility for national climate adaptation policy has not been allocated to a single coordinating minister or ministry. Individual ministers and ministries are responsible for policy in their respective sectors.

There is no overview of the allocation of climate adaptation tasks and responsibilities to the ministries. The people we interviewed said that many tasks and responsibilities had been allocated to the ministries over the course of time and had not been recorded.



Interministerial consultation

51

There is currently no formal consultation between the ministries responsible for the policy sectors that must adapt to climate change. Interministerial consultation is held on specific climate adaptation issues, such as the environment, health and zoonoses, the Delta Programme and a number of ongoing flood safety issues. Our audit found that interministerial consultation on certain issues was held on paper but not regularly in practice. Consultation was chiefly informal, on an individual basis and at a 'shop floor' level. Systematic consultation is held on the Netherlands' position in the international and EU negotiation of environmental issues, for example by the International Environmental Affairs Coordination Committee chaired by the Ministry of BuZa.

Many of the ministry staff we interviewed said directors held interministerial talks on climate adaptation policy but, as in other horizontal policy fields, they had been scaled down in recent years, partly on account of government cuts. Several interviewees said the ministries were withdrawing from their policy fields and the sharp definition of tasks and responsibilities meant related policies were sometimes developed separately. Ministries, however, are dependent on each other. The Ministry of VWS, for example, develops policy on zoonoses but the Ministry of EL&I drafts legislation on animal measures.

We asked staff at the ministries and experts at research and knowledge institutions whether they thought adaptation policy was adequately coordinated. Virtually all interviewees replied that there was little if any coordination of adaptation policy as a whole at present. Only specific issues were coordinated, chiefly as part of the Delta Programme. Most of the interviewees said coordination of policy as a whole was desirable on account of the relationship between the sectors requiring adaptation to climate change.

The lack of coherence and coordination of government policy on climate adaptation harbours a number of risks. There is a risk that actions and measures overlap or have undesirable side effects in other areas (see section 2.3 for an example of the latter). There is also a risk that issues are overlooked or ignored. Many climate adaptation issues cut across the ministries' policy fields. Climate-proofing the energy and transport networks in the Netherlands, for example, is a matter for both the Ministry of EL&I and the Ministry of I&M. And the climate effects on health are a matter for both the Ministry of VWS and the Ministry of I&M. A lot of climate adaptation policy is also related to existing policy. Without coordination of the policy actions, in brief, there is a risk that policy as a



whole will be ineffective and that the Netherlands will not be adequately prepared for climate change. Lack of policy coordination might also lead to missed opportunities. Measures in different sectors can reinforce each other and thus strengthen adaptation. Measure to increase flood safety, for example, can be combined with measures to enhance a region's spatial quality and consequently benefit tourism and recreation. This is already happening in a number of flood safety projects, such as Room for the River and Weak Links in Coastal Defence.

52

4.2 Monitoring and evaluation of adaptation policy

The Dutch adaptation strategy announced that the adaptation process would be actively monitored (House of Representatives, 2007a). As part of the Spatial Planning and Climate Adaptation Programme, the Knowledge for Climate research programme would also develop a monitoring and evaluation system to track both weather conditions (such as precipitation data) and their effects (such as damage to farming). A system was commissioned but its status has been uncertain since the termination of the Spatial Planning and Climate Adaptation Programme. Knowledge for Climate, however, is developing a monitoring system for the hotspots (see chapter 2, section 2.1).

Climate adaptation policy as a whole is currently not monitored. To date, no evaluations have been made of either climate adaptation policy or the policy process. Monitoring and evaluation are hampered by the absence of a comprehensive national plan for climate adaptation and an overview of goals and actions.



5 Costs and benefits

The UNFCCC considers a calculation of the costs and benefits to be an essential component of the adaptation process (UNFCCC, 2011b). Insight into the costs and benefits of adaptation measures helps policymakers decide what actions to take.

We investigated national and international studies of the estimated cost of climate adaptation and the costs and benefits of adaptation. We also asked the ministries concerned whether they had an insight into government expenditure and the budget for climate adaptation. Expenditure includes government grants and payments to institutions.

5.1 Estimated costs and benefits of adaptation actions

To gain an insight into the costs and benefits of the spatial and social adaptation of the Netherlands to climate change, we studied the findings of three international studies: the Stern Review of 2006, the EU ClimateCost study of 2011 and a 2012 study by the European Environment Agency.¹⁶ We also looked at estimates made in national studies.

The Stern Review

In *Review on the Economics of Climate Change*, published on 30 October 2006, the economist Nicholas Stern discusses the consequences of global warming for the world economy (Stern, 2006). Stern prepared the report at the request of the UK government. Its main conclusion was that the benefits of strong and timely action to address climate change comfortably outweighed the cost of inaction. Stern considered the potential effects of climate change on water supplies, food production, health and the environment. In his opinion, if no action is taken the total annual cost of climate change will be at least 5% of global gross domestic product (GDP). If a wider range of risks and effects are taken into account, the costs could rise to 20% of GDP. The report provides

¹⁶ There are many international and EU academic studies of the costs and benefits of climate adaptation and of the cost of inaction. Some summarise other studies and their conclusions and also consider their methodologies. Examples include EEA, 2007; OECD, 2008 and UNFCCC, 2009.



examples of the consequences of climate change but does not consider them in detail for individual countries. It can therefore give only an indication of the economic consequences of climate change for the Netherlands. The Minister of EZ considered them in a letter to the House of Representatives in response to the Stern Review (House of Representatives, 2006). According to the minister, the percentages given by Stern will probably be higher in the Netherlands than in neighbouring countries because a large part of the country is below sea level. The cost of coastal flooding might also be higher because the Netherlands has a higher population density.

54

The EU ClimateCost study

The EU ClimateCost project studied the impact and cost of inaction to climate change (Watkiss, 2011). It found that the social and economic consequences of climate change differ from one member state to another but could be very high: 4-10% of GDP (European average) in 2100 without mitigation measures and 0.5-1% of GDP with measures. It also found that the consequences of climate change for public health, energy consumption, agricultural output and nature could be significant. The project also concluded that both mitigation and adaptation measures were necessary and that both were cost effective. The study indicated that adaptation measures could considerably reduce the cost of climate change. Adaptation costs are relatively low (especially in comparison with the potential cost of climate change) and the benefits are high. The study also found that the cost to the EU as a whole could not be estimated as it would be determined by the policies of the individual member states (in which different adaptation options could be chosen).

European Environment Agency (EEA) study

The European Environment Agency (EEA) argues in its most recent study, *Urban adaptation to climate change in Europe* (EEA, 2012), that postponement of adaptation measures would mean the measures might be taken too late and would be more expensive. The EEA observes that infrastructure, e.g. buildings, roads, railways, energy systems and sewer systems, last for tens of years and are expensive to replace. It is cheaper and more effective to design in climate change now.

Dutch studies

In recent years, several Dutch studies and reports have estimated the cost of climate change with a view to budgetary balance, i.e. the sustainability of public finances.¹⁷ In 2007, De Nederlandsche Bank (DNB)

¹⁷ We also considered the cost of climate change in our report, *Risks to public finances: insight and control*, of June 2012.



estimated the cost of climate change on the basis of existing reports (DNB, 2007). It expressed its findings in terms of the sustainability of public finances. In its opinion, the effect of climate change on public finances would be limited, in even the least favourable scenario, to 0.1-0.2% of GDP. The study confined itself, though, to the necessary strengthening of sea dykes. In 2008, the Netherlands Bureau for Economic Policy Analysis (CPB) made an estimate of the *mitigation* costs to the Netherlands (CPB, 2008). It put them at 0.6% of GDP. These are the social costs that will have to be borne by both the private and the public sectors. The CPB did not include expenditure on climate policy in its calculation of the sustainability of public finances owing to the limited financial significance of expenditure on flood safety and the great influence of global developments on mitigation policy.

55

Several Dutch studies specifically looked at the costs and benefits of adaptation measures:

- In 2006, the Roadmap project of the Spatial Planning and Climate Adaptation Programme estimated the costs and benefits of a series of adaptation options such as river widening, coastal expansion, urban water storage, raising the level of the IJsselmeer, creating cooling capacity in cities, climate-proofing buildings and further construction of the National Ecological Network (van Ierland, 2006). The study consisted chiefly of an estimate of the costs of 'hard' measures rather than 'soft' measures such as dissemination of knowledge. It concluded that the costs and, in particular, benefits of the adaptation options were difficult to estimate owing to the lack of reliable information. More study is therefore required.
- In 2008, the Veerman Committee gave an indication of the additional annual expenditure required to guarantee flood safety in the Netherlands: on average €1-€1.5 billion a year (House of Representatives, 2008a).
- The *Climate as an Opportunity* publication of 2010, issued as part of the Knowledge for Climate research programme, asked whether a hundred spatial planning projects had considered climate-proofing and, if so, what it would cost (Sedee & Pijnappels, 2010). It found that the cost of climate adaptation was difficult to calculate but climate adaptation policy need not cost much more if it was integrated into other policy smartly and on a timely basis. It also pointed out that including climate effects in other projects and taking adaptation measures usually had benefits for all sectors, especially for construction, transport, recreation and nature.



- The PBL has also studied the cost of adaptation, particularly in urban areas. It found that the lack of flexibility in urban areas, in contrast to rural areas, quickly led to high planning and adaptation costs for infrastructure and buildings (PBL, 2009). Future additional costs in urban areas, according to the PBL, could be significantly reduced if climate-proofing were consistently taken into account in the decades ahead. The PBL refers to 'no regret' measures that can be taken now at little if any cost by 'piggybacking' them onto other policy objectives (PBL, 2011).

56

National studies and reports have estimated adaptation costs chiefly in the fields of flood safety, spatial development and spatial planning. Several projects in the Knowledge for Climate research programme, such as the Climate Proof Cities project, are currently analysing the costs and benefits of adaptation policy. A good estimate cannot be given until the adaptation options are known and the associated measures have been specified.

5.2 Climate adaptation expenditure and budget

Climate adaptation expenditure

The Ministries of I&M, VWS and EL&I could provide only limited information on their expenditure on climate adaptation to date. A limited amount of government expenditure can be identified, for example that on the Knowledge for Climate and Climate for Spatial Planning research programmes. The former Ministry of VROM granted the Climate for Spatial Planning programme € 40 million (subject to 50% co-financing) from the Economic Structure Enhancing Fund (FES) and reserved a further € 50 million (subject to the same co-financing condition) from the FES for Knowledge for Climate. The Climate for Spatial Planning programme commenced in 2004 and was completed on 31 December 2011. The Knowledge for Climate programme commenced in 2007 and will be completed in 2014. On completion of these programmes about €200 million will have been spent on study and research. The government has also incurred expenditure for the activities referred to in the previous chapter (including the Delta Programme, the Natural Climate Buffers and other projects and the measures for vector-borne diseases).

It is difficult to determine exactly how much the government has spent on climate adaptation because expenditure can be hidden in other outgoings, for example expenditure by VROM, LNV and VWS on climate studies conducted by the PBL, Wageningen University and the RIVM. These



studies are financed on a lump sum basis together with other studies. Furthermore, a lot of climate adaptation expenditure is difficult to identify because it is not accounted for as such. Climate adaptation measures often coincide with other measures.

57

Size of the climate adaptation budget

At our request, the Ministries of I&M and EL&I could provide only limited information on the funds they budgeted for climate adaptation policy. The Ministry of VWS could provide information only on the budget for actions and studies for zoonoses and vector-transmitted diseases in the period 2010-2014. In total, €6.2 million was involved.

The Ministries of I&M and EL&I could provide no information on their budgets because climate adaptation expenditure was not accounted for separately, and was often conflated with other policy and therefore spread across several budgets and budget articles. At I&M, for example, the climate adaptation budget is part of the water policy budget and at EL&I part of the nature policy budget.

Some information is available on the budget reserved in the Delta Fund for the Delta Programme (see box).

Delta Fund

The Delta Fund was formally established when the Delta Act came into force. It was created further to the recommendations of the Veerman Committee (See chapter 3, section 3.1.3). With effect from the 2013 budget, the Fund covers government expenditure on the construction, improvement, management, maintenance and operation of public works to ensure flood safety and fresh water security and on related water quality management measures. It also covers expenditure to collect the necessary basic information. A budget is provided from the public purse each year for the implementation of the Delta Programme. Until 2020, the funds already reserved for flood safety and fresh water security in the Infrastructure Fund will be transferred to the Delta Fund. Under the supplementary policy agreement of the fourth Balkenende government, at least € 1 billion will be earmarked each year for the Delta Fund. The Delta Fund is administered by the Minister of Finance. The aim is to spend the budget on the intended purpose and not to compete with other social objectives. The Minister of Finance is responsible for funding and administering the fund and direct supervision of expenditure. The Minister of I&M has final responsibility for expenditure from the Fund. (Source: www.rijksoverheid.nl)



6 Climate adaptation in Europe

58

6.1 European policy

Adapting to Climate Change white paper

The white paper, *Adapting to Climate Change*, presents a framework for the European Union and its member states to prepare for the consequences of climate change (European Commission, 2009). It is a follow-up to a green paper of 2007 entitled *Adapting to Climate Change in Europe* (European Commission, 2007). Key elements in the white paper are: accumulating knowledge of the consequences of climate change for the EU, incorporating climate adaptation into a variety of policy areas, creating a financial and organisational footing to implement adaptation actions, and strengthening international cooperation in climate adaptation.

The white paper does not include legislative proposals and is therefore not directly binding on the member states. The intention is that the member states take the white paper into consideration when developing policy. The Dutch government informed the House of Representatives in 2009 that it thought the white paper was a sound and effective basis to tackle climate change in Europe. It called for a comprehensive and broad approach to climate adaptation as it covered many policy areas (House of Representatives, 2009a).

Apart from in the white paper, climate adaptation is considered in the EU Directive on the assessment and management of flood risks (2007/60/EC), the forthcoming new common agricultural policy and European policy to prevent water scarcity and drought.

European adaptation strategy

The European Commission announced a European adaptation strategy in 2011 (European Commission, 2011). It is a further elaboration of the *Adapting to Climate Change* white paper. The Commission is expected to adopt the European adaptation strategy in March 2013. The key objectives of the European strategy are to strengthen the knowledge base for adaptation to climate change and to develop a suitable EU policy framework for adaptation (European Commission, 2011). The European



adaptation strategy is expected to urge all member states to prepare their own national adaptation strategies. A target date for the strategies may also be set. The European Commission will propose measures that help member states tackle climate adaptation. It recognises the added value of improving the exchange of knowledge and best practices among member states (House of Representatives, 2012). The Commission favours spending a greater proportion of the EU budget on climate adaptation, directly by funding adaptation projects and indirectly by making adaptation one of the criteria for expenditure from other funds. Its aim is to climate-proof Europe. Climate adaptation goals are expected to be integrated into European financial instruments and the Multiannual Financial Framework 2014-2020 (House of Representatives, 2012). The Commission has also identified opportunities to mobilise private funds, for example from the insurance sector.

59

The forthcoming European policy may have consequences for the Netherlands. Formally, the Netherlands has a national adaptation strategy but, as have explained above, it has only partially been worked out into concrete actions and in practice is no longer being implemented. With a view to the Netherlands' effective use of European funding, in our opinion a clear and coherent national climate adaptation policy is required.

Parma Declaration

The Netherlands has signed the Parma Declaration on Environment and Health of 11 March 2010. The declaration includes a series of agreements to reduce the adverse impact of climate change on health and the environment (Parma Declaration on Environment and Health, 2010). One of the agreements is to integrate health aspect into all measures, policy lines and strategies for the mitigation of and adaptation to climate change at all levels and in all sectors. Implementation of the Parma Declaration is currently in its initial stages.

6.2 Policy in other European countries

To put the situation in the Netherlands into perspective, finally, we investigated how a number of other European countries – the United Kingdom, France, Germany, Denmark and Belgium – have developed national climate adaptation policies. The countries are at the same temperate latitude as the Netherlands and are therefore facing comparable challenges.



Most of the countries have carried out, or are carrying out, risk and vulnerability analyses. Some are coordinating the analyses nationally. The UK Climate Change Act passed in 2008, for example, provides for a national analysis of the risks of climate change every five years.

Until 2005 only one country in Europe, Finland, had a specific adaptation strategy (Swart, 2009). In the years since then, several other European countries have developed national adaptation strategies.

Countries with an adaptation strategy	Countries without an adaptation strategy
Belgium	Bulgaria
Denmark	Cyprus
Finland	Ireland
France	Italy
Germany	Estonia
Hungary	Norway
Netherlands	Austria
Portugal	Poland
Slovenia	Romania
Spain	Slovakia
Sweden	Czech Republic
United Kingdom	Lithuania

The table above is derived from the website of the European Climate Adaptation Platform (CLIMATE-ADAPT). The countries in the right-hand column are generally at an advanced stage of developing a national adaptation strategy. No information is available from CLIMATE-ADAPT on countries not listed in the table.

The UK, France, Germany, Denmark and Belgium have broad-based (i.e. covering all sectors) national climate adaptation strategies that they have worked out into national adaptation programmes or have almost done so.

The Netherlands has taken a different approach, as explained in chapter 3. The Dutch national adaptation strategy is broad-based but has not been worked out into a concrete adaptation agenda as initially intended. The Netherlands introduced the Delta Programme in 2010 but it is concerned primarily with flood safety and fresh water security and does not cover all sectors that are vulnerable to climate change, e.g. health.

The preparation and implementation of adaptation policy in neighbouring countries are also top-down in nature. In the United Kingdom, for example, management is arranged nationally pursuant to the 2008



Climate Change Act. The Act serves as an adaptation framework for the United Kingdom. The government accordingly has the power to have regional and local public entities report on how they address the risks and opportunities of climate change. The Act also provides for a national analysis of the risks of climate change every five years and requires the government to implement an adaptation programme. It also requires the installation of a dedicated government committee on adaptation. The committee must ensure that the government's adaptation strategy prepares the United Kingdom for climate change effectively.

61

The national strategies in some of the EU countries we selected (UK, France, Germany, Denmark, Belgium) pave the way for greater involvement by regional and local authorities. They coordinate and take up each other's strategies. This is not the case in the Netherlands. The Dutch government has concluded climate agreements with the associations of municipalities, provinces and water authorities.¹⁸ Many actions and measures will have to be taken at regional and local level.

The five EU countries we selected will be preparing and working out regional and local adaptation plans in the years ahead and have taken steps to manage their implementation. The Netherlands does not have a systematic overview of regional and local adaptation plans. It had been the intention to prepare an overview of current and planned climate adaptation actions as part of the Spatial Planning and Climate Adaptation Programme but no such overview was produced (see chapter 3). The Climate Agenda 2011-2014 was issued in 2011 but it is currently confined chiefly to the mitigation aspects of climate policy (House of Representatives, 2011d).

Other countries have a variety of platforms and forums to coordinate and disseminate knowledge. The Netherlands does not have a broad-based form of coordination and knowledge dissemination for climate adaptation. Knowledge is disseminated within the sectors, however, for example through the Sustainable Area Development Platform.

Some countries have introduced or are developing monitoring and evaluation systems. In the Netherlands climate adaptation policy as a whole is neither monitored nor evaluated (see chapter 4).

¹⁸ These agreements are directed chiefly at the mitigation of climate change.



Appendix 1 Abbreviations

BuZa	Ministry of Foreign Affairs
CBS	Statistics Netherlands
CPB	Netherlands Bureau for Economic Policy Analysis
DNB	De Nederlandsche Bank
EEA	European Environment Agency
EHS	National Ecological Network
EL&I	Ministry of Economic Affairs, Agriculture and Innovation
EU	European Union
EUROSAI	European Organisation of Supreme Audit Institutions
EZ	Ministry of Economic Affairs
FES	Economic Structure Enhancing Fund
GDP	Gross domestic product
I&M	Ministry of Infrastructure and the Environment
INTOSAI	International Organisation of Supreme Audit Institutions
IPCC	Intergovernmental Panel on Climate Change
KNMI	Royal Netherlands Meteorological Institute
LNV	Ministry of Agriculture, Nature and Food Quality
MNP	Netherlands Environmental Assessment Agency (precursor to the PBL)
OCW	Ministry of Education, Culture and Science
OECD	Organisation for Economic Co-operation and Development
PBL	Netherlands Environmental Assessment Agency (successor to the MNP)
PCCC	Platform Communication on Climate Change
RIVM	National Institute for Public Health and the Environment
SAI	Supreme audit institution
SMART	Specific, Measurable, Agreed, Realistic, Time-bound
STOWA	Foundation for Applied Water Research
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
V&W	Ministry of Transport, Public Works and Water Management
VRM	Ministry of Housing, Spatial Planning and the Environment
VWS	Ministry of Health, Welfare and Sport
WGEA	Working Group on Environmental Auditing



Appendix 2 Audit methodology

Audit background

This audit of climate adaptation is part of a joint project by a number of European supreme audit institutions. The initiative for this cooperative audit on adaptation to climate change was taken by the Working Group on Environmental Auditing (WGEA) of EUROSAI, the European Organisation of Supreme Audit Institutions.

The Netherlands Court of Audit accepted the WGEA's request to participate in the cooperative audit (referred to below as the joint audit) in 2011, mainly because the thematic area (climate) was already on its audit agenda for 2010–2015. An audit of adaptation to climate change is relevant from a national angle owing to the enormous social importance and the international agreements the Netherlands has signed, one being the United Nations Framework Convention on Climate Change. The subject is also important because of the growing pressure that climate policy expenditure may place on public finances.¹⁹

In addition to the Netherlands Court of Audit and the European Court of Auditors, the SAIs of the following countries took part in the project: Austria, Bulgaria, Cyprus, Malta, Norway, Russia and Ukraine.

The cooperative project will result in a joint report that the participating SAIs will publish in November 2012. The SAIs will also publish their own national audit reports. The joint audit report will draw on the findings of the national audits and present brief summaries of the national audits.

Audit questions

Our national audit was based on the projectplan and audit questions of the joint audit. The participating SAIs formulated the audit questions in consultation with each other. The audit questions were derived largely from the WGEA manual *Auditing the Government Response to Climate Change; Guidance for Supreme Audit Institutions* of 2010 (INTOSAI, 2010b). The manual contains examples of audit questions in the fields of climate change and climate adaptation. No overarching audit questions or problem definition was formulated. The audit questions for the joint audit were grouped into five areas:

1. risk and vulnerability analyses;
2. national adaptation strategy;

¹⁹ See our report, *Risks to public finances; insight and control* (Netherlands Court of Audit, 2012).



3. coordination of adaptation strategy;
4. implementation of policy;
5. results and impact of policy.

64

Like the other participating SAIs, we made a selection from the audit questions. Our national audit concentrated on the first three areas because, although the Netherlands formally introduced a climate adaptation policy in 2007 with the national climate adaptation strategy, it is not yet possible to audit the results and impact of that policy.

The central question in our national audit was: how has the national climate adaptation policy introduced by the fourth Balkenende government in 2007 been implemented to date? The audit was designed to gain an insight into the organisation and progress of the policy.

Our national audit consisted of five parts:

- *Analyses of risks and vulnerabilities*
We investigated whether the ministers and state secretaries concerned had carried out climate change risk and vulnerability analyses, whether the analyses were of satisfactory quality and were useful and what their results were (in which sectors is adaptation to climate change thought necessary?).
- *National adaptation strategy and policy*
We investigated the development, organisation and implementation of the national adaptation strategy. We considered whether the strategy was based on the risk and vulnerability analyses and assessed the quality of the strategy. We then looked at the status of the actions and measures announced in the strategy.
- *Coordination, monitoring and evaluation of adaptation policy*
We investigated how central government coordinated climate adaptation policy in the Netherlands, whether the allocation of responsibilities among the ministries was clear, whether there was consultation among the ministries and whether policy was monitored and evaluated.
- *Financial aspects (expenditure, budget, costs and benefits)*
We investigated the expenditure and budget for the national adaptation policy and estimates of the costs and benefits of adaptation to climate change.
- *Climate adaptation in Europe*
Finally, we looked at the state of adaptation policy in a number of neighbouring countries in order to put the situation in the Netherlands into perspective. We considered countries facing similar challenges as the Netherlands. We also looked at adaptation policy in the EU.



Standards applied

The audit standards we applied are stated at the beginning of each thematic chapter. A summary of our audit standards is listed in appendix III. They are derived largely from the WGEA manual referred to above (INTOSAI, 2010b). The standards it contains are based on the agreements laid down in the UNFCCC and on the recommendations of the Nairobi Work Programme of the UNFCCC (UNFCCC, 2011a). Although the agreements in the UNFCCC and the recommendations of the Nairobi Work Programme are not binding, they are regarded as frameworks for adaptation.

Collection of information

We collected information by means of interviews and documentary analysis. We analysed both public and non-public documents we requested from the relevant ministries. We held interviews with staff at the ministries most involved in this policy field:

- Infrastructure and the Environment (I&M);
- Economic Affairs, Agriculture and Innovation (EL&I);
- Health, Welfare and Sport (VWS);
- Foreign Affairs (BuZa).

We also talked to experts at various knowledge institutions in the Netherlands.

We obtained information on the status of adaptation policy in other European countries from the website of The European Climate Adaptation Platform (climate-adapt.eea.europa.eu). This public internet platform, maintained by the European Environment Agency, was set up on the initiative of the European Commission to help European, national, regional and local policymakers develop climate adaptation policies and measures. The information posted on the platform is provided by the member states.

We also made use of a study by the Partnership for European Environmental Research that compared the national adaptation strategies of a variety of European countries with each other. The countries included the Netherlands, the United Kingdom, Germany and France (Swart, 2009).

Audit scope

Our audit focused on central government adaptation policy in the period from 2005 to mid-2012. It also considered the preparation of the 2007 national adaptation strategy. Our audit covered only the ministries concerned, not provinces, municipalities or water authorities, which we do



not have the power to audit. For the sake of completeness, we would note that local authorities can also conduct climate policies and take climate adaptation initiatives and that the government has concluded climate agreements with the associations of municipalities, provinces and water authorities. Furthermore, our audit did not consider the Caribbean part of the Kingdom of the Netherlands. The international dimension of the policy field – Dutch policy to support climate adaptation in developing countries – was not investigated either. This report refers to international policy and local initiatives where relevant.

66

Quality assurance

We forwarded a draft report of provisional findings to the ministries for comment. We did so to ensure the accuracy and completeness of the facts presented. We submitted the draft report of findings in confidence to an external advisory group. Corrections and additions further to ministerial clearance and the response of the advisory group were included in the final report of findings, which formed the basis of this audit report.



Appendix 3 Audit standards

The standards applied in this audit are stated at the beginning of each thematic chapter. They are explained in this appendix.

The standards we used are based largely on the WGEA manual *Auditing the Government Response to Climate Change; Guidance for Supreme Audit Institutions* of 2010 (INTOSAI, 2010b). The standards proposed in the manual are based on the agreements laid down in the UNFCCC and on the recommendations of the Nairobi Work Programme of the UNFCCC (UNFCCC, 2011a). Although the agreements in the UNFCCC and the recommendations of the Nairobi Work Programme are not binding, they are regarded as frameworks for adaptation.

Apart from the standards arising from international agreements, INTOSAI applies 'basic standards' on good governance, such as clear allocation of responsibilities to the public actors involved in policy, transparency of decision making and formulation of appropriate goals and measures.

Where relevant, we have adapted the standards to the situation in the Netherlands or formulated our own standards.

The standards for each thematic area of our audit are summarised below.

Standards on climate change risk and vulnerability analyses

- Analysis of risks and vulnerabilities to climate change should be an essential component of the adaptation process (Source: UNFCCC, 2011a).
- The government should carry out comprehensive climate change risk and vulnerability analyses so that it can identify and assess the risks of future climate effects and use the findings to develop and/or refine policy (source: UNFCCC, 2011a; Netherlands Court of Audit, this report).
- Given the long-term nature of climate adaptation and the related development of knowledge, the analysis process should be continuous. Analyses should be periodically updated (source: UNFCCC, 2011a; Netherlands Court of Audit, this report).
- The government's risk and vulnerability analyses should cover common ground between the sectors. There are close and complex relationships between the effects of climate change and between the various aspects of climate adaptation (source: Netherlands Court of Audit, this report).



Standards for a systematic approach to climate adaptation policy

- The development and implementation of adaptation plans should be an essential component of the adaptation process (source: UNFCCC, 2011a).
- Adaptation plans should be based on risk and vulnerability analyses (source: UNFCCC, 2011a).
- The approach to climate adaptation should be planned nationally. Once risks and vulnerabilities have been identified, a decision must be taken on targeted activities; adaptation measures must be selected and weighed against each other. The outcomes of such decisions and the actions to be taken must be laid down in a plan (source: UNFCCC, 2011a).
- The adaptation plan or strategy should be consistent with the identified risks and vulnerabilities and cover all policy sectors affected by climate change. The strategy should also name the measures to be taken (preferably in SMART terms), the priority of the measures, the cost of the measures and the allocation of responsibilities to ministries and other stakeholders (INTOSAI, 2010b).

Standards for climate adaptation coordination

- Climate adaptation policy should be coordinated nationally. It is a complex policy issue that cuts across authorities and sectors (source: INTOSAI, 2010b).
- There should be an overview of all stakeholders and clarity about their tasks and responsibilities (source: INTOSAI, 2010b).
- The efforts of the various stakeholders should be complementary, not conflicting (source: INTOSAI, 2010b).
- There must be coordination in practice, not just on paper (source: INTOSAI, 2010b).

Standards for monitoring and evaluating climate adaptation policy

- Monitoring and evaluation should be essential components of the adaptation process, particularly with a view to the complex and long-term nature of climate change (source: UNFCCC, 2011a).
- Adaptation actions should be monitored (source: UNFCCC, 2011a).
- The measures taken should be evaluated (source: UNFCCC, 2011a).
- New insights should be continuously processed (source: UNFCCC, 2011a).
- The validity of the scientific material underlying policy should be regularly evaluated (UNFCCC, 2011a).



- The effectiveness, efficiency and overall utility of policy should be monitored, regularly evaluated and revised where necessary (source: UNFCCC, 2011a).

69

Standards for the financial aspects of climate adaptation policy

- Insight into the costs and benefits of the adaptation process should be an essential component of the adaptation process. It helps to weigh up the adaptation options and set priorities (source: UNFCCC, 2011b).



Literature

70

Publications

CBS, PBL & Wageningen UR (2009), *Werking van het broeikaseffect (indicator 0163, versie 05, 31 maart 2009)*, (*Impact of the greenhouse effect (indicator 0163, version 05, 31 March 2009)*)
www.compendiumvoordeleefomgeving.nl, The Hague, Statistics Netherlands, Bilthoven, Netherlands Environmental Assessment Agency (PBL), Wageningen, Wageningen University and Research Centre.

CBS, PBL & Wageningen UR (2012), *Temperatuurtrends in Nederland en mondiaal, 1906 - 2011 (indicator 0226, versie 10, 25 mei 2012)*, (*Temperature trends in the Netherlands and worldwide, 1906-2011 (indicator 0226, version 10, 25 May 2012)*),
www.compendiumvoordeleefomgeving.nl, The Hague, Statistics Netherlands, Bilthoven, Netherlands Environmental Assessment Agency (PBL), Wageningen, Wageningen University and Research Centre.

CPB (2008), *Economische gevolgen van Schoon en Zuinig in 2020 (Economic consequence of Clean and Economical)* The Hague, Netherlands Bureau for Economic Policy Analysis (CPB).

DNB (2007), *Gevolgen van klimaatverandering voor de Nederlandse overheidsfinanciën. Kwartaalbericht september 2007, (Climate change and Dutch public finances, Quarterly Bulletin, September 2007)*, De Nederlandsche Bank.

Dorland, R. van, W. Dubelaar-Versluis & B. Jansen (ed.) (2011), *Staat van het klimaat 2010. Actueel onderzoek en beleid nader verklaard, (State of the climate 2010. Current research and policy explained)*, De Bilt/Wageningen, Platform Communication on Climate Change.

Drunen, M. van et. al. (2006), *Naar een klimaatbestendig Nederland - samenvatting Routeplanner: een onderzoek naar de effecten van klimaatverandering (Toward a climate-proof Netherlands, Roadmap: a study of the effects of climate change)*, Climate for Spatial Planning.

EEA (2007), *Climate change: the cost of inaction and the cost of adaptation*, Copenhagen, European Environment Agency.



EEA (2008), *Impacts of Europe's changing climate – 2008 indicator based assessment*, Copenhagen, European Environment Agency. **71**

EEA (2010), *The European Environment – State and Outlook 2010. Adapting to climate change*, Copenhagen, European Environment Agency.

EEA (2012), *Urban adaptation to climate change in Europe Challenges and opportunities for cities together with supportive national and European policies*, Copenhagen, European Environment Agency.

European Commission (2007), *Green paper on adapting to climate change in Europe – options for EU action, COM 2007 354*, Brussels, Publications Office of the European Union.

European Commission (2009), *White paper on adapting to climate change: towards a European framework for action, COM (2009) 147*, Brussels, Publications Office of the European Union.

European Commission (2011), *Annex to the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Commission Work Programme 2012, COM 2011 777*, Brussels, Publications Office of the European Union.

Health Council of the Netherlands (2009), *Mondiale milieu-invloed op onze gezondheid (Global environmental impact on our health)*, The Hague, Health Council of the Netherlands.

Hitte de Baas (Beat the Heat) conference report (2006), *Hitte de Baas conference. Toename van hittegolfrisico's en het antwoord van de zorgsector daarop (Increase in heat wave risks and the response of the care sector)*, The Hague 10 November 2006.

House of Representatives (2006), *Evaluation note on climate policy Climate policy; Letter from the minister on economic losses due to climate change*, House of Representatives, 2006-2007, 28 240, no. 69, The Hague, Sdu.

House of Representatives (2007a), *National Adaptation Strategy; letter from ministers and state secretaries accompanying the policy memorandum*, House of Representatives, 2007-2008, 31 269, no. 1, The Hague, Sdu.



House of Representatives (2007b), *Adoption of the budget of the Ministry of Health, Welfare and Sport (XVI) for the financial year 2007; Letter from the state secretary on the national heat plan, appendix National Heat Plan*, House of Representatives, 2006-2007, 30800 XVI, no. 158. The Hague, Sdu. 72

House of Representatives (2008a), Delta Programme; *Letter from the state secretary on the report of the Delta Committee, Working together with water, Appendix Working together with water. Findings of the Delta Committee 2008*, House of Representatives, 2007-2008, 31 710, no. 1, The Hague, Sdu.

House of Representatives (2008b), *Letter from ministers regarding the National Environment and Health Strategy*, House of Representatives, 2007-2008, 28 089, no. 19, The Hague, Sdu.

House of Representatives (2008c), *National Adaptation Strategy; Report on the parliamentary committee meeting with members of the government of 21 November 2007*, House of Representatives, 2007-2008, 31 269, no. 4, The Hague, Sdu.

House of Representatives (2009a), *New Commission proposals and initiatives of the member states of the European Union; Government position on the EU white paper, 'Adapting to climate change: towards a framework for action'*, House of Representatives, 2008-2009, 22 112, no. 865, The Hague, Sdu.

House of Representatives (2009b), *Delta Programme. Letter from ministers and state secretaries on the submission of the National Water Plan and river basin management plans for the Eems, Maas, Rhine delta and Scheldt. Appendix, Memorandum of reply to the consultation on the draft National Water Plan*, House of Representatives, 200-2010, 31 710, no. 12, The Hague, Sdu.

House of Representatives (2010a), *Amendment of the Water Act and the Infrastructure Fund Act concerning protection from flooding and management of fresh water in relation to projected climate changes (Delta Act for flood safety and fresh water security)*, House of Representatives, 2009-2010, 32 304, no. 3, The Hague, Sdu.

House of Representatives (2010b), *Legislative proposal to adopt the budget statements of Housing, Spatial Planning and the Environment (XI) and the Wadden Fund 20. Report concerning a list of questions and*



answers, House of Representatives, 2010-2011, 32 500 XI, no. 8, The Hague, Sdu.

73

House of Representatives (2010c), *Adoption of the budget for the Infrastructure Fund for the financial year 2011. Motion not to have flood safety and fresh water security be disadvantaged by other ambitions in 'water projects', such as nature and recreation*, House of Representatives, 2010-2011, 32500 A, no. 44, The Hague, Sdu.

House of Representatives (2011a), *Adoption of the budget for the Ministry of Infrastructure and the Environment (XII) for the financial year 2012; Explanatory Memorandum*, House of Representatives, 2011-2012, 33 000 XII, no. 2, The Hague, Sdu.

House of Representatives (2011b), *Adoption of the budget of the Ministry of Economic Affairs, Agriculture and Innovation (XIII) for the financial year 2012; Memorandum of reply*, House of Representatives, 2011-2012, 33 000 XIII, no. 2, The Hague, Sdu.

House of Representatives (2011c), *Adoption of the budget of the Ministry of Health, Welfare and Sport (XVI) for the financial year 2012; Explanatory Memorandum*, House of Representatives, 2011-2012, 33 000 XVI, no. 2, The Hague, Sdu.

House of Representatives (2011d), *Government approach to climate policy en route to 2020; Letter from the state secretary on the submission of the Local Climate Agenda, 'Making work of Climate, climate agenda 2011-2014'*, House of Representatives, 2011-2012, 32 813, no. 2, The Hague, Sdu.

House of Representatives (2011e), *Animal welfare; Letter from the minister and state secretary on the state of the approach to zoonoses*, House of Representatives, 2010-2011, 28 286, no. 505, The Hague, Sdu.

House of Representatives (2012), *Environment Council. Letter from the state secretary on the submission of the report of the informal Environment Council of 7 and 8 July 2012 in Nicosia*, House of Representatives, 2011-2012, 21 501-08, no. 435, The Hague, Sdu.

Hove, B. van et. al. (2007), *Klimaatverandering. Gevolgen, adaptatie en kwetsbaarheid in beeld gebracht. Brochure naar aanleiding van de presentatie van het IPCC Working Group II Fourth Assessment Report (Climate change. Consequences, adaptation and vulnerability in view.*



Brochure on the presentation of the IPCC Working Group II Fourth Assessment Report), Ministry of LNV, Wageningen University and Research centre, Alterra.

74

Huynen, M. et. al. (2009) *Mondiale milieuveranderingen en volksgezondheid: stand van de kennis (Global environmental change and public health: state of the knowledge)*, Bilthoven, National Institute for Public Health and the Environment.

Ierland, E. van et. al. (2006), *A qualitative assessment of climate adaptation options and some estimates of adaptation costs. Routeplanner projects 3, 4 en 5 (Adaptation strategies)*, Wageningen, Wageningen University and Research Centre.

INTOSAI (2010a), *Coordinated International Audit on Climate change. Key implications for Governments and their auditors*, INTOSAI WGEA.

INTOSAI (2010b), *Auditing the Government Response to Climate Change. Guidance for Supreme Audit Institutions*, INTOSAI WGEA.

IPCC (2007), *Climate change 2007: synthesis report. Summary for policy makers*, Geneva, Intergovernmental Panel on Climate Change.

Jonge, C. de (2008), *De gevolgen van klimaatverandering voor recreatie en toerisme. Kansen voor de recreatiesector (The consequences of climate change for recreation and tourism, Opportunities for the recreation sector)*, The Hague, Stichting Recreatie.

MNP (2005), *Effecten van klimaatverandering in Nederland (Effects of climate change in the Netherlands)*, Netherlands Environmental Assessment Agency.

Netherlands Court of Audit (2012), *Risks to public finances: insight and control, House of Representatives, 2011-2012, 33 299 nos. 1-2*, The Hague, Sdu.

Netherlands Senate (2005a), *Lemstra motion on long-term investment strategies for major national investments*, Senate, 2004–2005, XXI-C, The Hague, Sdu.

Netherlands Senate (2005b), *Letter from the Minister of VROM on the Lemstra motion*, Senate, 2004–2005, XXI-C, The Hague, Sdu.



OECD (2008), *Economic Aspects of Adaptation to Climate Change: Costs, Benefits and Policy Instruments*, Paris, OECD.

75

PBL (2009), *Wegen naar een klimaatbestendig Nederland (Routes to a climate-proof Netherlands)*, Bilthoven, Netherlands Environmental Assessment Agency.

PBL (2011), *Een delta in beweging. Bouwstenen voor een klimaatbestendige ontwikkeling van Nederland (A delta on the move. Building blocks for a climate-proof development of the Netherlands)*, The Hague, Netherlands Environmental Assessment Agency.

PBL (2012), *Effecten van klimaatverandering in Nederland 2012 (Effects of climate change on the Netherlands)*, The Hague, Netherlands Environmental Assessment Agency.

Schram-Bijkerk, D. (2010), *Programma Klimaat en Gezondheid van het ZonMW: nut en noodzaak voor politiek Den Haag (Climate and health programme of the ZonMW: political utility and need)*, Bilthoven, National Institute for Public Health and the Environment.

Sedee, A.G.J. and M.H.J. Pijnappels (2010), *Klimaat als kans. Adaptatie in de ruimtelijke ordening (Climate as an opportunity. Adaptation in spatial planning)*, Utrecht, Knowledge for Climate programme office.

Stern, N. (2006), *The Economics of Climate Change. The Stern Review*, Cambridge, Cambridge University Press.

Swart, R. et.al. (2009), *Europe adapts to climate change: comparing national adaptation strategies. PEER Report no. 1*, Helsinki, Partnership for European Environmental Research.

UNFCCC (2009), *Potential costs and benefits of adaptation options: A review of existing literature. Technical paper*, UNFCCC.

UNFCCC (2011a), *Making informed adaptation decisions. The Nairobi Work Programme on impacts, vulnerability and adaptation to climate change*, Bonn, UNFCCC.

UNFCCC (2011b), *Assessing the costs and benefits of adaptations options. An overview of approaches. The Nairobi Work Programme on impacts, vulnerability and adaptation to climate change*, Bonn, UNFCCC.



Vonk, M. et. al. (2010), *Adaptatiestrategie voor een klimaatbestendige natuur (Adaptation strategy for climate-proof nature)*, The Hague /Bilthoven, Netherlands Environmental Assessment Agency (PBL).

76

VROM (2009), *Fifth Netherlands National Communication under the United Nations Framework Convention on Climate Change*, The Hague, Ministry of VROM.

Watkiss, P. et. al. (2011), *The ClimateCost Project. Final report. Volume 1: Europe. The impacts and economic costs of climate change in Europe and the costs and benefits of adaptation*, Stockholm, Stockholm Environment Institute.

International treaties

United National Framework Convention on Climate Change (1992),
[available at:
http://unfccc.int/key_documents/the_convention/items/2853.php]

Parma Declaration on Environment and Health (2010),
[available at: <http://www.euro.who.int/en/what-we-do/event/fifth-ministerial-conference-on-environment-and-health/documentation/parma-declaration-on-environment-and-health>]

Legislation and regulations

National legislation and regulations

Delta Act for flood safety and water security. Act of 1 December 2011 amending the Water Act and the Water Infrastructure Fund to protect against flooding and secure fresh water in anticipation of climate change, Bulletin of Acts and Decrees 2011, 604.

EU legislation

Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risks.
[available at: <http://eur.lex.europa.eu>EUROPA>EUR-Lex Home>]

Internet

<http://climate-adapt.eea.europa.eu>. Accessed on 9 June 2012.
<http://www.rijksoverheid.nl>. Accessed on 9 June 2012.

Audit team

W.H.S. Roenhorst (Project Manager)

H.E.J. van der Geest

The Netherlands Court of Audit

Algemene Rekenkamer

Lange Voorhout 8

P.O. Box 20015

2500 EA The Hague

phone +31 70 342 43 00

www.courtofaudit.nl

Translation

Alan Hyde

Cover

Design: Corps Ontwerpers, The Hague

Photo: Michiel ANP/Eljee Bergwerff

The Hague, April 2013