Federal Ministry for the
Environment, Nature Conservation,
Building and Nuclear Safety

Adaptation to Climate Change

Initial Progress Report by the Federal Government on Germany's Adaptation Strategy

Imprint

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Contents

Foreword

Dear Reader,

By the time the Paris Agreement was signed in 2015, it was already clear that climate change and climate adaptation are ongoing societal tasks which must concern us, both now and in the future. An ambitious climate protection programme aims to avoid and minimise adverse climate impacts worldwide and in Germany. However, there is no denying that climate change is already in full swing. Any responsible government must consider how societies and regions can adapt to climate change right now; and Germany is no exception.

Since 2009, the Interministerial Working Group 'Adaptation Strategy' (IWG Adaptation Strategy) has been working on actively advancing and supporting the "Joint Task for Climate Change Adaptation". The IWG Adaptation Strategy is a collaboration between all Federal Ministries, serving as a forum for the regular coordination of activities and continuous setting of new targets to meet Germany's requirements for climate change adaptation.

The 2015 Progress Report on Adaptation to Climate Change takes stock of our current position. This brochure outlines the current status of climate knowledge, our activities, and the options available.

Our aim is to get you involved in climate change adaptation. The earlier we start to incorporate climate change into our plans and activities, the less harm it will cause to society and our regions in future.

Or to quote Darwin: "It is not the strongest of the species that survives, nor the most intelligent that survives. It is the one that is most adaptable to change".

We welcome your interest and your involvement!

Your Interministerial Working Group 'Adaptation Strategy'

The Federal Government's Interministerial Working Group (IWG) 'Adaptation Strategy' is led by the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB). The Federal Foreign Office (AA), Federal Chancellery (BK), Federal Ministry for Finance (BMF), Federal Ministry of the Interior (BMI), Federal Ministry of Labour and Social Affairs (BMAS), Federal Ministry of Education and Research (BMBF), Federal Ministry of Food and Agriculture (BMEL), Federal Ministry for Defence (BMVg), Federal Ministry for Family Affairs, Senior Citizens, Women and Youth (BMFSFJ), Federal Ministry of Health (BMG), Federal Ministry of Transport and Digital Infrastructure (BMVI), Federal Ministry for Economic Affairs and Energy (BMWi) and Federal Ministry for Economic Cooperation and Development (BMZ) are all represented in the IWG Adaptation Strategy.

1 Climate change in Germany – We are preparing!

The effects are being felt – from the coast to the Alps

The effects of climate change can be seen and felt here in Germany. Rising sea levels, more frequent heat waves in cities and densely populated areas, and heavy rain and flooding with major damage to buildings and infrastructures are just some of the impacts already being felt.

However, other climate impacts, such as drought in certain regions, may impair biodiversity, forestry, agriculture and the energy sector. Examples include the regional spread of pests previously only seen in southern climes, and changes to the flowering times of (commercial) crops associated with a changing climate.

These examples show that climate change is not just a remote possibility; it is affecting the everyday lives of people in Germany right now. The question is,

- If developments are already visible today, how pronounced will their effects become in future? How severely will this affect individual regions?
- Which areas of society are particularly vulnerable to adverse climate impacts?
- What can we do to counteract this?
- Where can and must we take precautions?

Our regions are already visibly changing; we need to act now

Climate change is influencing our regions, both now and in the future. Our landscapes, our economic activities and the way we live together will change as a result. Over the coming decades, climate adaptation will become an on-going task.

The German Strategy for Adaptation to Climate Change (DAS), adopted in 2008, is now entering a new operational phase. This will entail scrutinising specific fields of action and their adaptation requirements even more closely than before. The core message here is that we are now in the transition phase from research to implementation.

Here are just a few examples:

- How will climate change affect the soil and our ecosystems, and in turn impact agriculture and forestry, for example?
- Which modifications must be made to our infrastructures? This is particularly important given the longer planning periods required.
- What are the anticipated impacts on areas such as health and tourism? Differentiated strategies are needed, depending on whether you are in a conurbation, the countryside, or a holiday region.
- How should planning legislation and processes in the regional planning sector be modified? This cross-sectional field of action can positively influence adverse climate impacts at an early stage (for example, by incorporating climate adaptation into development planning).

Focus on fields of action

Water

The "Water" cluster comprises the following fields of action:

- Water resources, water resource management,
- Coastal and marine protection and
- Fishery.

Land

The "Land" cluster comprises the following fields of action:

- Soil,
- Agriculture,
- Forestry & forest management, and
- Biological diversity.

Infrastructures

The "Infrastructures" cluster comprises the following fields of action:

- Building sector,
- Energy industry, and
- Transport/transport infrastructure.

Industry

The "Industry" cluster comprises the following fields of action:

- Trade and industry,
- Tourism industry, and
- Financial services industry.

Health

The "Health" cluster comprises the field of action "Human health".

Regional planning and civil protection

The "Regional planning and civil protection" cluster comprises two cross-sectional fields of action

- Spatial, regional and development planning, and
- Civil protection.

Chapter 6 examines these and other fields of action in greater depth with regard to their relevance for climate adaptation (cf. page 28 “Focus on fields of action”). One thing is clear: we need to step up our concerted efforts in these fields of action, to enable early adaptation to climate change.

Progress Report on the German Strategy for Adaptation to Climate Change: What has been achieved, what happens next?

The Progress Report on the German Strategy for Adaptation to Climate Change, published at the end of 2015, takes stock of nationwide activities and outlines the work programme for the next few years (Action Plan II). This brochure is based on the Progress Report, and as such does not include recent scientific developments.

Our intention is to inform decision-makers in politics and industry about the status of our nationwide work, and offer guidance for their own actions. Ideally, we would like more adaptation strategies and programmes to be created at Land and local authority level, to provide early, effective support to the Joint Task on Climate Change Adaptation.

Those responsible at Federal Government level are fully committed to this target and to maintaining a high standard of work. A progress report will be published approximately every four years, assessing and updating our combined work on climate adaptation measures.

Here is a link to the 2015 Progress Report (German only): www.bmub.bund.de/N52706/

2 Fact check – Climate change and its impacts

Recent climate research findings

In recent years, there has been a proliferation of scientific findings on climate change and its impacts (such as extreme weather events), both with regard to the status quo, and looking ahead to the future. The data situation and methodology in Germany provide a good basis for making the transition from knowledge to action.

Germany has adequate records dating back to 1881 for the two key meteorological variables – temperature and precipitation – to enable us to track climate changes. There is solid evidence that:

- The annual average air temperature in Germany rose by 1.2 degrees Celsius between 1881 and 2013 (area average).
- In terms of precipitation, winters have become significantly wetter since 1881 (10.6 percent rise in the amount of precipitation), while summers have remained virtually unchanged.

Climate models also give us a glimpse into the future, by providing projections on future climate development. 100% accuracy cannot be guaranteed, but the bandwidths and uncertainties for the near future are fairly small. Regional climate models with a resolution of approximately 25 x 25 kilometres have been developed to enable projections to be made at regional level, and linked to global models.

- A further temperature rise of 0.5 degrees Celsius is considered probable for the near future (up until 2050), while for the subsequent period up until 2100, projections suggest an increase of 1.5 degrees Celsius.
- Precipitation analysis indicates a trend for "less precipitation" in summer (minus 10 to 20 percent), and more precipitation in winter, which is expected to rise by 10 percent in the near future, and 15 percent in subsequent periods.

An analysis of extreme weather events is very informative, since this is one area where the general public feels the impact of climate change.

- Since 1951, the number of hot days (over 30 degrees Celsius) has increased from around three days to approximately eight days per annum (area average). By the middle of the century, this looks set to rise by a further five to ten hot days.
- An analysis of extreme precipitation shows that not only does it rain for longer in winter, but also more heavily. In the central German highlands, this trend is likely to intensify in future. If greenhouse gas emissions continue to rise, the North Sea coast may be more severely affected.

Key milestone – Monitoring of climate impacts

Monitoring weather changes is one thing. However, in future, regular monitoring will also be supplemented by a comprehensive overview of climate impacts and Germany's adaptation to them; an updated report will be published every four years, following on from the first report in 2015. The impacts of climate change are so wide-ranging that almost no segment of social, political or economic life will remain untouched over the next few years.

Time series allow us to monitor and record developments across multiple reporting periods. In future, we will therefore be able to track changes in climate impacts and how we are adapting to them – a milestone for climate stakeholders in Germany.

Here is a link to the 2015 Monitoring Report (German only): www.bmub.bund.de/N51892/

How susceptible is Germany to climate impacts?

As well as working to improve weather data and data on climate impacts and adaptation, the Federal Government is also committed to the precautionary principle. It is keen to identify which regions of Germany will be affected by climate change in future, and where we are most vulnerable to adverse climate impacts. We must get on the right track now and take early, proactive action to prevent economic and social damage associated with adverse climate impacts.

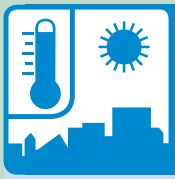
The Strategic Governmental Agencies Alliance or Vulnerability Network" (vulnerability is defined as susceptibility to adverse climate impacts) addresses this issue, and intends to build a picture of Germany's vulnerability to climate change, differentiated according to regions and topics. Chapter 3 (from page 15 onwards) outlines the other organisations linked to the DAS.

Before we present some of the key findings of their work, it is worth taking a look at the methodology used: as well as analysing climate data, it also links this to key regional data (such as population structure, economy, income, etc.), as the basis for making climate projections with regional relevance.

Despite major scientific advancements, there are still some gaps in our knowledge that would enable us to pinpoint how Germany's regions are affected by climate change. For example, there is a lack of data on strong winds (broad bandwidths and significant uncertainty) and on the development of rising sea levels along the German North and Baltic Sea coasts, such as local sedimentation and currents, and the associated increase in storm surges. Some deficits also remain with regard to socio-economic data and models which effectively correlate this data with sensitivity to climate change. In short, continuously advancing our knowledge is also an ongoing task.

Here is the link to the cross-sectoral analysis by the Vulnerability Network:
www.bmub.bund.de/N52580/

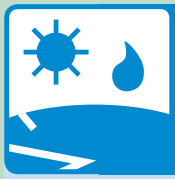
Overview of central challenges faced by Germany, classified according to thematic and regional vulnerability



Heat stress in conurbations

Action required: Pressures on human health, both outdoors, and in buildings and structures.

Where: Conurbations in areas that are already warm (will extend further)



Water use (in the distant future, summer drought)

Action required: Soils, forestry and forest management, and the energy industry.

Where: Regions with warm, dryer climates in eastern Germany and in the Rhine catchment area.

Heavy rain and flash floods: Damage to buildings and infrastructures

Action required: Water resources, water resource management, coastal and marine protection, construction sector, traffic, transport infrastructure, and industry and commerce.

Where: Conurbations in the north-west German lowlands, central German highlands and south-west Germany.

River flooding: Damage to buildings and infrastructures

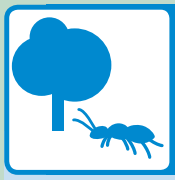
Action required: Water resources, water resource management, coastal and marine protection, construction sector, traffic, transport infrastructure, and industry and commerce.

Where: Conurbations in river valleys of the north German lowlands, as well as the catchment areas of the Rhine and Danube.

Coastal damage: (Becoming more pronounced in the distant future) – rising sea levels, more rough seas, and growing threat of storm surge

Action required: Coastal and marine protection, construction sector, traffic, transport infrastructure, and industry and commerce.

Where: Coastal regions.



Modified species and natural development phases

Action required: Human health, soil, biodiversity, agriculture, forestry and forest management, fisheries.

Where: Seas and rural regions.

How will Germany's regions be affected by climate change?

Germany's regions (natural spaces) are affected by climate change to varying degrees and in very different ways. The Rhine Valley and parts of east Germany are already suffering heatwaves. In the second half of this century, broad swathes of east Germany and parts of the Rhine catchment area will be affected by drought. The north German lowlands are generally vulnerable to river flooding, whereas central and southern Germany may experience severe damage from the rising incidence of heavy rain and flash floods. In future, coastal regions will suffer from rising sea levels, while mountain regions will experience above-average temperature rises plus more winter rain in place of snowfall.

Overview of regional affectedness:

- In **east Germany**, the limited availability of water and threat of droughts in summer are pivotal to its vulnerability. The climatic water balance, already unfavourable in some areas, will deteriorate further as a result of decreasing summer rainfall and higher evaporation. This will impact agriculture and forestry, as well as the transport sector (shipping). Furthermore, unless suitable action is taken, the catchment areas of the Elbe and the Oder will be extensively affected by flooding. Human health in the large conurbations in central east Germany could be adversely affected by particularly high summer temperatures and heat stress.
- In the **Upper Rhine Rift**, high temperatures are a particular problem. An area which already records some of the highest temperatures in Germany is expected to see the greatest temperature rise in future. Other parts of southern Germany will likewise experience above-average temperature rises. Combined with anticipated high population growth in these areas, this will pose a threat to health, exacerbated by the growing threat of flooding in early spring, triggered by more rainfall in winter rather than in summer, plus more frequent heavy rainfall and flash floods.
- The **mountains** will continue to experience fewer hot days than lower-lying regions, but average temperatures will rise disproportionately. In many areas, mountainous regions are particularly affected by climate change. Biodiversity in high mountain is especially vulnerable, characterised as it is by numerous endemic fauna and flora (only occurring in specific areas) whose opportunities to escape the impacts of climate change are limited. These regions also have many special microclimates and biotopes, making them more vulnerable than other regions. The risk of flooding and flash flooding is particularly high in the mountains.
- The **Central German Highlands** are only moderately affected by rising temperatures. The climate there tends to be cool and damp, and a warmer climate could even represent an opportunity for certain segments such as agriculture (for example better crop growth, longer vegetation periods). However, this region is highly vulnerable to flash floods and local flooding.
- **Coastal regions** are likewise only moderately affected by climate change. Although the immediate coastal regions are threatened by rising sea levels, whereby storm surges have the potential to cause extensive damage, these are long-term processes, and there are sufficient opportunities for adaptation. Agriculture, forestry and tourism in coastal regions may even benefit from the rising temperatures associated with climate change. By contrast, the fishing industry will be affected by species change (signs of which are already apparent) and changing reproduction patterns among native fish stocks.
- In **north-west Germany**, the effects of the ocean will help to ameliorate climate change impacts. With their moderate climates, most regions have a comparatively high tolerance range. Here too, agriculture and tourism, and to a certain extent the forestry sector, could potentially benefit from climate change, provided there is a sufficient water supply.
- Alongside the aforementioned regions, **wetlands** and **conurbations** will be particularly severely impacted by climate change unless suitable measures are taken. In wetland areas, water and biodiversity are particularly vulnerable, while in conurbation areas, human health (for example heat stress for local residents) and infrastructure (for example impairments to transport routes) will be particularly affected.

Regional affectedness and cross-sectoral impacts of climate change in Germany (near future)

Regions with warm climates

Regions characterised by heat and drought

In future:
- Spatial expansion
- In particular, more hot days and tropical nights

End of the century:
- More severe heat waves, probably with increasing incidence of drought
- Further spatial expansion

Regions with dryer climates

The driest regions of Germany have below-average year-round precipitation, coupled with sharp seasonable fluctuations in temperature and precipitation

In future, water resources may become further restricted as a result of:
- Trend towards higher summer and winter temperatures
- More hot days and tropical nights

End of the century:
- More severe heat waves, probably with increasing incidence of drought
- Further spatial expansion

Regions with cooler climates

Regions with moderate temperatures, many days with heavy rain and strong winds, minimal frosty and dry days

In future:
- Escalating potential for damage associated with extreme incidents, such as river flooding

End of the century:
- More frequent storm surges with rising sea levels

Densely populated areas as defined by the Conference of Ministers for Regional Planning

Zones prone to river flooding

Zones prone to flooding from storm surges

Low mountain climate regions

Regions with many days of frost and rainstorms, high summer and winter precipitation levels

In future:
- Rising precipitation in the winter months, more rarely as snowfall
- Higher average temperatures in summer and winter

Regions characterised by mountain foothill climate

Regions with above-average summer precipitation, many days of frost and heavy rain

In future:
- Rising summer temperatures and more hot days
- Intensified impacts caused by the projected growth in land use for settlement and transport infrastructure

Mountain climate regions

Regions with many days of heavy rain and frost, high precipitation levels

In future:
- Increase in heavy rain and winter precipitation, decrease in summer precipitation
- Above-average high temperature rises

Sources: Climate zone types: Own definition (evaluation of the DWD ensemble of climate models). MKRO densely populated areas 2010: Continuous regional monitoring by the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR), geometric basis by the German Federal Agency for Cartography and Geodesy (BKG), municipalities, 31 December 2013. Zones prone to river flooding: JRC 2013 (Distributed Water Balance and Flood Simulation Model, LISFLOOD) · Zones prone to flooding from storm surges: WasserBLIcK/Federal Institute of Hydrology (BfG) and the competent Länder authorities, 10.4.2014 · Federal Länder, municipalities: © GeoBasis-DE / BKG 31.12.2013

3 What is the German Adaptation Strategy *(DAS)*? – Key bodies and mechanisms

The German Strategy for Adaptation to Climate Change (DAS)

On 17 December 2008, the Federal Cabinet adopted the German Strategy for Adaptation to Climate Change (DAS), creating an important framework for this comparatively recent policy-making area. Today, the strategy has become an established component of the Federal Government's combined activities.

DAS – History of the German Strategy for Adaptation to Climate Change

2005

- Adoption of the national climate protection programme: Agreement on the development of a national strategy for adaptation to climate change

2008

- Cabinet resolution: The German Strategy for Adaptation to Climate Change (DAS)

2009

- Establishment of the Interministerial Working Group on Adaptation to Climate Change and the Federal/Länder Working Group on Adaptation to the Impacts of Climate Change

2011

- Cabinet resolution: Adaptation Action Plan (APA I)
- Establishment of the Vulnerability Network

2013

- COM communication: The EU strategy on adaptation to climate change

2014

- Publication of the monitoring report
- Publication of the vulnerability analysis

2015

- Cabinet resolution: First progress report on the German Strategy for Adaptation to Climate Change including Adaptation Action Plan II (APA II)
- Paris Climate Change Agreement

The content of the German Strategy for Adaptation to Climate Change is primarily the work of the Federal Government, but its mandate is clear: as well as being implemented by Federal Government, it should also enable other stakeholders to formulate their own adaptation strategies and programmes.

The German Adaptation Strategy is designed to be process-driven. Working in collaboration with the Federal Länder, municipalities and community groups, the risks of climate change will gradually be assessed, areas for action identified, targets defined, and suitable measures for adaptation developed and implemented.

The Adaptation Action Plan

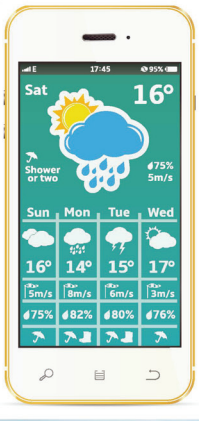
The 2011 Adaptation Action Plan (APA I) was the first step towards translating the DAS targets into specific activities. APA I was developed in dialogue between various Federal Ministries and closely coordinated with the Federal Länder, municipalities, academia and community groups. A second Adaptation Action Plan (APA II) has since been published together with the DAS Progress Report in 2015.

The Adaptation Action Plan I (APA I) can be found here: www.bmub.bund.de/fileadmin/bmu-import/files/pdfs/allgemein/application/pdf/aktionsplan_anpassung_klimawandel_en_bf.pdf

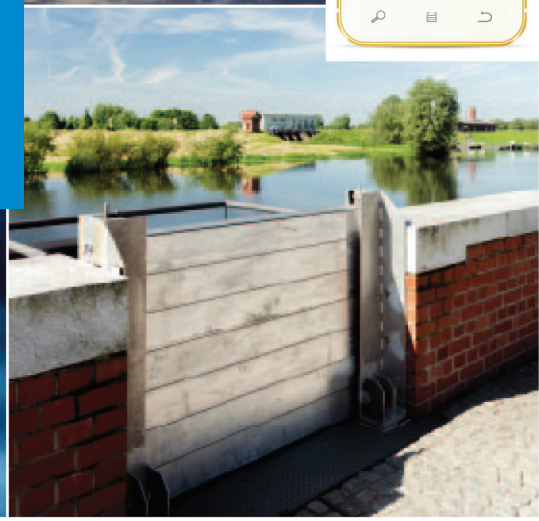
Principal bodies

As always, cooperative working forms are the key to successful networking and collaboration. The principal bodies in brief:

- **IWG Adaptation Strategy:** This Interministerial Working Group was set up to foster cooperation between the Federal Ministries. The IWG Adaptation Strategy was created shortly after the DAS was adopted in 2009.
- **Standing Committee on "Climate Change Adaptation" (StA AFK):** This committee was set up to ensure cooperation with the Federal Länder. It too began work in 2009, having been established by the Conference of Environmental Ministers (UMK) as part of the Federal-Länder Working Group on Climate, Energy, Mobility and Sustainability (BLAG KliNa).
- **Vulnerability Network:** The Vulnerability Network was set up in 2011 as part of the Adaptation Action Plan (APA I). It comprises representatives from 16 higher federal authorities and institutions from nine departments. www.netzwerk-vulnerabilitaet.de (German only).



4 From knowledge to action – What have we achieved?



Stocktake of Federal Government activities

Which measures has the Federal Government implemented in recent years, and which are currently ongoing? Which priorities has it set itself? The 2015 progress report investigates these questions, subdivided into four pillars:

- Pillar 1: Providing knowledge, informing, enabling and involving
- Pillar 2: Framework-setting by the Federal Government
- Pillar 3: Activities for which the Federal Government is directly responsible
- Pillar 4: International responsibilities

The activities within these four pillars are very varied, ranging from large-scale programmes to smaller projects, projects with a limited time frame and ongoing activities. The following assessment will focus on explaining the direction of Federal Government activities in each of the pillars, and illustrating them with examples. A list and description of all activities can be found in APA I.

Analysis in figures

- **APA I comprises a total of 150 activities**
- **43 have already been completed**
- **78 are ongoing (some of these are permanent tasks)**
- **23 have yet to be implemented (some are under preparation)**

Pillar 1: Providing knowledge, informing, enabling and involving

This pillar is at the heart of APA I, and is aimed at building knowledge and providing information, driven by the belief that decision-makers and stakeholders affected by climate change should be empowered to identify and assess their own affectedness and decide on the adaptation measures required.

Climate change adaptation calls for strategies and decisions with a long time horizon. The handling of regional climate change impacts requires sound knowledge and a good understanding of the effects, as the basis for developing and implementing appropriate measures. It comes as no surprise that 60 percent of all APA I activities are assigned to the first pillar.

Extensive R&D (research and development) activities have been implemented to deepen our understanding of changing, regional climate impacts and the areas affected. From the outset, practical relevance was a key consideration, for example via the use of model regions, which apply climate change adaptation measures to pilot projects, develop institutions and stakeholder networks, and make specific climate projection techniques available.

The following examples illustrate the focus of activities in this pillar:

Example 1: KLIMZUG – Making climate change sustainable in regions

Status
Completed in 2014.

Aim
To enhance the regional capacity for adaptation and strengthen innovativeness in the model regions.

Approach
Networks were created from academia, politics, industry and society in seven regions which developed practical, targeted adaptation strategies and measures.

Spectrum of topics
Varying priority areas in the model regions, such as:

- Water resources, water resource management – such as development of the planning tool Klima FLEX for water-sensitive urban development;
- Agriculture and forestry – such as an analysis of the effects of forest restructuring on the groundwater balance;
- Urban, regional and landscape planning – such as the preparation of risk maps for the regional plan North Hesse 2017 and incorporation of the concept "The compact city in the environmental network" into the landscape plan for Dresden.

Summary
The projects reached a large number of decision-makers and sensitised them to climate change adaptation; around 700 partners were involved in the regional networks, without project funding. The topic was integrated into numerous planning and development processes and capacity for adaptation was strengthened. The funding measure was designated one of 365 "Selected Landmarks 2012" under the "Germany – Land of Ideas" initiative.

Results
Many innovative regional approaches to climate change have emerged, from comprehensive regional adaptation strategies through to specific technical solutions. The publication series "Klimawandel in Regionen zukunftsfähig gestalten" (Making climate change sustainable in regions) outlines the central results of all KLIMZUG alliances in seven volumes, see: www.klimzug.de/de/1426.php

Example 2: Local adaptation to climate change – Forums for the exchange of ideas and cooperation

Status
To date, three pilot cooperation forums have been set up, with three further pilot events planned for 2016 and 2017.

Aim
To create a space for the exchange of ideas on local adaptation to climate change.

Approach
Three pilot cooperation forums have been implemented:

- 1. Coastal region, 2012 in Bremerhaven
- 2. Upper Rhine Rift region, 2013 in Karlsruhe
- 3. Ruhr region, 2014 in Essen

Summary
Between 50 and 150 active participants per event, each with 20 to 50 voluntary cooperation agreements on regional adaptation to climate change between stakeholders from industry, associations, academia and government authorities. It is a deliberately open concept, to enable facilitation by other institutions.

Results
Examples of cooperation: hot weather hotline/hot weather warning system for vulnerable groups, climate risk check for companies, living roofs, transboundary networking in municipalities, supply of drinking water during hot weather, cooperation on all aspects of water resources, and others.

Model spatial planning projects – Spatial development strategies on climate change (KlimaMORO)

Status
Completed in 2013, entered the transfer phase in 13 model regions in 2014.

Aim
To model and assess the input of spatial planning for regional adaptation activities to climate change; to trial adaptation strategies and implement projects.

Approach
Model projects were developed in the following model regions: West Pomerania, Havelland-Fläming, Leipzig-Westsachsen, Oberes Elbtal/Osterzgebirge, Central and Southern Hesse, Northern Black Forest, Stuttgart.

Summary
Useful technical support for planners on adapting to climate change.

Results
Recommendations on the use of vulnerability analyses in regional planning; a "techniques manual" for regional climate assessment in regional planning; recommendations for regional adaptation strategies.
www.klimamoro.de (German only)

Pillar 2: Framework-setting by the German Federal Government

This pillar covers the Federal Government's opportunities for action on climate change adaptation, particularly via the creation of legal frameworks. The aim is to integrate climate change adaptation as a cross-sectional task into all policy sectors and to define responsibilities.

The following examples illustrate the focus of activities in this pillar:

Example 1: Amendment to provisions of the Federal Building Code

- Amendments were made to the Federal Building Code (BauGB) on planning guidelines to incorporate climate change and climate protection (§1 paragraph (5), sentence 2 of the BauGB).
- These guidelines must be taken into account in the municipalities' physical development planning, to ensure sustainable urban development.
- Amendments have also been made to urban planning legislation, highlighting the fact that climate change adaptation must also be considered within the context of urban redevelopment (§171a of the BauGB) and urban regeneration (§136 of the BauGB).
- The Conference of Construction Ministers (Bauministerkonferenz) of the Federal Länder adopted 'model decrees' on introduction of the respective revisions to the BauGB in 2011 and 2013.
- Towns and municipalities are required to implement the regulations on climate protection and adaptation in their physical development planning.
- The publication "Praxishilfe Klimaschutz in der räumlichen Planung" is available as a practical guide to climate protection in regional planning. www.umweltbundesamt.de/publikationen/klimaschutz-in-raeumlichen-planung (German only)

Example 2: Technical Rule on Installation Safety

- Technical Rule on Installation Safety "Precautions and Measures against the Hazard Sources Precipitation and Flooding – TRAS 310").
- This document sets out the responsibilities of operators who are at risk of releasing hazardous substances as defined in the Major Accidents Ordinance (StörfallV) and the Federal Immission Control Act (BImSchG).
- In order to allow for potential climate changes up until 2050, a climate change factor of 1.2 is applied to the flooding, storm surge and heavy rain intensities calculated for 2010 for example when planning protective measures.
- Dykes may be elevated by up to one metre to accommodate storm surges.
- TRAS 310 is reviewed every five years to incorporate the latest findings on the impacts of climate change.

Example 3: Funding programmes for climate change adaptation

- In 2011, climate change adaptation was included as a funding topic in the national Climate Protection Initiative (public guideline).
- Existing funding of public climate protection concepts was extended to allow the development of integrated adaptation and climate protection concepts, along with sub-concepts on adaptation.
- In 2012, a funding programme was created specifically for adaptation to climate change.
  www.ptj.de/folgen-klimawandel
- It supports projects aimed at strengthening the capacity of regional or local stakeholders for adaptation.
  The programme is designed to develop a multiplier effect.
- It is designed for high-profile facilities with a role model function that can generate good publicity.
- Funding is available for adaptation concepts for companies, educational modules and community flagship projects, as well as local and/or regional cooperation arrangements.
- Local authorities, companies, associations, clubs, universities, non-university research institutions, foundations and comparable institutions are eligible to apply for funding.

Pillar 3: Activities for which the Federal Government is directly responsible

This pillar covers the Federal Government's responsibilities for climate change adaptation in its capacity as the owner of property, land and infrastructure, and also as a developer. For example, the Federal Government will investigate a building's climate change adaptation requirements and the opportunities for reducing carbon dioxide emissions in future construction and renovation projects.

The Federal Government plays a key role in climate change adaptation, both as an investor and as an operator, for example in the construction and maintenance of infrastructures, construction projects, and property management. In spending public funds, it has a particular responsibility to ensure that the value it creates is protected from the risks of climate change.

The following example illustrates the focus of activities in this pillar:

Example: KLIWAS – Impacts of climate change on waterways and navigation – Searching for options of adaptation

Status
2009–2013

Aim
To develop basic methods, tools and results for assessing the impacts of climate change on waterways and navigation, and the need for adaptation.

Approach
A research alliance was set up, including representatives from the Federal Institute for Hydrology (BfG, coordinating office), the Federal Maritime Hand Hydrographic Agency (BSH), the Federal Waterways Engineering and Research Institute (BAW), and the German Meteorological Service (DWD). A steering group was also established in the competent ministry. KLIWAS comprised 30 projects covering inland and coastal waters. The alliance collaborated with more than 100 cooperation partners from scientific institutions in Germany and Europe.

Summary
The findings were of a high quality and practical relevance, and culminated in a range of basic techniques and tools for climate change adaptation. The alliance format and practical relevance led to the emergence of a new network representing experts from multiple modes of transport (www.expertennetzwerk-bmvi.de). The waterways and navigation administration is now in a position to gradually establish climate change adaptation as a permanent task over the next few years, and ensure that it is integrated into its planning operations.

Results
Model chains were developed, which for the first time enable us to illustrate the potential effects of climate change on hydrology, substance balance and ecology (near future and beyond) for the major navigable waters, the Rhine, Elbe and Danube. For the North Sea, the regional linking of atmospheric and ocean models helped to improve climate projections. Scenarios were also drawn up to reflect the future development of sea levels, rough seas, the sediment regime and other core parameters. A concluding report and individual project reports can be found at www.kliwas.de

Pillar 4: International responsibilities

Internationally, Germany is a key provider of funding for climate change adaptation. In recent years, Germany's expenditure on climate change adaptation in developing countries has increased continuously, from 335 million euros in 2010 to 1,124 million euros in 2014. German Chancellor Dr. Merkel has announced Germany's intention of doubling its international climate funding by 2020 against the 2014 baseline. Across the wide range of projects on climate change adaptation and climate-safe development, most funding takes the form of bilateral development cooperation and financial contributions to various UN aid funds, such as the Green Climate Fund, the Least Developed Countries Fund, the UN Adaptation Fund and the International Climate Initiative. Germany is also extensively involved in global and sectoral initiatives (see box).

The following example illustrates the focus of activities in this pillar:

Example: Protection from the impacts of climate change – the G7 initiative InsuResilience

- At the 2015 World Climate Change Conference in Paris, Germany and representatives of the G7 nations, the insurance industry, civil society and affected developing countries, committed a further 420 million USD to the climate risk insurance initiative InsuResilience, of which the German Government is contributing around 150 million euros. InsuResilience was initiated under Germany's presidency of the G7 to provide 400 million poor and vulnerable individuals in developing countries with insurance coverage against the impacts of climate change by 2020.

Example: Supporting developing countries with national adaptation planning (NAP) and their national contributions to the Paris Agreement

- Similar to the domestic measures outlined in the German Action Plan of the German Adaptation Strategy, developing countries must likewise systematically integrate climate impacts into all affected sectors.
- In 2014, Germany set up the NAP Global Network together with the United States and other industrialised and developing countries. The network aims to encourage an exchange on national adaptation planning processes, and improve the coordination of NAP activities by bilateral contributors.
  www.napglobalnetwork.org
- Germany offers a range of support to developing countries (including Albania, Cambodia, Mauretania, Morocco and Togo) to help them structure their NAP processes, including knowledge-sharing and training workshops on individual elements of the NAP process. Examples include vulnerability analyses, trans-sectoral planning, the development of funding strategies, and the evaluation of activities.

5 A “lateral” view of cities and regions – What can we learn from research programmes and projects?

Countless nationwide research alliances and projects on climate change adaptation have been implemented since 2008. A “lateral evaluation” focussing on urban and regional development was undertaken to collate overarching findings and effective techniques and instruments, which analysed twelve research and subsidy programmes covering 55 individual projects from five departments.

Overarching statements and conclusions

- **Prevention is taking place, but is not necessarily labelled as “adaptation”:** There are numerous activities, particularly in sectors such as flood protection, green development, prevention of soil sealing and heat protection, which are not necessarily labelled as “climate change adaptation”.
- **Climate change adaptation = Investing in the future:** Where climate change adaptation is actively addressed, it is seen as a cross-sectoral task and a long-term investment for minimising risks and improving local quality of life.
- **Small communities need support:** Whereas large cities are capable of performing costly climate and vulnerability analyses, small communities often lack the resources to initiate an adaptation process. Overall, there is a need for an improvement in planning practice; adaptation plays a more subordinate role.
- **Still insufficient pressure to be proactive:** In most regions of Germany there is (still) very little pressure to be proactive. The idea that “it doesn’t affect me” means a lack of problem awareness when adapting existing strategies, standards, beliefs and behaviour patterns.
- **There is no such thing as the ideal adaptation process:** Local framework conditions vary significantly. However, there are certain basic phases of climate change adaptation: understanding climate change, ascertaining the level of affectedness and assessing the consequences, developing and implementing measures, and improving and monitoring the implementation of measures.
- **Uncertainty should not prevent action:** The projects and models have found the development, planning and implementation of adaptation measures to be successful, even in the face of uncertainties.
- **“From knowledge to action” is happening:** Numerous positive examples in the action fields outlined in the German Strategy for Adaptation to Climate Change – particularly coastal protection, flood protection and prevention, rainstorms, heat protection and drought – have been systematically recorded, and the findings compiled into both topic-specific and overarching brochures for municipalities and regions.
- **Local stakeholders are interested and involved:** The funding programmes and model projects for climate change adaptation have been accepted and supported by the local stakeholders.

Mainstreaming = Factoring climate change into our thinking

A key recommendation for local adaptation is the buzzword “Mainstreaming”. This simply means “factoring climate change into our thinking” - in other words, considering climate risks and adaptation aspects in every decision we make. Recommendations include “latching onto” current planning processes (such as landscape planning, land use planning, town planning), and integrating adaptation measures into urban development funding.

More than this, however, it is also a matter of linking into other social processes and fields of action in cities and regions (such as the new direction in energy policy, climate protection, demographic change, structural change). What is more, climate knowledge should be combined and prepared to suit the specific application.

6 Focus on fields of action – There's work to be done!

But which fields of action are affected and how, and where is action needed? Which specific climate impacts are happening right now or are pending? Below, we outline the fields of action in climate change adaptation, and the principal climate impacts.

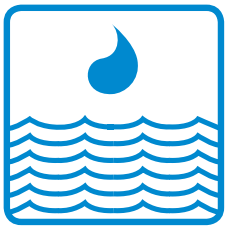
Water

The "Water" cluster comprises the following three fields of action:

- Water resources and water resource management,
- Coastal and marine protection and
- Fishing.

The "Water" cluster is a key starting-point for adaptation to climate change. Changes in the water regime also affect the "Land" cluster – for example, water levels drop, which in turn diminishes harvests or hampers tree growth.

Heavy rain, river flooding and flash floods are among the biggest challenges faced in the "Water" cluster. Heavy rain poses a growing challenge, especially with regard to correct dimensioning of the sewer network and wastewater treatment plants. In the long term, rising sea levels and the growing threat of storm surges will pose a challenge for coastal protection.



Water properties such as temperatures and salt levels may also change as a result of climate change, leading to modified biological processes and species compositions in waterbodies. Sectors such as fishing are likely to be severely impacted (changes in fish stocks in the North and Baltic Seas).

Land

The "Land" cluster comprises the following fields of action:

- Soil,
- Agriculture,
- Forestry and forest management, and
- Biodiversity.

Rising temperatures and drought influence biological processes in the soil and adversely impact agriculture and forestry. Forestry is reliant on long-term processes. Damage caused, for example, by storms or pests due to drought may therefore reduce revenues.

Soil erosion by wind and water is already a problem now. Although further exacerbation as a result of climate change is likely to be minimal in the near future, particular attention must be devoted to the aspect of long-term impacts and irreversible damage.

While rising temperatures have actually had some positive effects on agriculture (such as better crop growth, longer periods of vegetation), more frequent drought during the vegetation period and an increased incidence of heavy rain and other extreme events are causing a range of adverse impacts.

Biological diversity faces a particular threat from the spread of invasive species, coupled with changes to the ecosystems as a result of species transformation, and dedicated action is needed.

Infrastructures

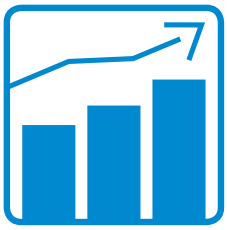
The "Infrastructures" cluster comprises the following fields of action:

- Building sector,
- Energy industry, and
- Transport/transport infrastructure.

This cluster is highly significant fur future adaptation to climate change, since it entails preventing potential damage to long-term infrastructures such as buildings, power plants and roads. Some of these restructuring processes require lengthy planning and approval periods and high investments. Early, integrated, comprehensive planning is therefore essential.

Above all, we need structural measures to improve the urban and interior climate, and to protect buildings and infrastructures from flooding. In the transport sector, flood protection and prevention measures are required, for example to prevent erosion and inundations from damaging the road and rail infrastructure and buildings.

Industry



The "Industry" cluster comprises the following fields of action:

- Trade and industry,
- Tourism industry, and
- Financial services industry.

Extreme weather events affect the "Industry" cluster to varying degrees. For example, they may impair the transportation of goods, interrupt production processes, and damage plant and equipment, causing severe financial loss.

The amount of time taken to adapt to climate change can vary significantly: the adaptation, relocation or rebuilding of infrastructures can be a lengthy process (see the "Infrastructures" cluster). Other, faster-acting measures include changes to company management, such as modifying working conditions on hot days.

The changes in snowfall are likely to bring with them both positive and negative impacts: reduced snowfall may lead to financial losses in the winter sports and tourism sectors, while increased snowfall may lead to financial losses associated with damage to operating equipment in trade and industry. This cluster is also closely linked to the transport and transport infrastructure field of action.

Health

The "Health" cluster comprises the „Human health" field of action. Various adaptations to climate change could be implemented in this area in the short term, such as public warning systems or behavioural guidelines for hot weather and extreme weather events. The implementation of an adequate health infrastructure, with improved equipment and organisation of rescue and assistance services in extreme weather events, will take longer to implement.

The "Health" cluster is important, mainly because the impacts of climate change in the other fields of action often directly or indirectly influence human health, from health problems during heat waves, to accidents caused by a damaged infrastructure.

Since vulnerable individuals (such as older people and those with certain medical conditions) already face health risks from heat waves, there is a pressing need for action. During frequent spells of fine weather (with solar radiation), there may be more incidences of respiratory complaints associated with ground-level ozone, unless we can reduce air pollution from ozone precursors. Similarly, carriers of diseases can establish themselves and spread more easily at higher temperatures. The heat-island effect, coupled with higher population density, means that conurbations and large cities will be most severely affected by heatwaves.

Regional planning and civil protection

The "Regional planning and civil protection" cluster comprises two cross-sectoral fields of action:

- Spatial, regional and development planning, and
- Civil protection.

Spatial, regional and development planning play a central role in anticipatory adaptation to climate change, and provide a cross-sectional instrument to other fields of action. The regional planning targets of climate protection and adaptation to climate change must be implemented as a matter of urgency to counteract the adverse impacts of climate change. The portal www.klimastadtraum.de summarises adaptation options and illustrates these with some positive examples for cities and regions.

"Integrated planning", by which we mean systematically addressing the interactions between the planning tools of the various clusters and fields of action, is pivotal to success here.

Civil protection plays an important role in how we as a society handle extreme weather events, which are currently projected to become more frequent in future. As a result, civil protection incorporates a number of adaptation measures centred around this key task, such as continuously improving deployment planning and informing citizens of the potential risks.

7 From research to implementation – Adaptation Action Plan II

The consequences of climate change are continuing to escalate, and will impact all fields of action in the German Strategy for Adaptation to Climate Change. A permanent, reliable supply of data and tools is needed in order to implement activities in these fields, and assist politicians and decision-makers with their own programmes and action concepts.

A quick look at the current raft of measures in APA II indicates that the Federal Government is further differentiating its activities to provide optimum support for this task. Its creative and regulatory competencies will be defined in greater detail. However, the greatest challenge will lie in reshaping our infrastructures to transform them into resilient, robust systems. This requires further technical regulations, qualification across a wide range of professions, and the development of suitable funding and incentive mechanisms.

There is also a need for tailored research and monitoring, coupled with support for networks and cooperation arrangements. Last but not least, we will be supporting campaigns and projects aimed at raising public awareness and sharing information and experiences.

The Federal Government's complete Action Plan II is a table containing around 146 measures, and would therefore be impossible to replicate in its entirety here. However, the following examples are designed to illustrate how qualitative levers can be applied at Federal Government level to consistently counteract climate change.

Cross-sectoral activities

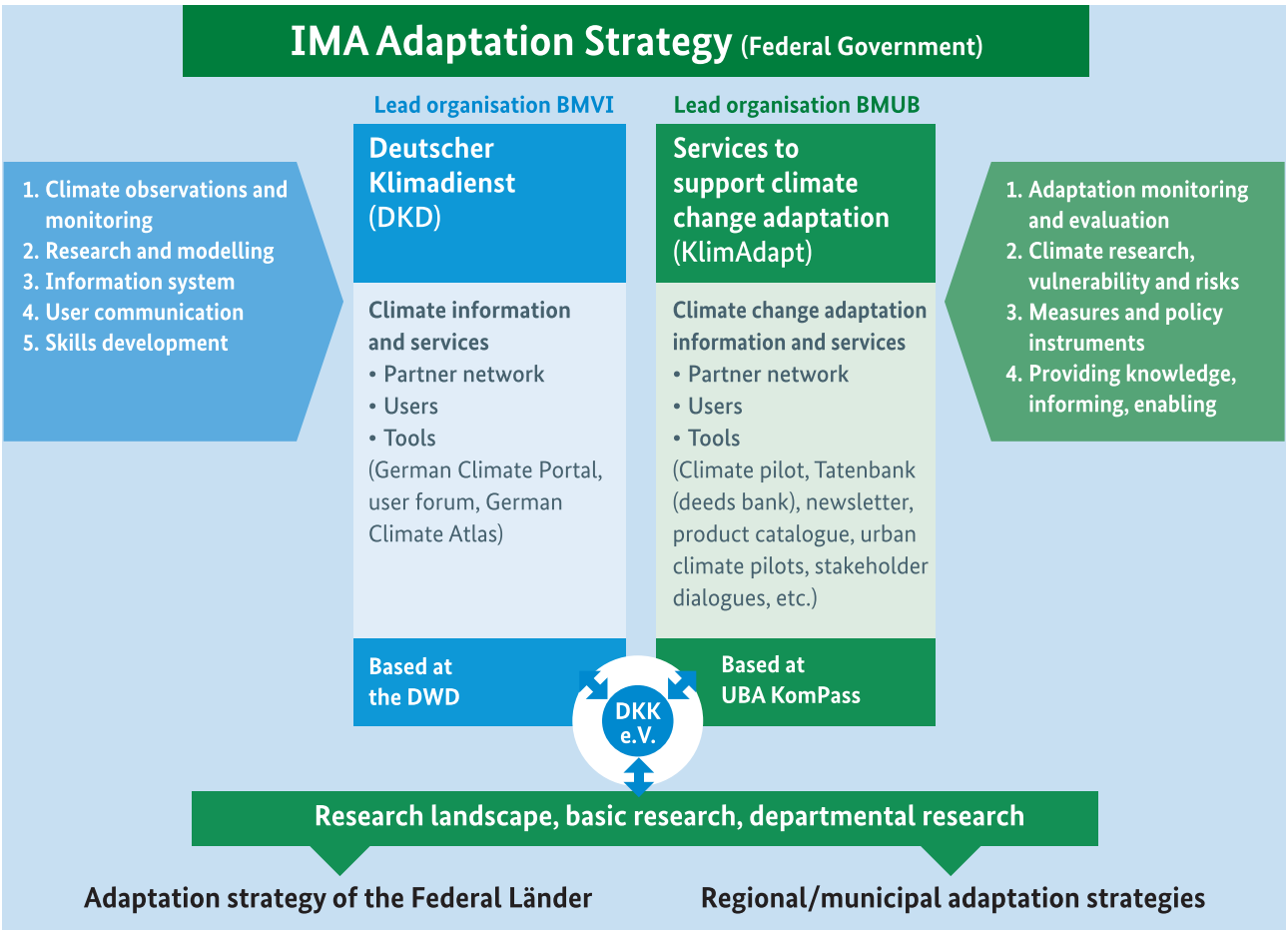
Examples: the Federal Government is establishing a complete package of climate services and services designed to support climate change adaptation. A two-pillar concept has been devised, incorporating the Deutscher Klimadienst (DKD) and a range of climate change adaptation services (KlimAdapt) (see chart).

Autumn 2015 saw the launch of the Deutscher Klimadienst (German Climate Service, DKD) as the first pillar, based at the German Meteorological Service (DWD), which was tasked with ensuring that climate information and climate services at national level are provided in a scientifically accurate, user-appropriate and reliable manner.

The second pillar comprises a range of services for adaptation to climate change (KlimAdapt Deutschland), including the assessment of climate change impacts, vulnerability analyses to identify risks, and the development of policy instruments for adapting to climate change. KlimAdapt is based at the Federal Environment Agency (UBA). The IWG Adaptation Strategy acts in a steering capacity for both these agencies.

Link to Deutscher Klimadienst (DKD) (German only):
www.dkd-netzwerk.de

DKD and KlimAdapt under the auspices of the IWG Adaptation Strategy: organisation, tasks and cooperation



source: IMA Adaptation Strategy

Adaptation of infrastructures

Examples: whether on the water, on the roads or on the rails, infrastructure adaptation must be "climate-robust". Research is ongoing to ascertain which measures must be taken to keep our federal waterways navigable even in the event of (extreme) flooding and low water levels.

There are plans to progress the renaturation of watercourses and floodplains (riverbank restoration, reconnection of backwaters) by creating additional (natural) floodplains.

Research is also ongoing to identify which train lines in the vicinity of rivers and waterbodies, and possibly in coastal locations as well, could become non-operational for long periods if large-scale flooding were to occur. Based on a risk analysis, researchers are collaborating with the infrastructure operator (DB Netz AG) to identify which diversion routes must be retained in the long term.

A study into road transport will investigate the effects of increased temperatures on the service life of different types of asphalt. Researchers will also aim to establish the maximum annual average temperature at which standard asphalt construction techniques may be used.

Adaptation of legal instruments, regulations and technical standards

Examples: the World Health Organisation (Europe) recommends the introduction of heat-health action plans. Germany does not yet have one of these plans in place. The Federal Länder are encouraged to investigate the possibility of devising heat-health action plans. Mandatory risk and hazard maps for heavy rain and storm surges are also under consideration.

In connection with heavy rain, the appropriate dimensioning of road drainage systems is being investigated. As heavy rain becomes more frequent, the risk of overloading the drains increases; conversely, long spells of dry weather may also lead to operational problems. Correct dimensioning of the infrastructure is the key here.

We are also reviewing whether the building code should be adapted in line with climate risks. For example, it could introduce a requirement for planting and vegetation on structural installations. By formulating clear requirements for buildings in thermally stressed urban areas, the proportion of living roofs and façades could be increased. Measures for the seepage, collection or use of rainwater on site could help buildings to adapt to more frequent and more severe extreme precipitation. The building code is the responsibility of the Federal Länder. The Federal Government is investigating a more detailed specification of proposals for adapting the building code.

Education, training

Examples: to help ameliorate the health impacts of climate change, experts in the healthcare sector should receive targeted training. Multiplier training courses can help spread the word about preventative and health-promoting measures. Background information on climate research and the potential impacts for deployments is another consideration in civil protection, and is now being integrated into training content by the Academy for Crisis Management, Emergency Planning and Civil Protection (AKNZ) of the Federal Office of Civil Protection and Disaster Assistance (BBK).

Funding and incentives

Examples: the DAS adaptation funding programme aims to continuously support regional and local stakeholders in their capacity to adapt to the consequences of climate change. This includes incentives for companies to set up their own adaptation concepts. It also supports educational courses and local flagship projects on this topic. Inter-community and regional alliances are also eligible for financial assistance when setting up cooperation arrangements and planning and implementing pilot concepts for climate change adaptation.

The funding scheme "Forest Climate Fund" aims to tap into and optimise the potential of forests and woods to minimise carbon dioxide, helping Germany's forests to adapt to climate change.

Research and monitoring

Examples: new research funding programmes are improving the foundations for climate adaptation, and eliminating barriers to their implementation. Building on the experiences of KLIMZUG, as part of the priority topic "Climate-resilient cities and regions", we are supporting joint projects that link theory and practice. In this way, we hope to develop innovative approaches and build on our knowledge and implementation experience. Another funding measure aids urban climate modelling with the capacity to monitor all relevant climatological processes in a city. This would then serve as a sound basis for sustainable urban planning.

A trend analysis of imported, vector-borne infectious diseases (transmitted by ticks, flies and other insects) addresses a completely different aspect of climate change. The Robert-Koch-Institut continuously evaluates relevant data (for example on the chikungunya virus, dengue virus, malaria) at national level, and publishes the results. It focuses in particular on the analysis of time trends, changes in the principal countries of infection, and investigations into cases that may have been imported from or are native to southern European countries.

Other research projects and studies address the impacts of climate change on wind-based soil erosion, the sustainable use of peatlands, and the salt and heat content of the North Sea. The latter supplies key basic knowledge for assessing and developing the physical status of the North Sea (including, for example, temperature-related changes to the ecosystem of the North Sea).

Networks and cooperation arrangements

Examples: there is no uniform, collated data available on the soil status in Germany, and no guaranteed access to data in the many different systems. The plan is therefore to establish and expand soil monitoring networks, and improve soil monitoring from a climate change perspective, in order to track the success of adaptation measures. This necessitates more networking and collaboration on data evaluation, which in turn will serve as an important basis for other tasks, such as national reporting on climate-relevant issues.

The "Strategic Governmental Agencies Alliance on Adaptation to Climate Change", established in 2007, will continue to improve how we as a society handle the consequences of climate change, particularly with extreme weather events. This concerns both long-term strategic planning and short-term operational measures.

Public relations work, communication and information

Examples: in future, a new geo-information system will allow home-owners to assess the climate change-related risks to their homes more effectively. The research project "Risk assessment of future climate change effects in the real estate and housing industry" will be used to develop and implement a corresponding tool to help home-owners across Germany to identify and assess the risks (extreme weather events) associated with climate change impacts.

Since September 2010, the Climate Portal www.klima-wandel-und-klimaschutz.de has been supplying information on every aspect of climate change, with particular reference to the achievements of the agriculture and forestry sectors. It incorporates the research database FISA (www.fisaonline.de), to encourage the translation of research results into practical solutions. The Federal Länder may also present their projects on this platform.

Other information campaigns are designed to educate the general public, for example, about the impacts of climate change on biodiversity, as part of the Government's public relations work on the National Biodiversity Strategy, in conjunction with activities related to the United Nations Decade on Biodiversity (2011 to 2020), announced in late 2010. The aim is to get the general public involved by sharing and utilising their knowledge (citizen science).

8 Summary

- This progress report marks a new phase in the DAS process:
  Climate change adaptation is established as a permanent task. Action-related data and projections must be continuously made available to the relevant decision-makers and stakeholders.
- The mainstreaming strategy is a suitable approach:
  Adaptation strategies and measures, as permanent elements of planning and decision-making processes, should be incorporated both into specialist policy-making and on a cross-sectoral basis, and coordinated at regional level.
- At international level, adaptation will be a key element of the new international Climate Convention. Germany's contribution to international cooperation on climate change adaptation will play a key role.
- The German Government will continue to actively support the task of climate change adaptation. The format of the Interministerial Working Group "Adaptation Strategy", which controls the climate change adaptation process at Federal Government level, together with the bodies for coordination with the Federal Länder, have proven successful, and will be continued.

With the impacts of climate change now visible, implementation of Germany's adaptation strategy at all levels, and by as many stakeholders as possible, becomes ever more significant. We must act now to avoid future damage from adverse climate impacts.

Links

Action Plan I (APA I)
www.bmub.bund.de/fileadmin/bmu-import/files/pdfs/allgemein/application/pdf/aktionsplan_anpassung_klimawandel_bf.pdf

BMVI network of experts
www.expertennetzwerk-bmvi.de

Brochure (German only): **„Klimawandel – Herausforderung für den Bevölkerungsschutz“**
www.bbk.bund.de/SharedDocs/Downloads/BBK/DE/Publikationen/Praxis_Bevoelkerungsschutz/Band_5_Praxis_BS_Klimawandel_Herausforderung_f_BS.pdf?__blob=publicationFile

Climate Service Center Germany
www.gerics.de

DAS (German Strategy for Adaptation to Climate Change)
www.bmub.bund.de/en/topics/climate-energy/climate/details-climate/artikel/german-strategy-for-adaptation-to-climate-change-summary/?tx_ttnews%5BbackPid%5D=216

www.umweltbundesamt.de/en/topics/climate-energy/climate-change-adaptation/adaptation-at-the-federal-level

German IPCC coordination office
www.de-ipcc.de/eng_index.php

German Climate Atlas
www.dwd.de/EN/climate_environment/climateatlas/climateatlas_node.html

German Climate Service
www.deutschesklimaportal.de/EN/Home/home_node.html

Deutsches Klima-Konsortium (German Climate Consortium, DKK)
www.deutsches-klima-konsortium.de/en/startseite.html?module=API&format=csv&convertToUnicode=0&method=CoreAdminHome.runScheduledTasks&trigger=archivephp&token_auth=163554dbb2a2aafb6055cb325096d4f2&cHash=d577b7bdb5a9f6129c810852cc827850

German Climate Portal
www.deutschesklimaportal.de/EN/Home/home_node.html

German Meteorological Service (DWD)
www.dwd.de/EN/Home/home_node.html

Elements of the progress report
www.umweltbundesamt.de/en/topics

Results from the KLIMZUG funding scheme
www.klimzug.de/en/index.php

Progress report 2015 (German only)
www.bmub.bund.de/N52706/

Funding programme for adaptation to climate change (German only)
www.ptj.de/folgen-klimawandel

Information portal on climate change and cities (German only)
www.dwd.de/inkas

Information portal on climate change and regional development (German only)
www.klimastadtraum.de

Climate observation
www.gcos.de
www.gcos.de/inventarbericht

Climate pilots (German only)
www.umweltbundesamt.de/node/33047

Climate monitoring
www.dwd.de/EN/climate_environment/climatemonitoring/climatemonitoring_node.html

KLIWAS
www.kliwas.de/KLIWAS/EN/Home/homepage_node.html

KomPass
www.umweltbundesamt.de/en/topics/climate-energy/climate-impacts-adaptation

Monitoring report 2015 (German only)
www.umweltbundesamt.de/publikationen/monitoringbericht-2015

Klima MORO (German only)
www.klimamoro.de

NDC Partnership
https://seors.unfccc.int/seors/attachments/get_attachment?code=KJJ8B8CY2BF6MHL4JNA831P7Q6H4B077

https://seors.unfccc.int/seors/attachments/get_attachment?code=K1LO5BIFAVYWBPTCFN31CBU1XTN8QZAL

Netzwerk Vulnerabilität (Vulnerability Network) (German only)
www.netzwerk-vulnerabilitaet.de

Practical guide to climate protection in spatial planning (German only)
www.umweltbundesamt.de/publikationen/klimaschutz-in-raeumlichen-planung

Regional climate offices of the Helmholtz Association
www.klimabuero.de/index_en.html

Urban heat islands (German only)
www.dwd.de/waermeinsel

Tatenbank (Deeds bank) (German only)
www.umweltbundesamt.de/themen/klima-energie/klimafolgen-anpassung/werkzeuge-der-anpassung/tatenbank

Overview of BMBF funding measures in the climate research sector
www.fona.de/de/massnahmen/tag/995

Vulnerability analysis (German only)
www.umweltbundesamt.de/publikationen/vulnerabilitaet-deutschlands-gegenueber-dem

Guide to climate knowledge (German only)
www.klimanavigator.de

Glossary

Affectedness
Sum total of climate change impacts in a sector or region

APA
Action Plan on Adaptation (I und II)

Autochthonous
Indigenous

Climate change impacts
(Potential) impacts of climate change and climate variability on selected systems

DAS
German Strategy for Adaptation to Climate Change

DB Netz AG
Subsidiary of Deutsche Bahn (DB)

Ecological succession
Natural development over time of different plant communities and/or fauna communities or biotic communities in the same location following changes in significant location factors or a significant disruption to their habitat

GFCS
Global Framework for Climate Services

ICI
International Climate Initiative

KlimaMORO
Model spatial planning projects – Spatial development strategies on climate change

KLIMZUG
Managing climate change in the regions for the future

KLIWAS
Impacts of climate change on waterways and navigation

Mainstreaming
Integrating climate change adaptation into all fields of action

Pathogens
Organisms (such as bacteria, viruses, fungi, fauna) which attack plants and live “at their expense”

RAS-Ew
Construction guidelines for roads – Section: Drainage

RCM
Regional climate models

RiStWag
Construction guidelines for roads in water protection areas

StA AFK
Standing Committee “Adaptation to the Consequences of Climate Change”

Transition countries
Countries in a state of flux, for example due to a change in their political regime

TRAS 310
Technical Rule on Installation Safety

Vulnerability
Susceptibility to harm or damage

www.bmub.bund.de/english