

THE INTEGRATION OF THE ADAPTATION APPROACH INTO EU AND DUTCH LEGISLATION ON FLOOD RISK MANAGEMENT

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1 INTRODUCTION

Climate change, worldwide, gives rise to multifarious issues concerning water management. At a global level, in general, average temperatures and the sea level are expected to rise, and weather and precipitation patterns are expected to change. At regional levels, this will lead to both an increase of flood risks and risks related to drought and water scarcity, mostly as a result of sea level rise, increasing river discharges and heavy rainfall, respectively longer, more severe warm and dry periods.² To obtain a more concrete view of the expected regional effects of climate change, both for the EU and the Netherlands, climate risks have been assessed and scenarios and policy papers have been drafted.³

Although scientific uncertainty remains as to the magnitude of these effects, there is a broad scientific and political consensus that action needs to be taken. In this respect, two types of response can be distinguished: mitigation and adaptation action. However, as the effectiveness of the so-called 'limitationist approach' under the present circumstances could more and more be questioned, adaptation becomes a more realistic approach in combating these climate issues.

'Adaptation' refers to 'adjustments in ecological, social or economic systems in response to actual or expected climatic stimuli and their effects or impacts. It refers to changes in processes, practices and structures to moderate potential damages or to benefit from opportunities associated with climate change'.⁴ Although this general

definition leaves much room for further interpretation with a focus on particular regional circumstances,⁵ it clearly conceptually delineates the adaptation approach, which is one that lends itself to be integrated within diverse sectoral policy domains at various institutional levels.

This process of integration is referred to as 'mainstreaming',⁶ which is one of the major focus points of current developments in adaptation policy as such.⁷ It must be borne in mind, however, that the factual process of mainstreaming is still in its infancy. In some policy domains there is already a clear integral notion of the adaptation approach, which has also been embedded within the law. The domain in which the adaptation approach to date seems to have matured at most is that of flood risk management, at least at the EU and Dutch domestic levels.⁸

This article aims to assess whether the adaptation approach has been appropriately integrated within the legal systems of flood risk management at the EU and Dutch national levels. Appropriateness, admittedly, is a rather vague criterion. For the purposes of this article, it is confined to an assessment of whether the most important characteristics of the climate change issue (ie that climate change is a process with diverging regional effects, which is not yet fully understood, but is subject to ongoing research and debate, creating a steady flow of advancing insights) have been taken into account, and whether there is clarity about the scope, division and allocation of responsibilities.

The way in which the adaptation approach has been embedded within the legal systems of flood risk management cannot be understood correctly without having insight

1 This article has been written in the framework of the European Union's Seventh Programme for Research, Technological Development and Demonstration within the STAR-FLOOD project (www.starflood.eu). Contact: h.k.gilissen@uu.nl.

2 See Fifth Assessment Report of Working Group I of the IPCC *Climate Change 2013: The Physical Science Basis* <http://www.ipcc.ch/report/ar5/> (IPCC 2013).

3 See COM(2007) 354; COM(2009) 147; COM(2012) 673; COM(2013) 216; Koninklijk Nederlands Meteorologisch Instituut *KNMI Climate Change Scenarios 2006 for the Netherlands* (KNMI Scientific Report WR 2006-01 De Bilt 2006) <http://www.knmi.nl/klimaatscenarios/knmi06/WR23mei2006.pdf>; Koninklijk Nederlands Meteorologisch Instituut *Klimaatverandering in Nederland: Aanvullingen op de KNMI'06 klimaatscenarios* (KNMI-Brochure De Bilt 2009) <http://www.knmi.nl/klimaatscenarios/documents/brochure09.pdf>; Koninklijk Nederlands Meteorologisch Instituut (KNMI 14) *Climate Change Scenarios for the 21st Century: A Netherlands Perspective* (KNMI Scientific Report WR 2014-01 De Bilt 2014) <http://www.knmi.nl/bibliotheek/knmi/pubWR/WR2014-01.pdf>; and Delta Programme 2014.

4 See Third Assessment Report of Working Group II of the IPCC *Climate Change 2001: Impacts, Adaptation and Vulnerability* <https://www.ipcc.ch/ipccreports/tar/> (IPCC 2001) 881. For comparable definitions see also B Smit, I Burton, R J T Klein and J Wandel 'An anatomy of adaptation to climate change and Variability' (2000) 45 *Climatic Change* 223–51 at 227–28; W N Adger, N W Arnell and E L Tompkins 'Successful adaptation

to climate change across scales' (2005) 15 *Global Environmental Change* 77–86 at 78; R Verheyen *Climate Change Damage and International Law: Prevention Duties and State Responsibility* (Martinus Nijhoff Publishers Leiden/Boston 2005) 34–35; and COM(2007) 354.

5 See R J T Klein 'Adaptation to climate variability and change: what is optimal and appropriate?' in C Giupponi, M Schechter (eds) *Climate Change in the Mediterranean: Socio-Economic Perspectives of Impact, Vulnerability and Adaptation* (Edward Elgar Cheltenham 2002) 32–47 at 34–35.

6 See D McEvoy, D L Lonsdale and P Matczak *Adaptation and Mainstreaming of EU Climate Change Policy: An Actor-based Perspective* (January 2008) Centre for European Policy Studies no 149; A Prutsch, S McCallum, I Grothman, I Schausser and R Swart 'Modify existing and develop new policies, structures and processes' in A Prutsch, T Grothman, S McCallum, I Schausser and R Swart (eds) *Climate Change Adaptation Manual: Lessons Learned From European and Other Industrialised Countries* (Routledge New York 2014) 246–71; and C J Uittenbroek 'How mainstream is mainstreaming? The integration of climate adaptation into urban policy' (diss. Utrecht University 2014).

7 See COM(2013) 216.

8 See H K Gilissen *Adaptatie aan klimaatverandering in het Nederlandse waterbeheer: Verantwoordelijkheden en aansprakelijkheid* (Kluwer Deventer 2013).

into the developments concerning this approach in a broader context. To this extent, the coming of age of the adaptation approach within the international climate debate as an ever more adhered to approach in combating the adverse effects of climate change will be addressed first (section 2). Secondly, the major policy developments giving further substance to the adaptation approach within the EU and the Netherlands will be discussed (section 3). Relevant adaptation provisions in the legal systems of flood risk management at both levels in a descriptive and evaluative way are examined in section 4, by means of a quick scan. Finally, some overall conclusions are set out in section 5.

2 THE COMING OF AGE OF THE ADAPTATION APPROACH⁹

Ever since the 1970s there has been a vivid international scientific debate on climate change. As time progressed, this debate became more and more political. During the 1988 Conference on the Changing Atmosphere in Toronto – which was attended by both scientists and state representatives – it was solemnly declared that the global emission of greenhouse gases should be strongly (ie 20 per cent) reduced by 2005. Furthermore, inter alia, the need for a legally binding international agreement was stressed in order to be able to achieve these goals.¹⁰ Thus, the focus of the international climate debate was set: climate change was declared to be a ‘common concern of human kind’,¹¹ and a strong belief took root that this threat could only be repelled by mitigation measures. The malleability of the global climate – which can be viewed as a characteristic of ‘the positive spirit of the 1990s’ – became the starting point of negotiations on the conclusion of the United Nations Framework Convention on Climate Change (UNFCCC).¹² This makes clear that during the early stages of the climate debate, the so-called ‘limitationist approach’ became prevalent; adaptation to climate change was generally viewed as a fatalistic, obstructionist, lazy, arrogant and anti-environmental approach.¹³

Indeed, the early ‘adaptation approach’ actually asked for antipathy, as it factually proclaimed a passive attitude towards climate change by putting trust into the ‘invisible hands’ of natural adaptation capacity and market forces: adaptation would take place of itself without any human intervention.¹⁴ Surprisingly, the more the feasibility of achieving global success with mitigation measures was questioned the more this approach gained increasing

support. Despite the fact that the UNFCCC, the Kyoto Protocol and eventually (only) political agreements were concluded,¹⁵ mitigation action has not yet proven as effective as these global (be they legal or political) agreements are meant to be. This seemed to be fertile soil for the adaptation approach to evolve into a conceptually more active one, proclaiming adaptation measures to be taken by human hands.¹⁶ According to Nordhaus: ‘Mitigate we might; adapt we must!’¹⁷

Thus, after a relatively long period of aversion, the adaptation approach favoured during the mid-1990s came to be generally accepted as a necessary reaction to climate change by the beginning of the new millennium, explicitly in addition to mitigation.¹⁸ In the course of the first decade of the 21st century, adaptation and mitigation were viewed as complementary approaches with promising synergetic effects, if ‘optimally mixed’.¹⁹ This approach to climate change – which came to be known as the ‘realistic approach’ – soon became prevalent.²⁰

The birth of this realistic approach, however, seems not to be the final stage in the coming of age of the adaptation approach, as in its latest report of 2014 the IPCC placed an even stronger focus on adaptation as an ever more independent approach beside mitigation.²¹ This, of course, does not mean the limitationist approach was formally – or will ever or even should be²² – rejected, but it can be interpreted as the adoption of a somewhat more realistic attitude towards mitigation: as long as there is no certain and convincing proof of the limitationist approach being effective in due time, adaptation in the short term becomes the most realistic approach for combating the adverse effects of climate change.

This development towards ‘independency’ cannot be ignored. It is to be expected that this trend will continue in the next few decade(s) and that scientific and political attention to adaptation will increase even more. This might eventually mean that the adaptation approach becomes prevalent. The coming of age of the adaptation approach within the international political and scientific climate debate has put adaptation on the policy agenda at lower institutional levels. This approach, however, particularly requires extensive elaboration at these lower levels,

15 See for instance D Bodansky ‘The Copenhagen Climate Change Conference: a postmortem’ (2010) 104(2) *The American Journal of International Law* 230–40 on the conclusion of political agreements in the Copenhagen Accord.

16 See in general Schipper *Exploring Adaptation to Climate Change* (n 14) and Schipper ‘Conceptual history of adaptation in the UNFCCC process’ (n 14).

17 See W D Nordhaus *Managing the Global Commons: The Economics of Climate Change* (Massachusetts Institute of Technology Cambridge 1994) 189.

18 See IPCC 2001 (n 4).

19 See S M Kane, J F Shogren ‘Linking adaptation and mitigation in climate change policy’ (2000) 45(1) *Climatic Change* 75–102.

20 See Fourth Assessment Report of Working Group II of the IPCC *Climate Change 2007: Impacts, Adaptation and Vulnerability* <http://www.ipcc.ch/report/ar4/> (IPCC 2007). See also T J Wilbanks, S M Kane, P N Leiby, R D Perlack, C Settle, J F Shogren and J B Smith ‘Possible responses to climate change: integrating mitigation and adaptation’ (2003) 45(5) *Environment* 28–38 at 31–32.

21 See Fifth Assessment Report of Working Group II of the IPCC *Climate Change 2014: Impacts, Adaptation and Vulnerability* <http://www.ipcc.ch/report/ar5/> (IPCC 2014).

22 The limitationist approach falls outside the scope of this article, which explicitly does not imply it should be neglected, nor rejected as an important approach in combating climate change and its adverse effects.

9 Parts of this section have previously been published as a column at <http://www.starflood.eu/category/column/>. See also Gilissen *Adaptatie aan klimaatverandering in het Nederlandse waterbeheer* (n 8) 20–38 for a more extensive elaboration of the developments within the climate debate.

10 See ‘The changing atmosphere: implications for global security’ Toronto Conference Statement (June 1988) 296–97; J Jäger ‘From conference to conference’ (1992) 2 *Climatic Change* iii–vii (editorial).

11 See also Resolution 43/53 of 6 December 1988 and Resolution 44/207 of 22 December 1989 of the UN General Assembly.

12 See generally D Bodansky ‘The United Nations Framework Convention on Climate Change: a commentary’ (1993) 18(2) *Yale Journal of International Law* 451–558.

13 See R A Pielke ‘Rethinking the role of adaptation in climate policy’ (1998) 8(2) *Global Environmental Change* 159–70 at 162.

14 See E L F Schipper *Exploring Adaptation to Climate Change: A Development Perspective* (University of East Anglia Norwich 2004) 49 and E L F Schipper ‘Conceptual history of adaptation in the UNFCCC process’ (2006) 15(1) *Review of European Community and International Environmental Law* 82–92 at 88.

as in fact it only provides a framework for developing more concrete regulations, strategies and plans of measures, based on regional needs and relevant circumstances of any kind.

3 ADAPTATION POLICY DEVELOPMENTS: ELABORATION OF THE ADAPTATION APPROACH

In the literature it has been argued that the international climate regime (ie the UNFCCC and related documents and decisions) is not a major source of adaptation responsibilities,²³ but that especially the international scientific and political climate debate proved to have an agenda-setting effect.²⁴ Indeed, the EU and many of its Member States – including the Netherlands – from the first decade of this century onwards have put increasing effort into drafting adaptation policies, further elaborating the adaptation approach.²⁵ There has always been a strong interaction between these developments and the coming of age of the adaptation approach as described above, as these developments were mainly prompted by this fast-rising approach, whilst at the same time contributing to its evolution.

Moreover, as the first notions of the adaptation approach at both institutional levels emerged, more recent developments took place on parallel, overlapping, highly intertwined and eventually integrated tracks. As a last general remark, whereas the first notions of adaptation mainly represented rather vague and abstract policy ambitions, the latest developments – especially at lower institutional levels – aim at achieving far more concrete objectives, although the overall conclusion remains that ‘we’re not there yet’.²⁶ The most relevant developments are discussed further below.

3.1 Developments at the EU level

Whereas early EU climate policy focused principally on mitigation,²⁷ the first policy domain for the adaptation

approach to emerge was the domain of flood risk management. Over time, flood risks across the EU were expected to increase in severity, mainly as a result of climate change, increasing population density and concentration of economic activities in flood-prone areas. In a Communication of 12 July 2004 the Commission stressed that coordinated and integrated action would considerably contribute to the effectiveness of the overall level of long-term protection against floods across the Community (Union).²⁸ Flood risk management, according to the Commission, should aim at limiting both the chance and the consequences of floods by virtue of a programmatic approach, focusing on prevention, protection, preparedness, crisis management and recovery.²⁹

Eventually, on 18 January 2006 the legislative proposal for the Directive on the assessment and management of flood risks was submitted, introducing a programmatic, phased and cyclic approach to flood risk management, giving the Member States considerable policy discretion to determine their objectives and to choose their strategies and measures, but also enjoining them to take into account the likely impacts of climate change on the occurrence of floods.³⁰ The proposal was adopted on 23 October 2007 and entered into force on 26 November 2007. It soon came to be known as the Floods Directive (FD).³¹

As the developments in the policy domain of flood risk management rushed towards the enactment of the FD in 2007, the Commission explicitly emphasised the importance of addressing adaptation to climate change in a more integral manner in its Communication of 9 February 2005.³² The first official EU policy document in which adaptation was addressed in an integral manner was the Green Paper of 29 June 2007.³³ This Green Paper elaborated on the effects of climate change for the EU and its Member States, distinguishing vulnerable areas, area types and (social) sectors. Moreover, it aimed at raising awareness and creating a solid knowledge base through integrated scientific and applied research, in anticipation of the establishment of a comprehensive European Adaptation Strategy (EAS) by 2013.

Over and above this, in order to develop the policy ambitions outlined in the Green Paper even further, in April 2009 the White Paper on Adaptation was published,³⁴ paving the way for the establishment of the EAS and for mainstreaming the concept of adaptation into sectoral policy domains, namely public health, agriculture, forestry, biodiversity, ecosystems, water, marine and coastal areas, production systems and infrastructure.³⁵ The water sector was addressed in further detail in a working document accompanying the White Paper,³⁶ which inter alia referred

23 As it was concluded in 1992 and entered into force in 1994, the UNFCCC exudes a strong sense of the limitationist approach. See P Sands ‘The United Nations Framework Convention on Climate Change’ (1992) 3 *Review of European Community and International Environmental Law* 270–77; Bodansky (n 12); R Verheyen ‘Adaptation to the impacts of anthropogenic climate change: the international legal framework’ (2002) 11(2) *Review of European Community and International Environmental Law* 129–43; and Verheyen *Climate Change Damage and International Law* (n 4).

24 See Gilissen *Adaptatie aan klimaatverandering in het Nederlandse waterbeheer* (n 8) 56.

25 See for instance R Swart, R Biesbroek, S Binnerup and others *Europe Adapts to Climate Change: Comparing National Adaptation Strategies* PEER Report no 1 (Partnership for European Environmental Research Helsinki 2009); J Klostermann, J Gupta and R Biesbroek ‘Multilevel klimaatbeleid in Nederland: mitigatie en adaptatie’ (2009) 4 *Bestuurskunde* 17–26; D Ellison ‘Addressing adaptation in the EU policy framework’ in E C H Keskitalo (ed) *Developing Adaptation Policy and Practice in Europe: Multi-level Governance of Climate Change* (Springer Dordrecht 2010) 39–96; G R Biesbroek and others ‘Europe adapts to climate change: comparing national adaptation strategies’ (2010) 20(3) *Global Environmental Change* 440–50; and Gilissen *Adaptatie aan klimaatverandering in het Nederlandse waterbeheer* (n 8) ss 3.3, 4.2.

26 See Gilissen *Adaptatie aan klimaatverandering in het Nederlandse waterbeheer* (n 8) 440–42.

27 See for instance the fifth (1992) and the sixth (2002) European Environmental Action Programmes, in which mitigating anthropogenic climate change was addressed as one of the major challenges within the EU environmental policy field for the years to come.

28 See COM(2004) 472.

29 See COM(2004) 472 at 4.

30 See COM(2006) 15 at 5–6.

31 See in further detail F A G Groothuijs *Water weren: Het publiekrechtelijke instrumentarium voor de aanpassing en bescherming van watersystemen ter voorkoming en beperking van wateroverlast en overstromingen* (diss. Utrecht Instituut voor Bouwrecht Den Haag 2009) 111–118 and H F M W van Rijswijk, H J M Havekes *European and Dutch Water Law* (Europa Law Publishers Groningen 2012) 254–58. See also section 4 of this article.

32 See COM(2005) 35.

33 See COM(2007) 354.

34 See COM(2009) 147.

35 See COM(2009) 147 at 10–15.

36 See SEC(2009) 386.

to the previous developments within the framework of flood risk management, expressing that the full implementation and execution of the FD is considered to provide for an appropriate framework for a Union-wide integration of the concept of adaptation within this policy domain. No further EU (legislative) action was deemed necessary.³⁷

On 16 April 2013, the European Adaptation Strategy was eventually published.³⁸ Publication of the EAS marked a temporary end of the development of integral EU adaptation policy, as this strategy inter alia encourages Member States to adopt comprehensive National Adaptation Strategies (NASs) themselves, at the latest by 2017. In 2017, the Commission will assess the progress made by the Member States. If they appear to have failed in drafting comprehensive NASs, the Commission will immediately consider proposing binding EU adaptation legislation.³⁹ Water management is still an important pillar within the EAS, although the main focus concerning water is on the implementation of the Strategy on Water Scarcity and Droughts.⁴⁰ Attention to this aspect of water policy appears to have been somewhat overlooked in the EU from as long ago as 2007, despite the fact that progress on its implementation has regularly been evaluated and Member States have repeatedly been encouraged to do better.⁴¹ However, the EAS has paid less attention to flood risk management, as the implementation of the FD should have taken place at the latest on 26 November 2009⁴² – the same year the White Paper was published – and the first phased planning cycle was already in full swing at the time the EAS was published.

The concept of adaptation has found its way into EU flood risk policy and has developed into an integral and overarching EU policy domain as such. These policies, however, mainly reflect the rather simple notion of adaptation and express the need to integrate this approach into all relevant sectoral policy domains. On the basis of the principle of subsidiarity, the role of the EU, in particular the Commission, is complementary to the role of the Member States.⁴³ The Member States are primarily responsible for mainstreaming adaptation within their sectoral policies and for implementing and executing these policies themselves.

The role of the Commission is an initiating, facilitating, stimulating, information-sharing, awareness-raising, co-funding, coordinating, supervisory, evaluative and framework-setting one.⁴⁴ This role must not be underestimated, although it is clear that Member States have considerable discretion as to how to define their own adaptation objectives and the means by which they will pursue these goals. Given the high divergence regarding the regional effects of climate change, the national and regional levels are the appropriate levels at which extensively to elaborate the adaptation approach. At these levels, concrete adaptation

strategies and practically oriented plans of measures can understandably diverge greatly, as can – unfortunately – levels of ambition.⁴⁵

3.2 Developments at the Dutch domestic level

Near flood events during the last decade of the 20th century heralded a major change in the policy perception prevailing at that time on flood risk management in the Netherlands. During the first years of the new millennium issues concerning climate change, sea level rise and soil subsidence gave rise to the development of a new approach, addressing ‘water’ as one of the main guiding principles within the Dutch system of landscape planning.⁴⁶ This was first expressed in a policy paper of the Commission on 21st Century Water Management⁴⁷ and was later confirmed and further elaborated in a Government Memorandum and several administrative agreements, in particular the ‘Starting Agreement on 21st Century Water Management’ and the ‘National Administrative Agreement on Water Issues’.⁴⁸

The notion that protection against floods could no longer only be guaranteed by technical water safety measures became increasingly credible, and it was believed that water should be given more space to flow freely in periods of large water surpluses.⁴⁹ Given this notion, several programmes of measures were established, such as the programme ‘Room for the River’ and the project ‘Weak Coastal Links’, both mainly to retain or to create more space for water, in order to provide for proper protection against floods over the next decade or so.⁵⁰ Climate change being an important initial driver of these developments, it has been argued that the concept of adaptation in the Netherlands mainly originated within the policy framework of flood risk management some years before these developments took root at the EU level.⁵¹

The second half of the first decade of the new millennium is characterised as a period of integration, as the first integral adaptation policy documents emerged, and important steps were taken towards the establishment of a

45 See A M Keessen, H F M W van Rijswijk ‘Adaptation to climate change in European Water law and policy’ (2012) 8(3) *Utrecht Law Review* 38–50; A M Keessen and others ‘European river basin districts: are they swimming in the same implementation pool?’ (2010) 22(2) *Journal of Environmental Law* 197–222; and Y Uitenboogaart, J J H van Kempen, M Wiering and H F M W van Rijswijk *Dealing with Complexity and Policy Discretion: The Implementation of the Water Framework Directive in Five Member States* (Sdu Uitgevers Den Haag 2009).

46 See H K Gilissen, J Kevelam and H F M W van Rijswijk *Water en Ruimte: De bescherming van watersysteembelangen in het ruimtelijk spoor* (2nd rev edn Berghauser Pont Publishing Amsterdam 2014).

47 See Commission on 21st Century Water Management 2000 (Commissie Waterbeheer 21e eeuw) *Waterbeleid voor de 21e eeuw: Geef water de ruimte en de aandacht die het verdient* (Den Haag 31 August 2000).

48 See Starovereenkomst Waterbeleid 21e eeuw (2001) and Nationaal Bestuursakkoord Water (2003).

49 See Groothuijse (n 31) 27–29 and Van Rijswijk and Havekes (n 31) 259–63.

50 See for instance H K Gilissen, M Kok, J Edelenbos and others *Governance Analysis Case Noordwijk: ‘Weak Links’ Along the Coast* Paper for the Conference ‘Deltas in times of climate change’ (Rotterdam September 2010) and M H Winnubst *Turbulent Waters: Cross-scale Conflict and Collaboration in River Landscape Planning* (diss. Nijmegen Radboud University Nijmegen 2011).

51 See Klostermann, Gupta and Biesbroek (n 25) 21–23 and Gilissen *Adaptatie aan klimaatverandering in het Nederlandse waterbeheer* (n 8) 100–101.

37 See SEC(2009) 386 at 6.

38 See COM(2013) 216.

39 See COM(2013) 216 at 6.

40 See COM(2007) 414.

41 See COM(2008) 875; COM(2009) 147; COM(2010) 228; COM(2011) 133; and COM(2012) 673.

42 See FD art 17(1).

43 See COM(2013) 216 at 3.

44 See Gilissen *Adaptatie aan klimaatverandering in het Nederlandse waterbeheer* (n 8) 67–69.

system of integral water management, resulting inter alia in the entry into force of the Water Act in 2009.⁵² Partly in response to a Motion of Parliament,⁵³ the Dutch central government in 2006 initiated the national programme 'Adaptatie Ruimte en Klimaat' (ARK), stimulating the establishment of integral adaptation policy covering the policy domains of water, infrastructure and mobility, nature and biodiversity, rural areas, urban areas, recreation, public health and energy. Building upon the ARK, in 2007 a National Adaptation Strategy (NAS) was published as a comprehensive and thorough policy paper, clarifying climate risks according to sector and focus area, and setting the agenda for determining more concrete strategies based on pre-set sectoral and thematic adaptation objectives.

Despite the explicit aim for integrality of both the ARK and NA the main focus, however, was on flood risks and adaptation within the water management sector, as it was claimed that the effectiveness of adaptation within any sector is fully dependent on the effectiveness of adaptation in the water sector. Moreover, as another characteristic of this early adaptation policy, the aim of most policy objectives was principally on retaining current situations and protecting current interests, instead of internally adapting to changing climatic circumstances.⁵⁴

Not very surprisingly, the focus on adaptation within the water management sector seemed to dominate in the years to come.⁵⁵ In the course of 2007, the Dutch Cabinet established the (second) Delta Commission (DC) with the task of comprehensively advising on the protection of the Netherlands against the adverse long-term effects of climate change.⁵⁶ In its report of 2008, the DC concluded that over the coming decades the Netherlands would be facing major adaptation challenges regarding both flood risks and fresh water supply.⁵⁷ Concerning flood risks, it recommended increasing all safety levels of dike rings by a factor of 10, and expeditiously executing programmes of measures within the riverine region and alongside the coast, explicitly anticipating the long-term effects of climate change.⁵⁸

Another particular recommendation was to adopt a Delta Act, providing a legal basis for the appointment of a Delta Commissioner, and the establishment of a Delta Fund and a Delta Programme.⁵⁹ In October 2009 the Cabinet accepted the bill entitled the 'Delta Act on Water Safety and Fresh Water Supply', which entered into force on 1 January 2012, as a part of the above-mentioned Water Act of 2009.⁶⁰ By that time, a Delta Commissioner had already been appointed (2010) and the establishment of a Delta Programme (DP) was in preparation.

From 2010 until 2014, the Delta Programme has delivered five coherent and consecutive reports. The first report (DP 2011) aimed at exploring the major long-term challenges in flood risk management, and roughly charted possible long-term adaptation strategies.⁶¹ The reports published in 2011 and 2012 (DP 2012 and DP 2013) further examined and analysed the challenges and strategies, and started paving the way for making so-called Delta Decisions by 2014.⁶² Based on the assessment of 'promising strategies' in DP 2013,⁶³ DP 2014 presented a selection of 'preferred strategies' elaborated in further detail.⁶⁴ This eventually led to the publication of a Delta Decision in 2014 (DP 2015),⁶⁵ which has to be implemented in the strategic water policy (water plan) by 2015 and in the law (Water Act) by 2017, and from then on will be the leading strategy in Dutch flood risk management and will function as a central principle in establishing programmes of measures.

The new safety standards will represent an annual general per capita probability of death caused by a flood event of 0.001 per cent (1:100,000), which for each area will be calculated by multiplying the consequences of a flood event and the chance of such an event. It is expected that all primary flood defence structures will meet the new safety standards by 2050. Another main feature of the DP 2015 is a moderate shift in strategy, to some extent reflecting the policy concept of 'multi-layered safety'.⁶⁶ The main strategy remains to prevent flood events by taking protective measures, such as building dikes and creating or retaining space for water. Under 'specific circumstances',⁶⁷ however, there is a possibility of 'smartly combining' protective measures with spatial flood mitigation measures and complementary preparation and disaster management in order to provide the required safety levels.⁶⁸

Having implemented this strategy in national water law and policy, the Netherlands will presumably meet the requirements resulting from the EU Floods Directive.⁶⁹ Moreover, it can be argued that the adaptation approach is adequately mainstreamed within the policy framework of Dutch flood risk management. Of course, it might develop further over time, as climate change and adaptation will remain subject to continued vigilance, but to date the integration process can be considered as finalised. This is, however, not necessarily the case for other sectors, such as energy, ICT, infrastructures and public health, as preliminary research shows sector-specific climate risks in combination with low levels of awareness.⁷⁰ For these

52 See Van Rijswijk and Havekes (n 31) 108–113.

53 See Motion Lemstra of 21 March 2005 (Parliamentary Documents I 2004/05, XXI-C).

54 See P J J Driessen and H F M W van Rijswijk 'Normative aspects of climate adaptation policies' (2011) 2(4) *Climate Law* 559–81.

55 See S Schaap *Klimaat en overstroming: Een verleidelijk verband* (oration Delft Technical University Delft 2010).

56 See *Government Gazette* (2007) 179.

57 See Delta Commission (Commission Veerman) *Samen werken met water: Een land dat leeft, bouwt aan zijn toekomst: Bevindingen van de Deltacommissie 2008* (Den Haag 2008) 25–27, 29–31.

58 The recommendation to increase safety levels by a factor of 10 was eventually disregarded in 2013.

59 See Delta Commission (n 57) 77–85.

60 See section 4 of this article.

61 See DP 2011 at 56–67 and Annex 2.

62 See DP 2012 at 15–18, 20–43 and DP 2013 at 35–42.

63 See DP 2013 at 43–46.

64 See DP 2014 (Deltaprogramma 2014 *Werk aan de Delta: Kansrijke oplossingen voor opgaven en ambities* (Den Haag 2013)) 94–97.

65 See DP 2015 at 16–23. In total, five Delta Decisions have been taken. One addressed water safety and the others addressed fresh water supply, spatial adaptation, the Lake IJssel region and the Rhine–Meuse Delta.

66 See D L T Hegger, P J J Driessen, C Dieperink and others 'Assessing stability and dynamics in flood risk governance: an empirically illustrated research approach' (2014) 28 *Water Resource Management* 4127–42.

67 For instance, when safety measures are extremely costly or have disproportionate societal effects.

68 See DP 2015 (n 65) 16, 19.

69 See section 4 of this article.

70 See H Runhaar, H K Gilissen, C Uittenbroek, H L P Mees and H F M W van Rijswijk *Publieke en/of private verantwoordelijkheden voor klimaatadaptatie: Een juridisch-bestuurlijke analyse en eerste beoordeling* (Utrecht University Utrecht 2014).

(and other) sectors, mainstreaming the adaptation approach is one of the challenges for the years to come.

Recent developments show slow but steady progress in the 'recalibration' of the 2007 National Adaptation Strategy. This is partly driven by developments and incentives at the EU level (EAS) and should eventually lead to the establishment of a comprehensive and fully integral National Adaptation Strategy by 2017.⁷¹ The discussion above precludes important shifts regarding adaptation. Adaptation within the water management sector is taken to another level, as the new strategy has to be converted into concrete plans of measures, both at national and regional levels. In addition, there is a shift in focus: as the 'precondition' of increasing adaptability in flood risk management – at least in theory – seems to be met, more attention can now be paid to mainstreaming adaptation in other policy domains.

4 LEGAL INTEGRATION OF THE ADAPTATION APPROACH

The adaptation approach emerged in the international political and scientific arena and underwent major conceptual shifts through time. As the notion of the necessity of adaptation action grew, this approach took root in the policy at lower institutional levels. Both at the EU and the Dutch national level it first started to develop within the policy domain of flood risk management, but soon also grew as a more integral policy domain itself. Moreover, the adaptation approach at both levels found its way into the legislation on flood risk management, namely the Floods Directive and the Water Act. This must not, however, be considered as an independent development, but rather as one of the particular results of the developments described above, as it was mainly done to establish a legal framework for future adaptation action and to facilitate further adaptation policy developments concerning flood risks. This progression will be discussed further below.

4.1 The integration of the adaptation approach in the EU Floods Directive

The Floods Directive (FD)⁷² builds upon the framework established in the 2001 Water Framework Directive. Its purpose is to establish a framework for the assessment and management of flood risks, aiming at the reduction of the adverse consequences for human health, the environment, cultural heritage and economic activity associated with floods in the EU.⁷³ The FD is characterised by a phased and cyclical approach. Each cycle consists of three phases, namely the phase of undertaking preliminary flood risk assessments and identifying flood risk areas, the phase of preparing flood hazard maps and flood risk maps, and the phase of establishing flood risk management plans.⁷⁴ Each cycle takes six years, so whereas the first 'generation' of flood risk management plans must be completed by 22 December 2015, the next generation

must be completed by 22 December 2021, and so on, going through all consecutive preparatory phases in each cycle.⁷⁵

According to Article 7 FD and Part A of the Annex, the flood risk management plans must consist of the conclusions of the preliminary flood risk assessment, delineating the flood risk areas that are subject to the plan; the flood hazard maps and flood risk maps and a conclusion that can be drawn from those maps; a description of the appropriate objectives of flood risk management; and a summary of the measures and their prioritisation aiming to achieve those objectives. The Member States have considerable policy discretion to determine their objectives, as well as to choose their strategies and measures.⁷⁶

During each consecutive cycle, the assessments, maps and plans must be reviewed and, if necessary, updated. As the FD in its preamble explicitly highlights climate change as a factor that contributes to an increase in the likelihood and adverse impacts of flood events,⁷⁷ the likely impact of climate change on the occurrence of floods must be taken into account in the consecutive reviews of the preliminary flood risk assessments and flood risk management plans.⁷⁸ The requirement periodically to review and update the assessments and plans for the Member States implies a duty to conduct research into climate change and its impacts on the occurrence of flooding.⁷⁹ The adverb 'likely' implies that only the impacts of climate change that could reasonably be expected on the basis of current knowledge (state of the art) must be taken into account in the reviews, as well as in undertaking and establishing new generations of flood risk assessments and flood risk management plans.

In order to determine which impacts are 'likely', Member States, however, must investigate a broader range of *possible* impacts of climate change on the occurrence of floods, automatically contributing to the increase of knowledge. Moreover, new insights into climate change and its effects on flood risks have to be taken into account in new planning cycles, and can lead to adjustments of new generations of plans every six years, making flood risk management across Europe more adaptive step by step.

Thus, there is a legal obligation for Member States to have fully integrated adaptation policies within their flood risk management policies, at the latest by 2021. The Member States, however, are encouraged to do so earlier in their first generation of flood risk management plans.⁸⁰ The introduction of a phased and cyclic approach can be considered especially as an appropriate way to address climate issues within flood risk management. This fits well with the main characteristics of climate change, namely that climate change as such is a process with rather high levels of uncertainty regarding its concrete effects through time. This, moreover, fits well with the ever-continuing but never completed developments in knowledge and insights into this process; policy decisions can at best be based on the current state of the art.

71 See Planbureau voor de Leefomgeving *Aanpassen met beleid: Bouwstenen voor een integrale visie op klimaatadaptatie* (Den Haag PBL 2013).

72 For closer reading, see for instance Van Rijswijk and Havekes (n 31) 254–58 and Groothuijse (n 31) 111–118.

73 See FD art 1.

74 *ibid* arts 4, 5, 6 and 7.

75 *ibid* art 14.

76 See Van Rijswijk and Havekes (n 31) 210.

77 See FD Consideration 2 of the preamble.

78 *ibid* art 14(4) and Consideration 14 of the preamble.

79 See Gilissen *Adaptatie aan klimaatverandering in het Nederlandse waterbeheer* (n 8) 85–87.

80 As can be derived from FD art 4(2).

Another characteristic of climate change, namely that its effects can highly differ from region to region, is appropriately covered by the FD, as well as the fact that regional circumstances – such as population density and the concentration of (socio)economic activities – can differ significantly and might change over time. In this respect, it is understandable that the main responsibility to determine adaptation objectives and formulate concrete strategies lies fully with the Member States, as does the responsibility for appointing competent authorities for the execution of these strategies by virtue of concrete plans of measures.⁸¹

Nevertheless, there is a downside to this approach. The FD, being a typical example of a framework directive, does not prescribe any explicit objectives, strategies or types of measures by which these objectives must be pursued. It grants the Member States a large measure of policy discretion. This might entail that policy ambitions and ways in which responsibilities have internally been allocated will differ greatly across the Union. From a transboundary perspective, this can be problematic within river basins, as this might put the coordination objectives of the FD and even the solidarity principle – which is at the very heart of the directive⁸² – under pressure.⁸³

In other words, as the responsibilities for the Member States as individual addressees of the FD – although generally formulated – are clear, the effectiveness of their measures and the effectiveness of the FD as such is also dependent on the efforts other Member States put into flood risk management. This is a well documented phenomenon in EU water law.⁸⁴ Problems such as these can be obviated by increasing transboundary cooperation and coordination of policy objectives between Member States within a river basin, or at least between neighbouring Member States. However, ultimately the effectiveness depends on the political willingness of the Member States to cooperate.⁸⁵

In addition to this, the question can be raised whether and to what extent the Water Framework Directive (WFD) – as the overarching legal framework for EU water law – provides appropriate instruments for adaptation to climate change. It should first be mentioned that the WFD is not primarily important for flood risk management, although it is for other climate related issues of water quantity management, for instance regarding drought and water scarcity. In fact, the EU strategy on drought and water scarcity is mainly to be implemented by means of the instruments provided for in Article 9 WFD (cost recovery).⁸⁶

81 *ibid* art 3(2)(a).

82 See FD Consideration 15 of the preamble.

83 See Keessen and Van Rijswijk (n 45); Keessen and others (n 45); and Uitenboogaart and others (n 45).

84 See H F M W van Rijswijk, H K Gilissen and J H H van Kempen 'The need for international and regional transboundary cooperation in European river basin management as a result of new approaches in EC water law' (2010) 11(1) *ERA Forum* 129–57.

85 See J J H van Kempen *Europees waterbeheer: eerlijk zullen we alles delen?* (diss. Utrecht Boom Juridische Uitgevers Den Haag 2012); Van Rijswijk, Gilissen and Van Kempen (n 84); and H K Gilissen *Internationale en regionaal-grensoverschrijdende samenwerking in het waterbeheer* (Sdu Uitgevers Den Haag 2009).

86 In a broader context, see P E Lindhout 'Cost recovery as a policy instrument to achieve sustainable and equitable water use in Europe and the Netherlands' (diss. Utrecht University Utrecht 2015). See also COM(2007) 414; COM(2008) 875; COM(2010) 228; COM(2011) 133; and COM(2012) 673.

Unlike in the FD, no explicit adaptation provisions have been included in the WFD, most likely because adaptation during the legislative procedure of the directive was not a (political) issue as important as it became in the course of the first decade of the 21st century.⁸⁷

The wording of the WFD, however, leaves much room for interpretation, and its programmatic approach at first glance seems to be promising for the implementation and integration of the adaptation approach in EU and domestic water policy.⁸⁸ As long as the effectiveness of the programmatic approach and the enforceability of the WFD remains questionable,⁸⁹ this integration is not very likely to succeed. To improve the current situation, in the literature amendments of the WFD (especially Articles 4 and 9) have been suggested, and moreover the need for more clarity about the exact status of the directive's objectives has explicitly been underscored.⁹⁰

4.2 The integration of the adaptation approach in the Dutch Water Act

The entry into force of the Dutch Water Act (WA) in 2009 introduced a new era of integrated water management, as nine former acts concerning sectoral aspects of water management, including the Flood Defence Act, were integrated into one piece of legislation.⁹¹ The main objective of the WA is to prevent and, where necessary, limit flooding, swamping and water shortage, while simultaneously protecting and improving the chemical and ecological status of water systems, and allowing water systems to fulfil societal functions.⁹² Concerning fluvial flood risks, for dike rings concrete safety standards have been set in Annex II of the WA.⁹³ Also for secondary flood defence structures safety standards have been set by Order in Council or Provincial Order.⁹⁴ Finally, for water nuisance (average annual overtopping probability) standards have been set by Provincial Order.⁹⁵ For pluvial floods (rainwater run-off) no legal standards apply.⁹⁶

87 Early European climate policy strongly focused on mitigation (see for instance the 6th Environmental Action Programme). The adaptation approach only emerged within EU environmental and climate policy after 2005 (see COM(2005) 35 and section 3 above). See McEvoy, Lonsdale and Matczak (n 6) 3.

88 See Keessen and Van Rijswijk (n 45).

89 See Lindhout (n 86). See also Case C–525/12 *Commission v Germany* (ECJ 11 September 2014) and P E Lindhout, H F M W van Rijswijk 'The effectiveness of the principle of recovery of the costs of water services jeopardized by the European Court of Justice' (2015) 12 *Journal of European Environmental & Planning Law* 78–92.

90 See Van Rijswijk and Havekes (n 31) 356–62; J J H van Kempen 'Countering the obscurity of obligations in European Environmental law: an analysis of art 4 of the European Water Framework Directive' (2012) 24(3) *Journal of Environmental Law* 477–97; Gilissen *Adaptatie aan klimaatverandering in het Nederlandse waterbeheer* (n 8) 87–93, 445–48; and (integrally) Lindhout (n 86).

91 There is no room for an in-depth discussion of the WA and the Dutch system of integral water management here. See further H J M Havekes, P J de Putter (eds) *Wegwijzer Waterwet 2014: Een praktische handleiding* (Kluwer Deventer 2013); Van Rijswijk and Havekes (n 31); Groothuijse (n 31). An English translation of the WA is available at <http://www.helpdesk.water.nl/algemene-onderdelen/serviceblok/english/legislation/@29167/dutch-water-act/>.

92 See WA art 2.1(1). The WA is based on art 21 of the Dutch Constitution: 'It shall be the concern of the authorities to keep the country habitable and to protect and improve the environment'.

93 See WA art 2.2(1).

94 *ibid* art 2.4.

95 *ibid* art 2.8.

96 This, however, does not mean there is no government responsibility to prevent or limit these types of floods, although these responsibilities are not discussed in further detail here. See WA art 3.5 and EMA (Environmental Management Act) Title 10.5.

The standards mentioned above give shape to the legal duties of care of the water management authorities, which have been assigned responsibilities on the basis of Chapter 3 of the WA.⁹⁷ This will remain the same after the standards have been amended, most likely by 2017.⁹⁸ Based on the regional needs and circumstances, the water management authorities must further interpret and elaborate these duties, referred to as their management tasks, in their management plans (plans of measures).⁹⁹ By doing so, they must take into account strategic policies and objectives which, in the light of the statutory objectives and standards mentioned above, have been set in strategic water plans, both at the national and at the provincial levels.¹⁰⁰ They are also responsible for executing the measures as laid down in their management plans. All plans mentioned have to be revised and updated at least once every six years.¹⁰¹

Thus, a cyclical systematic approach and, as far as flood risk issues are concerned, legal safety standards characterise the Dutch system of integral water management, as does the particular way in which it has been organised institutionally.¹⁰² The adaptation approach has mainly been embedded within this legal system by means of the Delta Act on Water Safety and Fresh Water Supply, which entered into force in 2012 as an integral part of the Water Act.¹⁰³ In addition, for legal provisions about the Delta Programme,¹⁰⁴ this new legislation provides for the obligation that the national water plan, from 2015 onwards, must contain a vision on the desired developments concerning flood risk management (and fresh water supply), taking into account the expectations about the adverse effects of climate change and covering a period of at least 40 years.¹⁰⁵

In other words, long-term adaptation strategies and objectives have to be integrated within the national strategic water policy, and must be revised and updated every six years according to the latest insights and experiences. In conjunction with this vision, the Delta Programme must indicate annually which concrete measures and provisions of national interest are to be implemented over the next period of six years to prevent or limit floods.¹⁰⁶ It shall also contain an indicative overview of strategies and measures preferably to be implemented during the following period of 12 years.¹⁰⁷ Thus, the Delta Programme constantly provides an input for long-term national adaptation policy based on newly generated insights¹⁰⁸ and, moreover, is at the basis of developing more concrete and

short-term adaptation projects and plans or programmes of measures.

The legal adaptation provisions in the WA are mainly directed towards the central government. This does not mean that regional planning authorities (provincial executives) and regional water management authorities do not have to take into account the effects of climate change within their strategic and executional planning, as – based on the principle of due care – there is a general obligation to investigate and take into account all relevant facts and circumstances.¹⁰⁹ Their representative organisations, moreover, take part in the establishment of many kinds of administrative agreements concerning adaptation to climate change, such as the National Administrative Agreement on Water Issues. These representatives also have a say in the establishment of strategic policy at the central level¹¹⁰ and play an important role within the ongoing process of annually establishing and implementing the Delta Programme.¹¹¹

Finally, decentralised authorities play an essential role in concrete project development and execution within the framework of nationally established and directed plans and programmes of measures, such as the programme ‘Room for the River’, the ‘Weak Links’ project, and the ‘Flood Protection Programme’. As a matter of course, they will also play such a role in the organisation and execution of future adaptation and flood risk management projects, plans and programmes.¹¹² To implement these further in daily practice, the concrete instruments at their disposal – mainly enshrined in Chapters 5 and 6 of the Water Act – are generally deemed to be sufficient in the literature.¹¹³

In this context it could be argued that the adaptation approach has appropriately been embedded within the (traditional) legal system of flood risk management, as the characteristics of this system provide ample opportunities for the specific features of climate change to be taken into account in a structured and future-oriented way. The strong focus on safety standards – which was reconfirmed in the latest Delta Programme – makes clear that flood *defence* is the dominant strategy in Dutch flood risk management. There are no obvious indications that this will change considerably in the (near) future, although there is a slight and tentative shift towards other strategies, namely flood mitigation, preparedness and crisis management.¹¹⁴

The Dutch adaptation approach, in other words, is a conservative one: it aims at maintaining possibilities for safe

97 See WA arts 3.1, 3.2.

98 See section 3 of this article.

99 See WA art 4.6.

100 *ibid* art 4.1, 4.4.

101 *ibid* art 4.8(1).

102 See H J M Havekes *Functioneel decentraal waterbestuur: borging, beschermings en beweging: De institutionele omwenteling van het waterschap in de afgelopen vijftig jaar* (diss. Utrecht Sdu Uitgevers Den Haag 2009).

103 See WA s 3.1A, art 4.1(2)(d), ch 4A and s 7.4A.

104 See section 3 of this article.

105 See WA art 4.1(2)(d). By doing so, the Netherlands will (most likely) comply with the requirements of the Floods Directive as discussed above.

106 See WA arts 4.9(2)(a), 4.9(5)(a).

107 See WA art 4.9(5) last sentence.

108 Scientific and applied studies on flood risk management can be part of the Delta Programme. These studies can be financed from the Delta Fund. See WA art 4.9(4) in conjunction with WA art 7.22a(2)(b).

109 See GALA (General Administrative Law Act) art 3:2. See Gilissen *Adaptatie aan klimaatverandering in het Nederlandse waterbeheer* (n 8) 135–37.

110 See WA art 4.3(1)(a).

111 *ibid* art 3.6d(1) WA in conjunction with arts 3.6b and 4.9(7).

112 Measures of national importance resulting from the Delta Programme will be financed from the Delta Fund. See WA art 7.22a(2)(a).

113 See H F M W van Rijswijk ‘Klimaatverandering en water; biedt het voorontwerp Waterwet voldoende instrumenten voor adaptief beheer?’ in S T Ramnewash-Oemrawsingh, T P de Kramer (eds) *Klimaatverandering en rechtsontwikkeling anno 2005: Preadvies VMR 2006-4* (Boom Juridische Uitgevers Den Haag 2006) 267–82 and – more recent, but like-minded – Gilissen *Adaptatie aan klimaatverandering in het Nederlandse waterbeheer* (n 8) 152–62.

114 This is referred to as the policy concept of ‘multi-layered safety’. See also section 3 of this article.

and undisturbed land use of any kind, now and in the future, even though climate change affects flood risks and many socio-economically important forms of land use take place below the sea level. Whereas the scope, division and allocation of responsibilities as to this legally embedded defence strategy are very clear, there is still uncertainty as to the other (emerging or possible¹¹⁵) strategies, mainly with regard to the scope and division of responsibilities. The reason for this is obvious, as these strategies do not (yet) have a sound and explicit legal basis. Fortunately, it is too early to consider this a lost cause, but regulation – at least to some degree – is a precondition for these strategies successfully to develop any further.

5 CONCLUSIONS

Conceptually evolving as an internationally ever more widely supported approach in combating the adverse effects of climate change during the last decade of the previous century, the adaptation approach started to extend its roots into the climate policy at lower institutional levels from the first years of the new millennium onwards. The first policy domain in which this approach started to develop and became fully integrated was the domain of flood risk management. An important step within this process was the adoption of explicit adaptation provisions in the legislation on flood risk management, both at the EU and at the Dutch national levels,

facilitating further substantive development of the adaptation approach.

Whereas the EU Floods Directive is deliberately intended as framework legislation, the Member States have policy discretion to determine their own adaptation objectives, as well as to decide by means of which strategies and measures they will pursue these goals. The Netherlands has chosen a future-oriented flood defence strategy, aiming to achieve newly developed safety standards mainly by means of building/strengthening flood defence structures and creating or retaining more room for surface water.

As to their appropriateness in terms of this article, it can be argued that both systems – by adopting a systematic and cyclic approach and by explicitly addressing climate issues in relevant legal provisions – provide adequate legal frameworks to respond to changing climatic circumstances and scientific developments. Responsibilities, moreover, are allocated at an appropriate institutional level and, although programmatically and for every project they need elaboration in further detail along the lines of the chosen strategy, should not be considered unclear. In this respect, important lessons could be learnt regarding the integration of the adaptation approach in other policy domains and socio-economic sectors, such as drought/water scarcity, ecology/water quality, landscape planning, energy, infrastructure, ICT, nature/biodiversity and agriculture.

115 Other strategies to distinguish are *risk prevention* and *compensation*. The former strategy, in short, aims at allowing floods, but preventing them from causing any damage, for instance by adopting building or land use prohibitions for certain flood-prone areas. The latter strategy, in short, also allows floods to occur, and mainly focuses on compensating any damages. However, there are possibilities to impose land use prohibitions and there is a compensation system for disaster relief; these are not principal features of Dutch flood risk management.