

**Compilation of submissions received from Parties on  
Information on adaptation approaches, strategies, practices and technologies  
at the regional, national and local levels in different sectors, as well as on  
experiences, needs and concerns**

**(Referred to in document: FCCC/SBSTA/2007/MISC.10)**

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PAPER NO. 1: ARGENTINA

**Implementation of the Buenos Aires Programme of Work on Adaptation and Response Measures -  
Five-year programme of work on impacts, vulnerability and adaptation to climate change.**

**1. Mandate**

The COP, by its decision 1/CP.10, requested the SBSTA to develop a structured five-year programme of work for the SBSTA on the scientific, technical and socio-economic aspects of impacts, vulnerability and adaptation to climate change (hereinafter referred to as the programme of work). The COP at its eleventh session adopted a five-year programme of work contained in an annex, requesting SBSTA to start implementation of the programme of work by undertaking the initial activities specified in the SBSTA conclusions and elaborate further additional activities and modalities of the programme of work, *inter alia*. The SBSTA 25 agreed to further implement the programme through the activities contained in its conclusions. Under the activities undertaken in line with the objective in the annex to decision 2/CP.11 to advance subthemes b (ii), “Collecting, analyzing and disseminating information on past and current practical adaptation actions and measures, including adaptation projects, short- and long-term adaptation strategies, and local and indigenous knowledge”, and b (iv), “Facilitating communication and cooperation among and between Parties and relevant organizations, business, civil society, and decision makers, and other stakeholders”, the SBSTA invited Parties and relevant organizations to submit to the secretariat information on the issues contained in para. 44 of the conclusions.

Argentina welcomes this opportunity to provide information on relevant programmes, activities and views about the matter. This submission contains relevant information about two Argentinian institutions working on these issues.

2. Universidad Nacional de Río Cuarto (National University of Río Cuarto - Faculties of Agronomy and Veterinary, Economic Sciences and Human Sciences) Project on “Integrated Assessment of Social Vulnerability and Adaptation to Climate Variability and Change Among Farmers in Mexico and Argentina”.

Type of adaptation action	Title of adaptation action, including projects	Status of adaptation action	Needs in order to successfully implement the adaptation action	Concerns/ Barriers	Experiences/ Lesson learned	References
<b>Scope of adaptation action</b>						
<b>Sectoral Level</b>						
<i>Agriculture</i>						
<b>Approaches/ Strategies</b>	Irrigation	Under consideration	Hydrological studies. Credit.	Cost of equipment. Cost of maintenance. Economics of scale.	Improved yields and reduced drought impacts. Additional subsistence benefits.	(1)
<b>Practices</b>	Individual or system development; groundwater or surface water.					
<b>Technologies</b>						
<b>Approaches/ Strategies</b>	Insurance	Ongoing	Guarantees of contracts. Market transparency. Information	Political will. Skepticism, distrust. Low value crops.	Enables cost recovery after loss. Facilitates agricultural diversification	(1)
<b>Practices</b>	Commercial, publicly subsidized or cooperative.					
<b>Technologies</b>						

Type of adaptation action (cont.)	Title of adaptation action, including projects (cont.)	Status of adaptation action (cont.)	Needs in order to successfully implement the adaptation action (cont.)	Concerns/ Barriers (cont.)	Experiences/ Lesson learned (cont.)	References (cont.)
<b>Approaches/ Strategies</b>	Infrastructure	Under consideration	Public funds	Competition for public funds. Local priorities.	Reduced uncertainty over production in flood-prone areas.	(1)
<b>Practices</b>	Drainage containment infrastructure Roads.					
<b>Technologies</b>						
<b>Approaches/ Strategies</b>	Technology	Ongoing	Time for technology development. Institutional coordination	Cost. Decline in public investment in research. Lack of explicit demand from social sector.	Reduces productivity gap between farmer groups. Increases economic margins.	(1)
<b>Practices</b>	Management (agronomic, financial, etc.)					
<b>Technologies</b>	Inputs (seeds, fertilizers)					
<b>Approaches/ Strategies</b>	Information	Under consideration	Information networks and intermediaries. Extension. Human resources.	Lack of organizational capacity. Lack of funding.	Better risk management and improved decision-making. Improved dissemination of technology. Greater access to public support programs.	(1)
<b>Practices</b>	Use of climate trends, variability, forecasts, markets, prices, new technologies.					
<b>Technologies</b>	Information network.					

(1) Working Paper N° 39. Local Perspectives on Adaptation to Climate Change: Lessons From Mexico and Argentina (Wehbe, M. et al). September 2006. Available at [http://aiaccproject.org/working\\_papers](http://aiaccproject.org/working_papers).

3. Centro de Estudios en Cambio Climático Global – Instituto Torcuato Di Tella (Center of Global Climate Change Studies – Torcuato Di Tella Institute).

Type of adaptation action	Title of adaptation action, including projects	Status of adaptation action	Needs in order to successfully implement the adaptation action	Concerns/ Barriers	Experiences/ Lesson learned	References
<b>Scope of adaptation action Regional Level</b>						
<b>Approaches/ Strategies</b>	Sustainable Development Paradigm global evolution and its expression in different cultural and economic environments.	First phase completed				
	Extreme weather events in the southern cone of South America.	Completed				
	Analysis of the ability of global climate models to represent temperature in southern South America, and future scenarios.	Completed				
	Evapo-perspiration scenarios for the Plata basin and for big rivers flows based on temperature scenarios.	Completed				
	Vulnerability to floods in the Plata basin.	Completed				
	Dam vulnerability to new climatic conditions.	Completed				
<b>Practices</b>						
<b>Technologies</b>						

Type of adaptation action (cont.)	Title of adaptation action, including projects (cont.)	Status of adaptation Status of adaptation action (cont.)	Needs in order to successfully implement the adaptation action (cont.)	Concerns/ Barriers (cont.)	Experiences/ Lesson learned (cont.)	References (cont.)
<b>Approaches/ Strategies</b>	Elabopration of criteria for a national adaptation plan <sup>1</sup>	Completed				
	Climatic trends, and past and future scenarios in Argentina	Completed				
	Hydrological trends	Completed				
	Urban vulnerability to high rainfall events.	Completed				
<b>Practices</b>						
<b>Technologies</b>						

<sup>1</sup> The vulnerability to changes in the climatic and hydrological conditions of the main elements of the socio-economic and natural systems in Argentina was assessed. Problematic zones were identified and the potential vulnerabilities were identified and analyzed for each of them. Work has been done at three different levels. The first one is the assessment of changes for the planning level, with a thirty year horizon under different scenarios. The second level was the analysis of vulnerability of infrastructure and of the natural systems both under the current climate conditions and for future changes in each of the scenarios previously considered. Finally, general guidance is to be provided in order to prepare adaptation strategies in the different critical areas.

Type of adaptation action (cont.)	Title of adaptation action, including projects (cont.)	Status of adaptation Status of adaptation action (cont.)	Needs in order to successfully implement the adaptation action (cont.)	Concerns/ Barriers (cont.)	Experiences/ Lesson learned (cont.)	References (cont.)
<b>Approaches/ Strategies</b>	Growth limitation of the Cuyo region basins facing the effects of climate change.	Completed				
	Hydric offer research on irrigation oasis in Mendoza and San Juan provinces.	Completed				
	Climate change scenarios and its impact on river flows.	Completed				
	Estimation of the coefficients between the regional ways of variation of pressure at the sea level considering the observed data and the 2006 models of generation.	Completed				
	Improvement of the 2006 models of generation on rainfall shields and temperature estimation.	Completed				
	Development of high resolution climatic scenarios for the Patagonia and the Andes regions.	Completed				
	Economic assessment on climate change impacts at the Patagonia region.	Completed				
	Temperature trends and its potential impacts on the electricity consumption at the metropolitan area of Buenos Aires.	Completed				
<b>Practices</b>						
<b>Technologies</b>						



Type of adaptation action (cont.)	Title of adaptation action, including projects (cont.)	Status of adaptation Status of adaptation action (cont.)	Needs in order to successfully implement the adaptation action (cont.)	Concerns/ Barriers (cont.)	Experiences/ Lesson learned (cont.)	References (cont.)
<i>Coastal zones (settlements)</i>						
<b>Approaches/ Strategies</b>	Coastal vulnerability to climate change and anthropogenic direct actions.	Completed				
<b>Practices</b>						
<b>Technologies</b>						
<i>Others</i>						
<b>Approaches/ Strategies</b>	Road and infrastructure vulnerability.	Completed				
<b>Practices</b>						
<b>Technologies</b>						

### Constraints and lessons learned

The nature of the needs, concerns, barriers and experiences and lessons learned, being common to all activities already undergone, under implementation, and/or under consideration, are treated together in the following items:

#### a) Needs in order to successfully implement the adaptation action

As adaptation actions are interlinked to government planning and investment decisions there is a need to increase the awareness of the decision makers related to climate change impacts and essentially to the need to consider adverse effects and vulnerabilities in their planning.

#### b) Concerns / Barriers

Main concerns are related to the political environment in which institutions dealing with climate change issues are doing their work.

The long term implications of climate change impacts, as contrasted with short term political goals, the continuous changes in the institutional setting in which climate change issues are addressed, and the instability of the technical human resources are some of the disadvantages faced by organizations.

The main barriers are related both to budgetary stringencies and financial constraints.

**c) Experiences/ Lesson learned**

The experience gained while undertaking the aforementioned activities is related to the understanding that:

- i. While financial resources are a key element, stability of scientific and technical teams is essential to avoid delays and preserve already acquired know how;
- ii. The implementation of soft measures (mainly related to knowledge dissemination, regulations and practices), is in many cases far more important than structural technological and equipment related investments;
- iii. Actions can be replicated at the regional level but there is a need to increase activities that allow discussion and consideration of shared concerns, similar impacts and replicable adaptation measures;
- iv. Vernacular knowledge should be considered in the elaboration of adaptation strategies.

PAPER NO. 2: AUSTRALIA

**Adaptation planning and practices**

At its twenty-fifth session, the SBSTA invited Parties and relevant organisations to provide structured submissions on adaptation approaches, strategies, practices and technologies for adaptation at the regional, national and local levels in different sectors, as well as on experiences, needs and concerns (FCCC/SBSTA/2006/11, paragraph 56). Australia is pleased to provide the following submission on this matter.

Australia notes that the structured submission format, while useful for indicating the specific information sought, proved in some ways restrictive. We therefore suggest that the provision of case studies also be considered as useful input for future 'structured' submissions.

Type of adaptation action	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns/Barriers	Experiences/ Lesson learned	References i.e. publications, websites etc.
<b>Scope of adaptation action</b> <i>Regional level</i>						
<b>Approaches/ strategies</b>	Supporting the assessment of climate change risks and impacts in the South Pacific region to better inform adaptation decision-making processes and assist in setting regional climate change priorities through the <i>Pacific Islands Framework for Action on Climate Change</i> (PIFRAC).	Ongoing – see projects listed below.		Lack of awareness of specific impacts of climate change and how best to use available information.	The PIFRAC provides a regional response to climate change – the challenge is now providing tailored responses within it to account for differing national circumstances.	
<b>Practices/ projects</b>	<i>Sea Level and Climate Monitoring Project</i> . This project will facilitate the collection of robust information on sea level and land movement changes in Pacific countries. Participants are the Cook Islands, the Federated States of Micronesia (FSM), Fiji, Kiribati, Marshall Islands, Nauru, Papua New Guinea, Solomon Islands, Tonga, Tuvalu, Vanuatu and Samoa.	1991-2010 AU \$32 million	Long-term data collection and analysis.	Lack of awareness of specific impacts of climate change.  Reliable internet access can be problematic.	Project data needs to be explained in the broader context of global datasets and findings.  Communication mechanisms should not be overly reliant on internet access.	The Island Climate magazine (page 6) <a href="http://www.bom.gov.au/pacificsealevel/pdf/ICU_August_2006.pdf">http://www.bom.gov.au/pacificsealevel/pdf/ICU_August_2006.pdf</a>  <a href="http://www.bom.gov.au/pacificsealevel/presentations/briefingpaper_spslcmp_nov_2006.pdf">http://www.bom.gov.au/pacificsealevel/presentations/briefingpaper_spslcmp_nov_2006.pdf</a>

Type of adaptation action	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns/Barriers	Experiences/ Lesson learned	References i.e. publications, websites etc.
<b>Practices/ projects</b>	<i>Pacific Island Climate Prediction Project.</i> This project seeks to improve the climate modelling, data management and climate-related prediction and decision-making capacity of the meteorological services and key sectors of developing countries in the Pacific. Participants include Samoa, Tuvalu, Niue, Fiji, Kiribati, Solomon Islands, Cook Islands, Tonga, Papua New Guinea and Vanuatu.	Phase I: 2003-2006 AU \$2.3 million  Phase II: 2007-2009 AU \$3 million	Capacity building of National Meteorological Services (NMS).	The existing capacity of countries' NMS lower than expected.  Loss of staff that underwent training in Phase I to other duties or organisations (or through migration).	Targeted and user-friendly software was taken up readily by the NMS.  Climate predictions service now being provided by some NMS has been highly valued by client groups.  Building the confidence of NMS has enabled them to participate more actively in regional and international forums.  In-country training for the clients to continue in Phase II, but NMS staff will be further trained through regional workshops.	<a href="http://www.bom.gov.au/climate/pi-cpp/">http://www.bom.gov.au/climate/pi-cpp/</a>
<b>Practices/ projects</b>	<i>Pacific Data Rescue Project.</i> This project secured paper based climate records at risk of	2005-07 AU \$84,000 Complete		Paper records are vulnerable. Digitisation of data is necessary to	Staffing resources in Pacific Island Countries are often limited. This limits	

Type of adaptation action	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns/Barriers	Experiences/ Lesson learned	References i.e. publications, websites etc.
	loss in five Pacific region countries, protecting this resource for use in climate modelling.			ensure the preservation of records and in order to make data comparable and accessible.	the capacity of countries to take the action recommended for the preservation of records.  Eventual digitisation of records is recommended.	
<b>Practices/ projects</b>	<i>Climate Change and Southern Hemisphere Tropical Cyclones Project.</i> This project will develop a tropical cyclone database for Australia and the South Pacific, along with the expertise to ensure the data is used widely in the region.	2006-07 AU \$100,000			Project has identified the difficulty in obtaining consistent climate records across national borders. It has also identified a range of missing historical data.	Linked to the Pacific Island Climate Prediction Project (see above) <a href="http://www.bom.gov.au/climate/pi-cpp/">http://www.bom.gov.au/climate/pi-cpp/</a> <a href="http://www.bom.gov.au/cgi-bin/silo/cyclones.cgi">http://www.bom.gov.au/cgi-bin/silo/cyclones.cgi</a>
<b>Practices/ projects</b>	<i>Climate Change and Southern Hemisphere Tropical Cyclone Extension Project.</i> This project will utilise the data from the project above to analyse tropical cyclone variability and trends in relation to climate change, and conduct further analysis of the climatology	2007-08 AU \$100,000 Commencing July 2007			New project.	Linked to the Pacific Island Climate Prediction Project (see above) <a href="http://www.bom.gov.au/climate/pi-cpp/">http://www.bom.gov.au/climate/pi-cpp/</a> <a href="http://www.bom.gov.au/cgi-bin/silo/cyclones.cgi">http://www.bom.gov.au/cgi-bin/silo/cyclones.cgi</a>

Type of adaptation action	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns/Barriers	Experiences/ Lesson learned	References i.e. publications, websites etc.
	of tropical cyclone variability to expand the database and develop a tropical cyclone forecasting scheme.					
<b>Practices/ projects</b>	<i>Building Robust and Reliable Data Monitoring Infrastructure for Climate Change Monitoring Project.</i> This project will use data management techniques to ensure that climate data in Pacific Island Countries is secure, accessible, and can be used to develop more informed responses to the impacts of climate change.	2006-07 AU \$125,000 Ending 3 <sup>rd</sup> quarter 2007	Additional key entry forms which mimic local paper observation registers.	Linking new forms to existing software.	Sufficient training in the use of relevant software is necessary for in-country staff. Ongoing support is needed to ensure systems continue.	Web site being developed.
<b>Approaches/ strategies</b>	Assisting Pacific Island Countries in managing and responding to the risks and impacts identified through practical adaptation projects.	Ongoing – see projects listed below.	Genuine and early community consultation is vital to ensure local engagement and ownership.	Comparable, long-term and high quality regional data will take time to develop.	Need to take into account local circumstances, capacity and competing priorities in order not to set unrealistic expectations, including overly ambitious timeframes.	

Type of adaptation action	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns/Barriers	Experiences/ Lesson learned	References i.e. publications, websites etc.
<b>Practices/ projects</b>	<i>Pacific Vulnerability and Adaptation Initiative.</i> This is a seven-year regional initiative to support practical adaptation initiatives, primarily to improve water security and coastal zone management. Participants are Tuvalu, Tonga, Vanuatu, Samoa, Fiji, Solomon Islands.	2002-09 AU \$4 million		Lack of awareness of the specific impacts of climate change and suitable adaptation measures.		
<b>Practices/ projects</b>	<i>Kiribati Adaptation Programme.</i> Australia's contribution to the second phase of this World Bank project aims to help Kiribati to reduce its vulnerability to the potential impacts of climate variability and climate change. Australia's contribution will support improvements in freshwater management and sanitation.	2006-08 AU \$2.9 million	This second phase requires both time to implement, and some level of existing capacity of the project proponents given its technical nature.			
<b>Approaches/ strategies</b>	<i>Climate Change Partnerships.</i> This initiative will support climate change adaptation and mitigation initiatives	2007-08 AU \$32.5 million (approx half for adaptation measures)				



Type of adaptation action	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns/Barriers	Experiences/ Lesson learned	References i.e. publications, websites etc.
	<p>with the UNFCCC, World Bank, the Asian Development Bank and the Mekong River Commission through:</p> <ul style="list-style-type: none"> <li>- funding of AU \$7.5 million to the UNFCCC's Least Developed Countries Fund (LDCF) to limit the impact of climate change on some of the poorest and most vulnerable countries (including our Pacific island neighbours)</li> <li>- support to the Asian Development Bank to support the Water Financing Programme, which will help to introduce integrated water resource management in 25 river basins across the Asia-Pacific region.</li> </ul>					
<b>Scope of adaptation action</b> <i>National level</i>						
<b>Approaches/ strategies</b>	<i>National Climate Change Adaptation Framework.</i> This framework outlines	Agreed by the Council of Australian			New initiative.	<a href="http://www.coag.gov.au/meetings/130407/docs/national_climate_cha">www.coag.gov.au/meetings/130407/docs/national_climate_cha</a>

Type of adaptation action	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns/Barriers	Experiences/ Lesson learned	References i.e. publications, websites etc.
	<p>the future agenda of collaboration between Australian governments (federal, state and local), over the next five to seven years, to address key demands from business and the community for targeted information on climate change impacts, and to fill critical knowledge gaps which currently inhibit effective adaptation.</p> <p>The framework includes possible actions to assist the most vulnerable sectors and regions, such as agriculture, biodiversity, fisheries, forestry, settlements and infrastructure, coastal, water resources, tourism and health to adapt to the impacts of climate change.</p>	Governments (COAG) on 13 April 2007.				<a href="#">nge adaption framework.pdf</a>
<b>Practices/ projects</b>	Under the National Climate Change Adaptation Framework, the Australian Government has allocated AU \$126 million	Under development.				

<b>Type of adaptation action</b>	<b>Title of adaptation action, including projects</b>	<b>Status of adaptation action</b> - ongoing - under implementation - under development - under consideration	<b>Needs in order to successfully implement the adaptation action</b>	<b>Concerns/Barriers</b>	<b>Experiences/ Lesson learned</b>	<b>References</b> i.e. publications, websites etc.
	for a <i>National Centre for Climate Change Adaptation</i> and AU \$44 million for an ' <i>Adaptation Flagship</i> ' – a research programme through Australia's Commonwealth Scientific and Industrial Research Organisation (CSIRO). The new Adaptation Flagship will provide more accurate information on localised climate changes. The new Australian Centre for Climate Change Adaptation will assist particularly affected sectors and regions, planning bodies, farmers, businesses and local government to understand better the impacts of climate change and to develop responses <sup>1</sup> .					
<b>Approaches/ strategies</b>	The new initiatives directly above build on the <i>National Climate Change Adaptation Programme</i> . This programme was established to commence	2004-2007 AU \$14.2 million.				<a href="http://www.greenhouse.gov.au/impacts/nccap/index.html">http://www.greenhouse.gov.au/impacts/nccap/index.html</a>

Type of adaptation action	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns/Barriers	Experiences/ Lesson learned	References i.e. publications, websites etc.
	preparing Australian governments and vulnerable industries and communities for the unavoidable impacts of climate change <sup>ii</sup> .					
<b>Practices/ projects</b>	<p>National risk and vulnerability assessment. This project identified sectors of highest priority for adaptation in Australia, namely biodiversity, water resources, human settlements and agriculture. Sector specific projects in these areas are discussed under sectoral approaches below.</p> <p>Additionally, some regions were pinpointed as high priorities for adaptation planning. These were the Murray-Darling Basin, the Cairns-Great Barrier Reef region, south-west Western Australia and the coastal zone. Further assessments in the Cairns-Great Barrier Reef region and south-west Western Australia have</p>	Completed in 2005. Results reported in <i>Climate Change Risk and Vulnerability - Promoting an Efficient Adaptation Response in Australia</i> .			For climate risks to be considered as a normal part of strategic planning and decision-making, a period of awareness raising, development of the necessary science and practical response techniques, and identification of priorities is essential.	<a href="http://www.greenhouse.gov.au/impacts/publications/risk-vulnerability.html">http://www.greenhouse.gov.au/impacts/publications/risk-vulnerability.html</a>

Type of adaptation action	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns/Barriers	Experiences/ Lesson learned	References i.e. publications, websites etc.
	been subsequently undertaken (see below). Sector specific action in relation to the Great Barrier Reef, the Murray Darling Basin and the coastal zone are discussed under 'sectoral level' approaches below.					
<b>Practices/ projects</b>	Integrated assessment of climate change impacts in south-west Western Australia.	First phase of the assessment, examining responses and resilience to historical changes in climate, has been completed.			Some human systems appear to have significant autonomous adaptive capacity, although climate change may bring us close to the limits of this capacity.  There can be a considerable lag between an abrupt climate shift and realisation that such a shift has occurred and responses are necessary.	Publication of report pending.
<b>Practices/ projects</b>	<i>Climate Change in the Cairns and Great Barrier Reef Region - Scope and</i>	2004. The report of the study describes the				<a href="http://www.greenhouse.gov.au/impacts/publications/pubs/gbr.p">http://www.greenhouse.gov.au/impacts/publications/pubs/gbr.p</a>

<b>Type of adaptation action</b>	<b>Title of adaptation action, including projects</b>	<b>Status of adaptation action</b> - ongoing - under implementation - under development - under consideration	<b>Needs in order to successfully implement the adaptation action</b>	<b>Concerns/Barriers</b>	<b>Experiences/ Lesson learned</b>	<b>References</b> i.e. publications, websites etc.
	<i>Focus for an Integrated Assessment.</i> This study was undertaken to determine the scope and focus for an integrated assessment of climate change impacts on, and adaptation options for, the Cairns Great Barrier Reef region.	study objectives and the process used to meet these objectives, and provides an overview of the Cairns Great Barrier Reef region, the views of technical experts on potential climate change impacts, stakeholder prioritisation of impacts and adaptation options, a list of perceived knowledge gaps, and a recommended structure for a future integrated assessment in the region.				<a href="#">df</a>
<b>Approaches/ strategies</b>	Providing guidance for the use of risk management in climate change adaptation.	Guidance developed and being applied by a number of organisations (see below).				
<b>Practices/ projects</b>	<i>Climate Change Impacts and Risk Management: A Guide for Business and</i>	2006. Workshops were also held around			Users of the guide will need to allocate adequate time and	<a href="http://www.greenhouse.gov.au/impacts/publications/risk-">http://www.greenhouse.gov.au/impacts/publications/risk-</a>

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	<i>Government (2006)</i> . This guide was produced to assist governments and business to adapt to climate change by showing how routine application of the Australian and New Zealand Standard for Risk Management AS/NZS 4360:2004 can be extended to include the risks generated by climate change.	Australia in May-June 2006, based around the risk management guidance publication and aimed at helping business and government plan for the impacts of climate change.			resources for proper risk management.	<a href="#">management.html</a>
<b>Practices/ projects</b>	<i>Climate Change Scenarios for Initial Assessment of Risk in Accordance with Risk Management Guidance (2006)</i> . This document accompanies the above <i>Guide for Business and Government</i> , providing simplified climate change scenarios for the year 2030 for use in the risk assessment process.				Importance of well developed climate change scenarios for risk identification.	<a href="http://www.greenhouse.gov.au/impacts/publications/risk-scenarios.html">http://www.greenhouse.gov.au/impacts/publications/risk-scenarios.html</a>
<b>Approaches/ strategies</b>	Australian State and Territory governments also have climate change adaptation strategies,					

Type of adaptation action	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns/Barriers	Experiences/ Lesson learned	References i.e. publications, websites etc.
	<p>research programmes and projects in place. Examples include the following:</p> <p><i>NSW Climate Change Impacts and Adaptation Research Programme.</i> Under this programme approximately AU \$2 million over four years has been allocated to researching the likely impacts of climate change in the following areas: health; threatened species; aquatic ecosystems; bushfires; conservation planning; invasive species; coastal impacts; terrain mapping; and water.</p> <p><i>Victorian Climate Change Adaptation Programme (VCCAP).</i> Under this programme AU \$14.8 million over four years has been allocated to four initiatives: helping Victorian communities adapt to climate change by increasing scientific</p>					<p><a href="http://www.greenhouse.nsw.gov.au/actions/agencies/cabinet/climate_change_impacts_and_adaptation_research_projects">http://www.greenhouse.nsw.gov.au/actions/agencies/cabinet/climate_change_impacts_and_adaptation_research_projects</a></p> <p><a href="http://www.greenhouse.vic.gov.au/greenhouse/wcmn302.nsf/LinkView/DB2BD54FA9CEEC7CCA25719A002A0E70013EE11B94AB8025CA2571A80011DB4B">http://www.greenhouse.vic.gov.au/greenhouse/wcmn302.nsf/LinkView/DB2BD54FA9CEEC7CCA25719A002A0E70013EE11B94AB8025CA2571A80011DB4B</a></p>



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	knowledge and technical expertise; establishing a Centre of Research Excellence in climate change adaptation to collaborate on research, assessment and provision of advice to the government and the community; work with local government, regional groups and other stakeholders to build local understanding of the impacts of climate change to assist in developing local solutions; and assessing the potential public health impacts on Victorians arising from climate change.					
<b>Scope of adaptation action</b> <i>Local (community) level</i>						
<b>Approaches/ strategies</b>	See programme of integrated assessment of human settlements described under sectoral approaches below.					
<b>Practices/ projects</b>	Climate change adaptation materials for local	Project commenced in April 2007.			New initiative.	

Type of adaptation action	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns/Barriers	Experiences/ Lesson learned	References i.e. publications, websites etc.
	government.					
<b>Scope of adaptation action</b> <i>Sectoral level</i>						
<i>Water resources</i>						
<b>Approaches/ strategies</b>	<i>A National Plan for Water Security.</i> This AU \$10 billion Plan integrates adaptation over the next 10 years by: <ul style="list-style-type: none"> <li>- requiring water sharing arrangements in the Murray-Darling Basin (MDB) to provide for the impacts of future climate change;</li> <li>- investing AU \$5.9 billion in modernising irrigation infrastructure to adjust to expected future declines in rainfall and run-off;</li> <li>- investing AU \$3 billion to address over use of water and place the MDB on a sustainable footing; and</li> </ul>	Under implementation (announced January 2007).	The CSIRO will provide an assessment of water availability in the Murray-Darling Basin (MDB), including in light of climate change and other risks, by the end of 2007. This will be complemented by other environmental, social and economic information. Implementation of the Plan is contingent on successful negotiations between the Commonwealth Government and MDB state and territory governments, which are currently		New initiative.	<a href="http://www.environment.gov.au/water/index.html">www.environment.gov.au/water/index.html</a>

Type of adaptation action	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns/Barriers	Experiences/ Lesson learned	References i.e. publications, websites etc.
	<ul style="list-style-type: none"> <li>- improving Australia's water information base.</li> </ul>		underway. Delivery of the Plan will require comprehensive stakeholder engagement and the development of delivery partnerships with a broad ranging engagement with the industry and community sectors.			
<b>Approaches/ strategies</b>	<i>National Water Initiative (NWI)</i> . This initiative provides Australia's blueprint for national water reform, including risk sharing arrangements for reductions in water allocations due to climate change.	Under implementation.	The NWI is supported by the AU \$2.2 billion Australian Government Water Fund.		National-level coordination has been required to ensure effective implementation of NWI commitments. Independent assessment of whether parties have met their commitments within agreed timeframes has proved useful in driving reform.	<a href="http://www.nwc.gov.au/nwi/index.cfm">www.nwc.gov.au/nwi/index.cfm</a>
<b>Approaches/ strategies</b>	Australian State and Territory governments also have relevant adaptation strategies and research					

Type of adaptation action	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns/Barriers	Experiences/ Lesson learned	References i.e. publications, websites etc.
	<p>programmes in place.</p> <p>Examples include the <i>NSW Climate Change Impacts and Adaptation Research Programme – Water</i>. This project aims to increase understanding of the impacts of anthropogenic climate change and natural climate variability on the supply of, and demand for, drinking water in Sydney and to formulate broad-brush policies for the resulting range of possible future water supply/demand balance scenarios.</p>					<p><a href="http://www.greenhouse.nsw.gov.au/how_can_we_adapt_to_climate_change/climate_change_impacts_and_adaptation_research_projects/climate_change_impacts_and_adaptation_research_programs/climate_change_impacts_and_adaptation_research_programs_-_water">http://www.greenhouse.nsw.gov.au/how_can_we_adapt_to_climate_change/climate_change_impacts_and_adaptation_research_projects/climate_change_impacts_and_adaptation_research_programs/climate_change_impacts_and_adaptation_research_programs_-_water</a></p>
<b>Technologies</b>	<p>Water use efficiency in irrigated agriculture.</p> <p>The National Plan for Water Security will make substantial investments in water use efficiency in delivery of water to the farm gate and in delivery on farm to crops.</p>	Under development.				<p><a href="http://www.environment.gov.au/water/index.html">www.environment.gov.au/water/index.html</a></p>
<b>Technologies</b>	Desalination plants.	A desalination plant	Good understanding		Importance of a risk	

Type of adaptation action	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns/Barriers	Experiences/ Lesson learned	References i.e. publications, websites etc.
		has been built in Perth as part of a broader water and climate change management strategy. Desalination is being considered for other major cities.	of risks to water resources as a result of climate change.  Financial resources.		management approach. Importance of bringing together the climate change and hydrological communities to generate the knowledge base for decision-making.	
<b>Technologies</b>	Upgraded water storage systems.	Following a major study of climate change implications for Melbourne's water, Tarago Reservoir – which was taken offline in 1994 – will be reconnected by 2011 to help protect Melbourne's water supplies from the impacts of climate change. A water treatment plant will be built near the reservoir to provide an extra 21,000 ML of drinking water to Melbourne each year – an additional 3.7%	Good understanding of risks to water resources as a result of climate change.  Financial resources.			

Type of adaptation action	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns/Barriers	Experiences/ Lesson learned	References i.e. publications, websites etc.
		capacity. Other actions from water strategies will also be moved forward. In addition, further investigations are being made into demand management, desalination options, aquifer storage, stormwater harvesting and the Eastern Water Recycling Proposal.				
<b>Natural Resource Management</b>						
<b>Approaches/ strategies</b>	<i>The Framework for Future Natural Resource Management Programmes.</i> The need to develop adaptation responses to climate change is one of the major cross-cutting components of the framework, which provides for the future development of natural resource management (NRM) programmes across Australia.	Endorsed by the Natural Resource Management Ministerial Council on 24 November 2006.			One of the common understandings on which the framework is based is that an adaptive management approach based on continuous learning should continue to underpin the delivery of NRM services.	<a href="http://www.nrm.gov.au/publications/future/pubs/future.pdf">http://www.nrm.gov.au/publications/future/pubs/future.pdf</a>

Type of adaptation action	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns/Barriers	Experiences/ Lesson learned	References i.e. publications, websites etc.
<i>Agriculture</i>						
<b>Approaches/ Strategies</b>	<i>National Agriculture and Climate Change Action Plan 2006-2009<sup>iii</sup></i> . The Plan is an agreement by Australian governments to develop a coordinated framework for climate change policy in agriculture. It provides practical tools to develop effective and efficient policies to deal with climate change challenges.	Released by the Natural Resource Management Ministerial Council in August 2006 and now being implemented. AU \$5 million allocated under the Natural Heritage Trust.				<a href="http://www.daff.gov.au/natural-resources/climate">http://www.daff.gov.au/natural-resources/climate</a>
<b>Practices/ projects</b>	See also footnote 1c (potential activities to be funded through the new National Centre for Climate Change Adaptation).					
<b>Approaches/ strategies</b>	Australian State and Territory governments also have relevant adaptation strategies and research programmes in place.  Examples include the					<a href="http://www.greenhou">http://www.greenhou</a>

Type of adaptation action	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns/Barriers	Experiences/ Lesson learned	References i.e. publications, websites etc.
	<i>Victorian Climate Change Adaptation Programme</i> , which includes work to increase scientific knowledge and technical expertise to make agricultural systems more resilient to climate change.					<a href="http://se.vic.gov.au/greenhouse/wcmn302.nsf/LinkView/DB2BD54FA9CEEC7CCA25719A002A0E70013EE11B94AB8025CA2571A80011DB4B">se.vic.gov.au/greenhouse/wcmn302.nsf/LinkView/DB2BD54FA9CEEC7CCA25719A002A0E70013EE11B94AB8025CA2571A80011DB4B</a>
<b>Biodiversity</b>						
<b>Approaches/ Strategies</b>	National vulnerability assessment for biodiversity.	Under way.		Inadequate understanding of ecosystem response to climate, including lack of historical distribution data.		
<b>Approaches/ strategies</b>	<i>National Biodiversity and Climate Change Action Plan 2004-2007</i> . This three-year action plan was developed to help focus efforts on minimising the impacts of climate change on species, communities and ecosystems.	Under review.			Need to make sure key stakeholders (government and external) are on board and involved in each step of the process.  Need to set specific and achievable targets, and to set out clearly how these targets will be achieved, including how key activities	<a href="http://www.environment.gov.au/biodiversity/publications/nbcap/background.html">http://www.environment.gov.au/biodiversity/publications/nbcap/background.html</a>



Type of adaptation action	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns/Barriers	Experiences/ Lesson learned	References i.e. publications, websites etc.
					under the plan will be resourced.	
<b>Practices/ projects</b>	Workshop identifying research needs and information gaps for the implementation of the key objectives of the National Biodiversity and Climate Change Action Plan. This scientific workshop was hosted by the Australian Government Department of the Environment and the Commonwealth Scientific and Industrial Research Organisation (CSIRO) in June 2005.	2005. The findings of the workshop can be found in the report <i>Biodiversity Conservation Research in a Changing Climate</i> (2007). This report is the product of a collaborative effort by the Australian Government, state and territory governments and the scientific community.				<a href="http://www.environment.gov.au/biodiversity/publications/biodiversity-climate-priorities.html">http://www.environment.gov.au/biodiversity/publications/biodiversity-climate-priorities.html</a>
	Australian State and Territory governments also have relevant adaptation strategies and research programmes in place.  Examples include the <i>New South Wales Climate Change Impacts and Adaptation Research Programme - Threatened Species</i> . This project will					<a href="http://www.greenhouse.nsw.gov.au/how-can-we-adapt-to-climate-change/climate-change-impacts-and-adaptation-research">http://www.greenhouse.nsw.gov.au/how-can-we-adapt-to-climate-change/climate-change-impacts-and-adaptation-research</a>

Type of adaptation action	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns/Barriers	Experiences/ Lesson learned	References i.e. publications, websites etc.
	focus on those ecological processes that have been identified as critical to species' persistence in the landscape or their ability to move to new habitats. This will include dispersal (fragmented and non-fragmented landscapes) and recruitment (arid landscapes), with a particular focus on a selected group of species and communities already perceived to be at risk.					<a href="#">h projects/climate change impacts and adaptation research programs/threatened species</a>
<i>Protected areas</i>						
<b>Practices/ projects</b>	Assessment of the impacts, vulnerability and management implications of climate change for: the National Reserve System; the World Heritage values of Australia's World Heritage properties; and the Australian Government's protected areas.	All three projects underway and due for completion by August 2007.		Inadequate understanding of ecosystem response to climate, including lack of historical distribution data.		
<i>Great Barrier Reef</i>						

<b>Type of adaptation action</b>	<b>Title of adaptation action, including projects</b>	<b>Status of adaptation action</b> - ongoing - under implementation - under development - under consideration	<b>Needs in order to successfully implement the adaptation action</b>	<b>Concerns/Barriers</b>	<b>Experiences/ Lesson learned</b>	<b>References</b> i.e. publications, websites etc.
<b>Approaches/ strategies</b>	<p><i>Great Barrier Reef Climate Change Response Programme.</i></p> <p>This programme aims to better understand and respond to climate change threats, including coral bleaching. Its aims are to: sustain Great Barrier Reef ecosystems; sustain industries and communities that depend on the Great Barrier Reef; and foster supportive policy and networks.</p>	<p>AU \$2 million funding allocated to understanding climate change impacts. This phase of the programme has been completed.</p> <p>New funding allocated to implement a 5-year climate change action plan building on existing best practice, such as increasing highly protected areas and improving water quality.</p>	<p>Scientific expertise.</p> <p>Community support.</p> <p>Effective partnership and co-investment from stakeholder groups.</p>	<p>Significant challenge is to raise awareness of climate change risk while also encouraging a sense of hope and motivation for action.</p>	<p>Important to invest in awareness raising about the risks posed by climate change - an effective strategy has been to work closely with stakeholder groups to assess the vulnerability/ resilience of ecological systems and dependent industries/ communities, and then facilitate them to formulate and implement stakeholder-specific adaptation strategies.</p> <p>A strong understanding of the factors influencing the resilience of ecological systems and the links between ecological and socio-economic systems is also important.</p>	<p><a href="http://www.gbrmpa.gov.au/corp_site/info_services/science/climate_change">http://www.gbrmpa.gov.au/corp_site/info_services/science/climate_change</a></p>

Type of adaptation action	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns/Barriers	Experiences/ Lesson learned	References i.e. publications, websites etc.
<b>Practices/ projects</b>	<i>Great Barrier Reef Coral Bleaching Response Plan.</i> This plan, part of the Climate Change Response Programme, is recognised worldwide as the leading model for tactical response to bleaching events. It has recently been adopted for use in Indonesia and the Florida Keys. It uses a combination of satellite imagery, aerial surveys and underwater surveys to rapidly and efficiently determine the extent and severity of a coral bleaching event, and to understand the impacts on the Great Barrier Reef.	Implemented every summer to monitor and document coral bleaching.				<a href="http://www.gbrmpa.gov.au/corp_site/info_services/science/climate_change/response_plan.html">http://www.gbrmpa.gov.au/corp_site/info_services/science/climate_change/response_plan.html</a>
<b>Practices/ projects</b>	The Coral Bleaching Response Plan includes <i>BleachWatch</i> , a community monitoring programme that has formed from strong partnerships with reef tourism operators, research stations and the broader community and helps to detect and monitor coral	Ongoing.			Value of broader community involvement.	<a href="http://www.gbrmpa.gov.au/corp_site/info_services/science/bleach_watch2.html">http://www.gbrmpa.gov.au/corp_site/info_services/science/bleach_watch2.html</a>

Type of adaptation action	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns/Barriers	Experiences/ Lesson learned	References i.e. publications, websites etc.
	bleaching.					
<i>Coastal zones</i>						
<b>Approaches/ strategies</b>	National coastal vulnerability assessment.	Under way.		Quantitative analysis at the level useful to decision-makers requires significant data, e.g. digital elevation models (DEM).		
<b>Practices/ projects</b>	See also footnote 1a (potential activities to be funded through the new National Centre for Climate Change Adaptation).					
<i>Human settlements</i>						
<b>Approaches/ strategies</b>	Programme of integrated assessment of human settlements. This programme aims to foster partnerships with a range of researchers, stakeholders and regional organisations in developing a body of knowledge, experience and expertise in the use of integrated assessment methods in	AU \$1.5 million allocated to five integrated assessment projects (to be completed in June 2008) that will provide information that local decision-makers can use to make informed adaptation decisions and develop a body			Importance of stakeholder-driven scientifically informed analysis.	

Type of adaptation action	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns/Barriers	Experiences/ Lesson learned	References i.e. publications, websites etc.
	Australia's urban environment.	of lessons, knowledge, methods and experience about integrated assessment of climate change impacts that can be applied to a broad range of Australian settlements.				
<b>Approaches/ strategies</b>	<p>Australian State and Territory governments also have relevant adaptation strategies and research programmes in place.</p> <p>Examples include the <i>Victorian Climate Change Adaptation Programme</i>, which includes work to increase scientific knowledge and technical expertise to understand what climate change will mean for individual communities, and to make buildings, infrastructure and homes more adaptable to climate change.</p>					<a href="http://www.greenhouse.vic.gov.au/greenhouse/wcmn302.nsf/LinkView/DB2BD54FA9CCEC7CCA25719A002A0E70013EE11B94AB8025CA2571A80011DB4B">http://www.greenhouse.vic.gov.au/greenhouse/wcmn302.nsf/LinkView/DB2BD54FA9CCEC7CCA25719A002A0E70013EE11B94AB8025CA2571A80011DB4B</a>

Type of adaptation action	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns/Barriers	Experiences/ Lesson learned	References i.e. publications, websites etc.
<i>Health</i>						
<b>Practices/ projects</b>	See footnote 1b (potential activities to be funded through the new National Centre for Climate Change Adaptation).					
<b>Approaches/ strategies</b>	<p>Australian State and Territory governments also have relevant adaptation strategies and research programmes in place.</p> <p>Examples include the <i>New South Wales Climate Change Impacts and Adaptation Research Programme – Health</i>. Under this programme NSW Health is undertaking research to more clearly characterise the effect of key climate change health impacts in NSW to assist in underpinning policy, to demonstrate future effects more clearly for NSW, and to provide some directions</p>					<p><a href="http://www.greenhouse.nsw.gov.au/how-can-we-adapt-to-climate-change/climate-change-impacts-and-adaptation-research-projects/climate-change-impacts-and-adaptation-research-programs/climate-change-impacts-and-adaptation-research-programs-health">http://www.greenhouse.nsw.gov.au/how-can-we-adapt-to-climate-change/climate-change-impacts-and-adaptation-research-projects/climate-change-impacts-and-adaptation-research-programs/climate-change-impacts-and-adaptation-research-programs-health</a></p>

Type of adaptation action	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns/Barriers	Experiences/ Lesson learned	References i.e. publications, websites etc.
	<p>for the development of climate change adaptation programmes.</p> <p>The <i>Victorian Climate Change Adaptation Programme</i> also includes work to increase scientific knowledge and technical expertise to help in understanding what climate change will mean for the health of Victorians.</p>					<p><a href="http://www.greenhouse.vic.gov.au/greenhouse/wcmn302.nsf/LinkView/DB2BD54FA9CFEC7CCA25719A002A0E70013EE11B94AB8025CA2571A80011DB4B">http://www.greenhouse.vic.gov.au/greenhouse/wcmn302.nsf/LinkView/DB2BD54FA9CFEC7CCA25719A002A0E70013EE11B94AB8025CA2571A80011DB4B</a></p>

<sup>i</sup> The *National Centre for Climate Change Adaptation* will be managed by the Australian Government but will work closely with the States and related bodies to ensure a coordinated national approach as envisaged by the National Adaptation Framework. The Adaptation Centre will commission scientific work, including from the new Adaptation Flagship, to develop tangible responses to climate change. Examples of the types of activities that could be funded include:

- a. identification of how to protect coastal infrastructure from likely changes in storm surge using well designed sea walls and flood barriers;
- b. work towards the design of a heat wave warning system and proposing ways to modify facilities to cater for those most at risk (the elderly);
- c. helping to plan for expanding the use of feedlots by farmers to reduce the exposure of their valuable stock to variation in pasture availability and heat stress; and
- d. identifying areas in national parks that will provide the best areas for recolonisation of plants and animals that have been displaced by climatic changes from their natural locations.

<sup>ii</sup> Key objectives of the four year *National Climate Change Adaptation Programme* were to:

- a. advise Government on policy issues related to climate change impacts and adaptation, including key risks to and opportunities for Australia
- b. build capacity to support the development of effective and targeted adaptation strategies
- c. engage stakeholders and provide targeted and scale-relevant information and tools to industry sectors and regions
- d. integrate climate change impacts and adaptation considerations into key policies and programmes, including into risk management practices across vulnerable sectors.

<sup>iii</sup> The *National Agriculture and Climate Change Action Plan* aims to raise awareness about climate change issues among primary producers and rural communities and will provide a strategic framework for primary producers when decision-making and business planning. Four key areas identified for climate change management are:

- a. adaptation strategies to build resilience into production systems
- b. mitigation strategies to reduce or offset greenhouse gas emissions



- 
- c. research and development strategies to enhance the agricultural and forestry sectors capacity to respond to climate change
  - d. awareness and communication strategies to inform decision-making by primary producers and rural communities.

**Submissions by Bangladesh on Adaptation Approaches, Strategies, Practices and Technologies for Adaptation**

<b>Type of adaptation action<sup>1</sup></b>	<b>Title of adaptation action, including projects</b>	<b>Status of adaptation action</b> - ongoing - under implementation - under development - under consideration	<b>Needs in order to successfully implement the adaptation action</b>	<b>Concerns/ Barriers</b>	<b>Experiences/ Lesson learned</b>	<b>References</b> i.e. publications, websites etc.
<b>Scope of adaptation action</b> <i>Regional level</i>						
<b>Approaches/ strategies</b>	The 14 <sup>th</sup> SAARC Summit, held in New Delhi during 3-4 April 2007 has adopted a decision to approach climate change as a regional concern. The immediate outcome is to organize a workshop this year where regional experts will identify coastal concerns and adaptation options. The prioritized options and actions will be developed into projects for funding and implementation.	Under consideration	Regional workshop to draw relevant experts from member countries to develop specific actions to take up nationally and regionally.  Additional resources and funds will need to be identified and secured to implement the adaptation actions.	Political commitment and support from key governments and the relevant international institutions.		Paragraph 13 of the New Delhi Declaration.  Web address provided for full text
<b>Practices</b>						

<sup>1</sup> Please be aware of the degree of adaptation within activities:

- Some activities are undertaken specifically to adapt to climate change, e.g. increased water storage capacity, development of new crop varieties.
- Some activities include a component of climate change adaptation, e.g. infrastructure replacement incorporating higher flood standards
- Some activities are not carried out for adaptation but have other objectives such as preserving biodiversity, however they can offer adaptation co-benefits, e.g. restored wetlands protect against storm surges.

<b>Technologies</b>						
<i>National level</i>						
<b>Approaches/ strategies</b>	<p>The Climate Change Cell, Department of Environment has developed a generic tool to operationalize mainstreaming and integration of climate risks management and adaptation. The objective of the country framework is establishing a mechanism that facilitates national development planning and implementation to integrate adaptation to climate change and climate risk management systematically and over time.</p> <p>Bangladesh has also prepared its NAPA which outlines prioritized actions for adaptation and includes a list of projects for immediate implementation</p> <p>Concept notes on the 15 prioritized projects are contained in the report.</p>	<p>Under development. A National Workshop took place on 20 February 2007, and the resulting outcome is preparing a road map for Bangladesh to adopt this tool for mainstreaming across all sectors and at all levels.</p> <p>Under consideration. The document has been submitted with UNFCCC.</p>	<p>The projects need to be developed further by host agencies, ministries. Available resources and funds are required to implement the projects.</p>	<p>Major concerns and barriers are described in the NAPA document Section 3.3.3 page 20.</p>		<p><i>Climate Resilient Development – Country Framework to Mainstream Climate Risk Management and Adaptation</i>, published in November 2006 by Climate Change Cell, DoE, Bangladesh.</p> <p>Full text Available from website, or by requesting on email</p> <p>Web source provided</p>
<b>Practices</b>						
<b>Technologies</b>						
<i>Local (community) level</i>						
<b>Approaches/</b>						

<b>strategies</b>						
<b>Practices</b>						
<b>Technologies</b>						

Web link for 14<sup>th</sup> SAARC Summit New Delhi Declaration -  
[www.priu.gov.lk/news\\_update/Current\\_Affairs/ca200704/20070405saarc\\_moves\\_implementation\\_phase.htm](http://www.priu.gov.lk/news_update/Current_Affairs/ca200704/20070405saarc_moves_implementation_phase.htm)

Web link and email address of Climate Change Cell for the Country Framework on Climate Resilient Development  
[www.climatechange-cell-bd.org](http://www.climatechange-cell-bd.org); [info@climatechange-cell-bd.org](mailto:info@climatechange-cell-bd.org);

Web link for Bangladesh NAPA [unfccc.int/resource/docs/napa/ban01.pdf](http://unfccc.int/resource/docs/napa/ban01.pdf)

<i>Sectoral level<sup>2</sup></i>						
<i>Agriculture</i>						
<b>Approaches/ Strategies</b>						
<b>Practices</b>						
<b>Technologies</b>						
<i>Water resources</i>						
<b>Approaches/ Strategies</b>						
<b>Practices</b>						
<b>Technologies</b>						
<i>Health</i>						
<b>Approaches/ Strategies</b>						
<b>Practices</b>						
<b>Technologies</b>						
<i>Coastal zones (settlements)</i>						
<b>Approaches/ Strategies</b>						
<b>Practices</b>						
<b>Technologies</b>						
<i>Others (please provide information about other relevant sectors) North west-Barind Area (Drought prone and drought affected)</i>						
<b>Approaches/ Strategies</b>	Department of Agricultural Extension (DAE) with Food and Agriculture Organization on the UN , with support from Comprehensive Disaster					“Improved Adaptive Capacity to Climate Change for Sustainable Livelihoods in the Agriculture Sector” Case study

<sup>2</sup> The sectors below are given as examples. Please provide information on any other sectors which you consider important and have examples to share.

	Management Programme of UNDP is implementing a project <i>Livelihood Adaptation to Climate Variability &amp; Change in Drought-prone Areas of Bangladesh</i>					<p>report - Developing Institutions and Options for Livelihood Adaptation to Climate Variability and Change in Drought-prone Areas of Bangladesh, May 2006,</p> <p>The publication can be accessed from FAO website or a pdf version may be requested from the Climate Change Cell.</p>
<b>Practices</b>						See Attached table -1
<b>Technologies</b>						See attached table-1

Table-1 Categories of adaptation options and their sources for drought risk management under the project Livelihood Adaptation to Climate Variability & Change in Drought-prone Areas of Bangladesh

Sl. No	Categories	Adaptation practice	Source
1.	Agronomic management	Seedbed method for <i>T.Aman</i> rice	Farmers and experts
2.		Manures and composting	Farmers
3.		Depth of transplanting for <i>T.Aman</i>	Farmers
4.		Weed control-reduce water seepage	Farmers
5.		Manual closing of soil cracks	Farmers
6.		Strengthening field bunds (Ail lifting)	Farmers
7.	Water harvesting	Re-excavation of traditional ponds	Farmers
8.		Re-excavation of khari canals	BMDA
9.		Canals	Farmers
10.		Water control structures	BMDA
11.		Miniponds	BMDA
12.		Supplemental irrigation	Farmers/ DAE
13.	Water resources exploitation	Shallow and deep tubewells	BMDA
14.	Water use efficiency	System of rice intensification	Experts
15.		Direct sown rice (drum seeder)	Experts
16.		Drought resistant rice varieties	Multiple sources
17. a)		Crop intensification	Green Manure – <i>T.Aman</i> system
b)	<i>T. Aus</i> – Chini atap system		Farmers
c)	<i>T. aman</i> – Mustard/linseed system		BARI/ BRRI
d)	<i>T. aman</i> – Chickpea		BARI/ BRRI
e)	<i>T. aman</i> – Mung bean		DAE
d)	Famine reserve crops		Experts
18.	Alternate enterprise	Mango cultivation	Farmers
19.		Homestead gardens	BARI
20.		Mulberry intercropping in rice	BRRI
21.		Fodder cultivation	DoL
22.		Fish cultivation in miniponds	DoF
23.		Cottage industries	Community
24.		Manufacturing industries	Community
25.		Alternative energy source	Community based biogas and tree planting
26.	Post harvest practices	Seed storage for higher viability	Farmers

## ADAPTATION TO CLIMATE CHANGE

### Adaptation Possibilities: A brief Overview of Options

The implications of high intensity floods cannot be overemphasized in Bangladesh. Management of flood in future will remain a major challenge, especially in view of further densification in increasingly flood vulnerable lands (Ahmed *et al.*, 1998a, Faruque and Ali, 2005). Creation of flood defense along the major rivers has been recommended by several authors (Alam *et al.*, 1998; Mahtab, 1989, Faruque and Ali, 2005). Community efforts to cope with floods can tremendously benefit from issuance of early warning. Improvement of current flood warning system and dissemination in people-friendly manner are thought to be highly potential adaptation option for future (Ahmed, 2005a). To enable this, one may contemplate further improvements in terms of modelling of monsoon rainfall throughout the GBM region and effective regional cooperation for on-time transfer of data from upstream areas along the GBM river systems as necessary pre-conditions for adaptation (Mirza and Ahmed, 2003).

Removal of impediments of drainage (dredging/re-excavation of choked rivers/khals; drainage canals), construction of drainage structures (culverts, bridges, and regulators), rehabilitation of structures such as roads, embankments etc. should be considered as adaptation measures towards facilitating drainage and reduce flood-related vulnerability (Ahmed *et al.*, 1998a, Ahmed, 2005a; Faruque and Ali, 2005). Pumping out water to remove water logging, especially in polder areas, has already been practiced, which will likely to be considered as an adaptation option for future (Faisal *et al.*, 2003). In view of urban flooding, this option will remain as an important adaptation option despite the high cost of its implementation. In increasingly flood vulnerable areas (FVA), efforts should be made for flood proofing of infrastructure, as deemed necessary (Faruque and Ali, 2005). Similar to that of Multi-purpose Cyclone Shelters, flood shelters should be built in FVAs (Choudhury *et al.*, 2003; GOB, 2005). In recent years, community-based flood management practices had shown high potential, which could also be considered as an important modality to adapt to climate change induced floods (Ahmad *et al.*, 2004). A large number of small steps have been considered to advance community-based flood management, each of which deserves due consideration.

For drought management, making water available to offset moisture deficit appears to be the major adaptation modality (Karim, 1996). However, creation and recreation of water storage systems (ponds, *khals*, reservoirs etc.) – operated and maintained by vulnerable communities – needs to be given due emphasis (WB, 2000). Choice of low-water-consuming crops instead of paddy will reduce immense pressure on dwindling ground water aquifers (Ahmed, 2005b). Such an adaptation will not only help diversify crop agriculture, it will also counteract gradual lowering of piezoelectric surface of groundwater aquifer system (Ahmed, 2005a). Capacity building for advanced irrigation techniques could also be considered as an important adaptation option in order to conserve available water resources. Conjunctive use of water for irrigation, as highlighted in National Water Policy, might also be considered as an important adaptation option (Ahmed, 2004a). Resuscitation of surface water bodies including silted-up rivers and rivulets should be given due priority in order to maintain water bodies even during the dry season for irrigation purposes (Ahmed *et al.*, 1998a). The proposed Ganges barrage is thought to offer huge potential for adaptation, especially for the entire Southwestern region (BUP, 2001; CEGIS, 2006). Regional cooperation towards ensuring augmentation of dry seasonal flows in international rivers has also been considered as an adaptation option (Ahmed, 2004a; Ahmed, 2005a).

Maintaining a sustained flow regime in coastal rivers throughout the dry season and flushing of brackish water zones with increased volumes of freshwater will help adaptation to increasing salinity ingress under climate change. Ahmed (2004a and 2005a) argued that, investing on a barrage on the Ganges River



would profusely benefit the southwestern region of the country by pushing salinity front towards the bay. Indeed, CEGIS (2006) found this measure as highly beneficial against ingress of salinity under climate change. It is also found that the option of having a barrage with proposed link canals to maintain a good flow regime along Betna-Bhairab, Gorai, and Madhumati systems would provide high dividend in terms of salinity control under climate change. Deaths arising from cyclones and associated tidal bores (both human and livestock) could be minimized by maintaining the Cyclone Preparedness Programme, and further strengthening the programme by means of building new MCSs, killas and other facilities along the coastal zone (Mahtab, 1989; Ali, 1999). The dilapidated structures need to be replaced by new ones, whereas those requiring occasional repairs should be repaired to enhance capacity to save lives when needed. The polders which might be at risk of inundation due to rising sea levels and/or by invigorated tidal waves should be identified and rationalized, in order to enhance their efficiency towards safeguarding lives, crops, and properties (Ahmed, 2005a). NAPA for Bangladesh proposed community focused coastal afforestation as a priority adaptation measure to reduce climate hazards (GOB, 2005).

According to Ahmed (2004a), there exist a good number of policy elements in the current policy regime which offer good adaptation potentials. Efforts need to be made to analyse these options further and through institutional coordination, a few of these adaptation measures – as outlined earlier in this section – be implemented on a priority basis. The NAPA has forwarded a few prioritized programmes in water sector (GOB, 2005), which could be given high priority. This itself has been regarded as an institutional adaptation, which may be advanced further as well as mainstreamed by the development of a proposed ‘climate change adaptation policy’ (Ahmed, 2004a).

In addition to adaptation in water-resources sector, one must consider adaptation in agricultural sector. The gravity of the issue and its importance on people’s livelihoods deserve special treatment, which is why the potential adaptation options in agriculture are discussed separately in the following section.

According to WB, the risk associated to human health in tropical developing countries is one of the salient risks of climate change (WB, 2000). Bangladesh’s current vulnerability to outbreaks of cholera and other waterborne and diarrheal diseases such as dengue or dysentery needs to be given due importance in view of increasing risk potentials caused by climate change induced drainage congestion and standing water. Treating pathogen-laden water with a mixture of lime, bleaching powder and alum, as provided in Ahmad *et al.* (2004), should be given due importance to avoid large-scale outbreak of water borne diseases. Inadequate provisions for drinking water in saline affected regions adds to people’s vulnerability, which needs to be given high priority towards designing national adaptation programmes (Ahmed, 2005a). Providing saline free drinking water should be considered as an immediate adaptation in view of current as well as future health risks (Ahmed, 2004b). The pressure on the availability and access to safe water, in particular during the dry period, and the increasing reliance on groundwater are an additional threat. RVCC project considered designation of community ponds to establish PDFs as an adaptation (RVCC, 2003). Moreover, sinking deep hand tubewells, subject to availability of groundwater sources, and building community/household based rainwater harvesting units in water scarce regions should be considered as adaptation measures, as promoted through the RVCC project (Ahmed and Schaerer, 2004).

Awareness needs to be increased among illiterate and poor people, especially along the drier western parts of the country, to combat heat-stress related health disorders. Improved cyclone as well as flood shelters, with increasing capacity and coverage, are likely to reduce overall death tolls in case of climate change induced high intensity disastrous events. Similarly, building relatively stronger houses by low-cost retrofitting along the cyclone-affected coastal regions could save lives as well as assets (RVCC, 2003). Safe use of carbolic acid would reduce susceptibility to snake bites in flooded regions. Use of oral rehydration saline for treating diarrheal patients will continue to save lives. Other major adaptation proposed for human health involves improving the health

care system, which is needed anyway to address the current human health situation. These improvements could significantly reduce the risks to human health from climate change (WB, 2000). Thus, the benefits of improving health care are likely to be even greater when avoided health impacts of climate change are accounted for.

Very little research has so far been undertaken to fully appreciate implications of climate change on ecosystems and biodiversity. However, it is suggested that ecosystems and biodiversity may be at greatest risk of all sectors sensitive to climate change (WB, 2000). Since the management of ecosystems is still relatively weak in its institutional realization and the institutions that are involved lack the capacity, adaptation to climate change for ecosystems and biodiversity warrant special institutional arrangements. Maintaining a sustained freshwater flow along the distributaries of the Ganges River, particularly in the dry season, has been recommended as a viable adaptation option

(Ahmed, 2004a). CEGIS (2006) considered two adaptation options<sup>15</sup>: the ‘Ganges barrage option’ and the option for ‘augmentation of lean flow of River Gorai’. Modelling results provide ample evidence that both the options will be useful for adapting to increasing salinity along the Sundarbans.

#### **Adaptation in Agriculture: Identifying Potential and Limitations**

Crop agriculture in Bangladesh is highly susceptible to variations in the climate system. It is anticipated that crop production would be extremely vulnerable under climate change scenarios, and as a result, food security of the country will be at risk. Despite being highly vulnerable, very little efforts have so far been made to understand potential of agricultural adaptation in Bangladesh. Ahmed (2000) made an early attempt to analyse the adaptation potential of the country's crop agriculture in a warmer world. Faisal and Parveen (2004) examined food security aspect and implications of climate change, however adaptation potentials were not discussed. A brief account of adaptation types, based on IPCC typology of adaptation (UNEP, 1996), and limitations of a few adaptation options in agriculture are provided below.

***Bear Crop Losses*** When potential loss of a standing crop is totally accepted by the growers, bearing crop losses is an adaptation option. It is however criticised that the option is rather theoretical, with limited applicability in Bangladesh (Ahmed, 2000). In practice, it is argued that, it is possible only when the cost of adaptation appears to be higher compared to the net crop loss. Such responses are often strategic and situation-specific.

***Share Losses*** The anticipated crop losses may be shared among the stakeholders. Compensating the farmers for trying out agricultural activities under high threats of crop loss can be a potential mechanism for sharing loss. Provision of insurance against crop loss has worked well in advanced economies. Provision of government subsidies and remission of taxes for the farmers operating in susceptible croplands could be other possible options where some of the losses might be shared among the different stakeholders. Loss sharing strategies necessitate strong political will, adequate financial resources and careful planning. Loss sharing mechanisms can be a very local affair, and sometimes can even be extended to the worldwide family of humanity.

**Modify the Threats to Crop Production** This appears to be the mostly practiced option in Bangladesh. Vulnerability analysis may provide important lessons concerning the nature and extent of the threats to crop production under a given climate regime. In such cases, adequate precautionary measures might possibly modify the threats. Although most of the precautionary measures are anticipatory in nature, there might be some spontaneous measures as well. Modifications may be approached either on an individual or a collective basis. Many such measures are technology-oriented and may require early investment for research and extension.

Development of drought and/or salinity tolerant varieties, switching to alternative cropping patterns with respect to altered agro-ecological zones etc. could modify the threat to a significant extent. Good extension programmes would help achieve awareness up to a desired level so that the farmers may respond to the threatening environmental factors. Adequate policy framework and market instruments (technology availability at subsidized rates, credit, etc.) coupled with social engineering processes could facilitate implementation of such measures.

**Prevent Adverse Effects** Some measures might consider preventing the losses in agricultural production. Preventive measures are anticipatory and might require large-scale investments. Building of large embankments to protect prime agricultural lands from excessive flooding may be cited as an example of preventive measure. Preventive measures often involve financial and institutional support of the government for planning and implementation.

**Change Land Use** In case it becomes extremely risky to continue agricultural activities under an altered climate scenario, an alternative land use might be considered as the next available option. If the suitability of Aus<sub>5</sub> paddy in pre-*Kharif* months (March-June) appears to be too low, the farmers should alter the land use and instead grow other suitable crops. However, such alterations should ideally lead to acceptable economic returns, optimizing social goods and services. In *beel* areas, growing *kachu* & *kachu-mukhee* (a local vegetable) appears to be better land use option than growing paddy with a risk of higher levels of inundation. In water logged areas, attempts have been made under the RVCC project to create floating gardens (i.e., hydroponics) by the use of water hyacinth and grow vegetables. The application of an indigenous practice through capacity building and extension allowed farmers of Jessore District to profitably change their land use and maintain livelihoods (Ahmed and Schaerer, 2004).

**Change Location** Change of location entails relocation of agricultural activities in areas that are not likely to be adversely affected. For Bangladesh, this appears to be a theoretical approach. Here access to land resources per capita is already high and there is hardly any unproductive land. Relocation, therefore, might not be socially accepted. Opting for relocation may necessitate long-term planning involving the farmers, farming communities and local governments. Planning for relocation has to be done through consultations among those involved. The farming communities that would have to accept such relocation in their areas should be compensated for lost opportunities. On the other hand, change of location may be a spontaneous adaptation (rather coping) measure in the highly vulnerable areas and people may become *climate change refugees* (UNEP, 1996). Table-2 highlights a few agricultural adaptation, according to the IPCC typology of Adaptation (Ahmed, 2000).

Table -2 Adaptation measures and requirements for crop cultivation under climate change in Bangladesh

<b>Adaptation Measures</b>	<b>Requirements</b>	<b>Comment</b>
Bear loss (no adaptation) - Loss of production - Loss of assets		Hypothetical, highly unlikely to take place.
Share losses - Crop insurance - Cooperative management - Governmental subsidies	Additional investment in terms of premium. Agreement for sharing the output. State allocation for offering subsidies. Adequate legal and institutional framework.	Provisions to be made. Political motivation is required.
Modify the threats - Preparedness (early warning) - Awareness and training - Investment for structural measures	- Research & extension - Extension, media campaign - Investments (anticipatory) - Crop calendar adjustment - Opting for less susceptible crops	Farmers are already practicing it, based on ancestral behaviour/ knowledge. Manifold opportunities are plausible, barrier removal and implementation could be less costly. High priority option.
Prevent adverse effects - Structural measures	- Large investment - Political motivation - Long-term planning	Investment intensive option. Financial constraints might hinder implementation process.
Change land use - Alternative cropping - Abandon crop agriculture	- Innovation through research, investment - Means of survival, skills for alternative employment	Unless alternative employment opportunities are created, it is not likely to be accepted socially.
Change location - Relocate to less vulnerable places	- Free cultivable land	Heavily constrained due to unavailability of fallow cropland.

Source: Modified from Ahmed, 2000.

The project titled Reducing Vulnerability to Climate Change (RVCC), implemented in six southwestern Districts of Bangladesh during 2002 till 2005, applied a few interesting adaptation measures in a bid to reduce vulnerability of communities to climate change by increasing people's coping capacity (RVCC, 2003; Schaerer and Ahmed, 2004). The agricultural adaptations worth special mention, due primarily to their simplicity and their overall social acceptance. Table-3 highlights the agricultural adaptation measures considered under the project.

**Table 3: Strategic Approaches Considered for Agricultural Adaptation for RVCC Project**

Strategy	Measure	Brief Description of Measure
<b>Household level strategies in agriculture (crop, fishery, agro-forestry, &amp; livestock)</b>		
Increase food through agriculture	Drought tolerant crops/vegetables	Introduction of drought tolerant crops such as groundnuts, watermelon, etc.
	Floating gardens	Cultivation of vegetables on floating beds of water hyacinth (hydroponics)
	Low-cost irrigation	Demonstration of treadle pump and other simple technologies for irrigation
	Homestead gardening	Cultivation of vegetables and fruits on homestead plots for consumption and market
	Saline tolerant non-rice crops	Introduction of saline tolerant varieties of chili, mustard, maize and potato
Increase income through alternative livelihoods	Embankment cropping	Cultivation of beans, gourds, okra & other vegetables on embankments surrounding prawn <i>ghers</i> (ponds)
	Integrated farming systems	Using small area of land, small water body, and surrounding embankments to produce rice, fish and vegetables
	Cage aquaculture	Small-scale fish farming in cages, implemented in household ponds or common water bodies
	Prawn fish poly-culture	Prawn and fish culture in fresh-water <i>ghers</i> (ponds)
	Shrimp fish poly-culture	Shrimp and fish culture in salt-water <i>ghers</i> (ponds)
	Cattle rearing	Raising cattle for consumption and market
	Poultry rearing	Raising chickens to produce meat and eggs for consumption and market
	Crab fattening	Collection, rearing and feeding of crabs for a period of 15 days to increase their market value
	Duck rearing	Raising ducks to produce meat and eggs for consumption and market
	Goat rearing	Raising goats for consumption and market
	Pig rearing	Raising pigs for consumption and market
	Apiculture & honey processing	Beekeeping and processing of honey for market
	Nursery & homestead afforestation	Establishment of community nurseries and distribution (with handling instructions) of indigenous varieties of tree saplings (mango, coconut, <i>sofeda</i> , <i>korai</i> , guava, <i>mehaguni</i> , neem, <i>kewra</i> , etc.) to beneficiaries for homestead planting
	Saline tolerant tree plantation	Planting of saline tolerant fruit and timber trees for longer term income generation
	<i>Mele</i> (reed) cultivation	Cultivation of reeds that are used to produce mats that are widely used for sitting and sleeping on

Source: Modified from Schaerer and Ahmed, 2004.

### ***Limitations of Agricultural Adaptation***

It is reported that the existing institutions had inherent inefficiencies, lack of foresight in planning for the future, poor coordination among relevant institutions, poor information assimilation capacity and lack of trained and motivated personnel (Ahmed, 2000). As a result, those often proved to be ineffective. The central government could not successfully utilize the full potential of the local government and the latter could not assume the full responsibility of implementing local-level planning due to weaknesses in governance system. This made it difficult to implement development activities at the grassroots. All these are possible barriers to successful adaptation, which might have direct implications in agricultural sector.

People's lack of understanding might also be considered as a possible barrier. Lack of understanding on far-reaching implications of certain actions considered by one can jeopardize adaptation options taken by many. Resorting to alternative livelihood options could be of immense help if understood their merits properly and planned early. Capacity building might be a pre-requisite to enhance people's understanding.

Poverty might be identified as another potential barrier. Many people would not be able to take advantage of crop insurance due to acute poverty. It was argued that, in order to overcome the limitations of adaptation the first step should be to strengthen the institutions which would enable and facilitate the farming communities to go for adaptation measures (Ahmed, 2000). Weaknesses in the current legal framework were also considered to be a limitation. Weak institutional coordination, especially among large numbers of institutions dealing with agriculture and support facilities, might also be identified as a limitation. Strengthening of the agricultural extension services was recommended as an institutional adaptation towards safeguarding future agricultural activities.

Financing investments in agriculture may appear a major issue, especially amongst poor farmers (Warrick and Ahmad, 1996). Requirements for cash investment soon after a major flood event limit cultivation of cash crops such as vegetables (brinjal) and spices (chilli), as observed in Jamalpur District. Early investments in relatively highlands for seedbeds could not be possible, even though the benefits of doing so were known to the farmers of the same region (Choudhury *et al.*, 2004). Lack of adequate credit facilities is reported as major constraints of coping in agriculture (Ericksen *et al.*, 1996; Asaduzzaman *et al.*, 2005).

### **Adaptation Measures as Prioritized in NAPA**

By collating available information from literature and through four regional consultations, the NAPA document highlighted a few adaptation measures and prioritized them. The following are the adaptation measures which have received endorsement of the Government of Bangladesh through NAPA exercise. It is important to note that the proposed adaptation measures are primarily based on existing coping mechanisms and practices, as well as 'needs based suggestions' forwarded by national experts in relevant field/sector.

#### ***Intervention Type Measures***

- Promoting adaptation to coastal crop agriculture to combat salinization through maize production under Wet Bed No-tillage Method and Sorjan systems of cropping in tidally flooded agro-ecosystem.
- Adaptation to agriculture systems in areas prone to enhanced flash flooding – North East and Central Region through no-tillage potato cultivation under water hyacinth mulch in wet sown condition, and Vegetable Cultivation on Floating Bed.
- Promoting adaptation to coastal fisheries through culture of salt tolerant fish especially in coastal areas of Bangladesh.

- Adaptation to fisheries in areas prone to enhanced flooding in North East and Central Region through adaptive and diversified fish culture practices.
- Construction of flood shelter, and information and assistance centre to cope with enhanced recurrent floods in major floodplains.
- Reduction of Climate Change Hazards through Coastal afforestation with community focus.
- Providing drinking water to coastal communities to combat enhanced salinity due to sea level rise.
- Enhancing resilience of urban infrastructure and industries to impacts of climate change including floods and cyclone.

#### ***Facilitating Type Measures***

- Capacity building for integrating Climate Change in planning, designing of infrastructure, conflict management and landwater zoning for water management institutions.
- Exploring options for insurance and other emergency preparedness measures to cope with enhanced climatic disasters (e. g. flood, cyclones and drought).
- Mainstreaming adaptation to climate change into policies and programmes in different sectors (focusing on disaster management, water, agriculture, health and industry).
- Inclusion of climate change issues in curriculum at secondary and tertiary educational institution.
- Climate change and adaptation information dissemination to vulnerable community to raise awareness.
- Promotion of research on drought, flood and saline tolerant varieties of crops to facilitate adaptation in future.
- Development of eco-specific adaptive knowledge (including indigenous knowledge) on adaptation to climate variability to enhance adaptive capacity for future climate change.

#### **4.4 Recommended Institutional Issues of Adapting to Climate Change**

A number of institutional issues have been recommended by various authors in order to advance adaptation to climate change in Bangladesh (Ahmed *et al.*, 1998a; Ahmed, 2004a; Ahmed, 2005a; Choudhury *et al.*, 2004; Thomalla *et al.*, 2005). Mainstreaming adaptation in development thinking and practices has been recommended as a priority (Ahmed and Haque, 2002; Huq *et al.*, 2003). Ahmed (2004a) revealed that the basic premise of adaptation to climate change has been grounded in the policy pronouncements; which needed to be formally recognized as another dimension of concern. Another institutional recommendation was to give climate change its due importance in decision-making processes.

It is necessary to understand that most of the climate change induced problems are likely to be exhibited in the form of water-related problems. Since climate change will have severe adverse impacts on agriculture and livelihoods and well being of the poor will most likely be at risk, a holistic policy approach should be considered.

It is recommended that, in order to mainstream adaptation to climate change, specific institutional guidelines need to be developed, which will provide for mechanisms on how inter-ministerial coordination will be achieved, how inter-ministerial policy conflicts will be resolved and who is supposed to mainstream adaptation to climate change, in which direction (Ahmed, 2005a). It is argued that, the current institutional authority revolves around two

national institutions<sup>1</sup>, leading to a potential impasse in terms of integrated and coordinated approach towards mainstreaming adaptation (Ahmed, 2004a). Removal of such institutional hindrance is therefore recommended. NAPA for Bangladesh is found to be in full conformity with the integrated approach of adaptation (GOB, 2005).

Ahmed (2004a) highlighted a few inter-sectoral policy conflicts, which might be counter productive towards implementing adaptation. It is recommended to establish an appropriate institutional regime, supplemented by the creation of a policy and regulatory regime. It is also recommended that the proposed Climate Change Policy should be housed and implemented under a supra-ministerial institutional platform, in order to facilitate its smooth functioning and to avoid unnecessary confusion. The proposed institution must be adequately empowered so that it can operate in cooperation with other relevant sectoral ministries<sup>2</sup>. To facilitate its functions, it may invite designated ministerial focal points to ensure coordination and cooperation among relevant line ministries. It is recommended that the pronouncement of the Coastal Zone Policy and the applications of generic guidelines provided in the Standing Orders on Disaster on horizontal and vertical integration may be revisited towards developing the proposed Climate Change Policy.

Recognizing that there exists a lack of awareness regarding all aspects of climate change, it is recommended that the government would consider steps towards enhancing awareness at all levels (WB, 2000; GOB, 2005). Building capacity through training appeared a useful mechanism to enhance human ability to adapt to a given climate condition (RVCC, 2003; Ahmed and Schaerer, 2004). Mainstreaming concerns of climate change would not take place without enhancing human capacity to analyze and respond. It is recommended that government officials, especially those dealing with water resources, agriculture, land-use, human health, coastal zone, fisheries and livestock should be provided with adequate training on climate change issues (Ahmed, 2004a). Climate change issues should also be an integral part of primary to tertiary level education, as advocated by RVCC (2003) and the NAPA for Bangladesh (GOB, 2005). RVCC has already initiated school-based educational programme on climate change, which should be integrated into national level curricula.

A major cross-cutting adaptation is to fill in the existing gaps in understanding on climate change (WB, 2000). The long-term water sector planning identified climate change as a gap<sup>3</sup> area and therefore no specific adaptation measures have been forwarded as such (WARPO-Halcrow *et al.*, 2004). It is recommended that such lack of understanding be removed on a priority basis during the time of revision of the plan (Ahmed, 2005b). It is recommended that the entire development regime would follow a planned approach, similar to that in water sector, and inter-sectoral coordination be ensured during implementation of programmes. Through the latter approach, it is anticipated that, the concerns of adaptation could be integrated into the plans and a climate resilient future therefore be established. NAPA for Bangladesh fully endorses such an institutional adaptation (GOB, 2005).

Recognizing that the major impacts of climate change will likely to be in water resources sector and national water resources are highly influenced by regional flow patterns, it is argued that efforts must be made to engage in regional cooperation on water (Ahmed, 2005a). Sharing of water in international

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<sup>1</sup> Ministry of Environment and Forest (MOEF), and Bangladesh Meteorology Department (BMD).

<sup>2</sup> The NAPA for Bangladesh, however, duly emphasized on an integrated approach and advocated for coordination.

<sup>3</sup> However, there exist a few programmes/components which would facilitate adaptation in water resources sector.



rivers, especially during the lean flow period, should be a priority. Exchange of data from upstream areas to increase lead time for flood warning is a long-standing concern (BANCID, 1997), which need to be resolved with co-riparian countries. The micro-level planning exercises carried out under the RVCC project at Union levels should be replicated to identify key risks of climate change and to seek solutions that might be useful to reduce vulnerability of that area.

Several studies emphasized on the needs of involving ‘environmental diplomacy’ as an institutional adaptation mechanism (Ahmed, *et al.*, 1998a; Huq *et al.*, 1996; Asaduzzaman *et al.*, 1996; Haque, 1996). Engaging in negotiations to draw adaptation financing have been recommended. In water sector, engaging in regional cooperation with a view to augment lean flows of international rivers has been recommended as an institutional adaptation (Ahmed, 2004a; Faruque and Ali, 2005). Considering legal measures have also been recommended by Freestone *et al.* (1996).

The civil society organizations have so far been proactive to raise public awareness and concerns regarding the country’s special vulnerability to climate change. Bangladeshi researchers have been conducted research on climate change issues and projected the country’s vulnerability at various international forums. The official GOB delegations have also played very important roles for raising concerns through official deliberations at SBSTA and COP. Continued engagement in negotiations and development of scientific background for adaptation should also be recognized as activities which would eventually facilitate institutional adaptation in the long run.

PAPER NO. 3: CUBA

**Adaptation approaches, strategies, practices and technologies for adaptation**

In the Nairobi Work Programme on Impacts, Vulnerability and Adaptation to Climate Change' (FCCC/SBSTA/2006/L.26), SBSTA invited Parties and relevant organizations to submit to the secretariat, structured information on adaptation approaches, strategies, practices and technologies for adaptation at regional, national and local levels in different sectors, as well as on experiences, needs and concerns.

The Republic of Cuba welcomes the opportunity to present views on the above issue and follow the main aspects of the structure developed by the secretariat.

***1) A Framework for Disaster Reduction in Cuba.***

This action which could be classified as **strategy** is an **ongoing** adaptation action which is based on the well structure National Civil Defence (NCD) and the more recent experiences addressing extreme climate events in Cuba. The framework is supported by Directive No. 1 of the Vice-president of the National Council of Defence, adopted in 2005. Although the scope of is national, its implementation occurs at **national, provincial, municipality and institutional levels**.

In order to successfully implementation the adaptation action the framework considers the inclusion of activities like: prevention, preparedness, response and restoration. The development of detailed disasters reductions plans at national, local and institutional levels, and its integration with economic and social development plans, is a key component of this strategy. A very important piece is also the knowledge increase on hazards, vulnerabilities and risks throughout the results of studies oriented to produce detailed temporal and spatial information.

**Experiences** of the Cuba response system for tropical storm and hurricane impacts is being improved, including other extreme events with the aim to strength institutional, individual and systemic capacity, for a potential increase of extreme weather intensity and frequency. Among other actions, annual exercises called METEORO are developed in the country to review the degree of implementation of the different elements of the disasters reductions plans. Thus the framework **involves the entire Cuban society**.

***2) Cuban Vaccination Program.***

This **strategic** and **ongoing** action was not primarily oriented for adaptation to climate change; however, the benefits of the program are crucial to increase the adaptation capacity of the Cuban population. By this program an important number of the diseases related with climate change influence have been eradicated at **national and local levels**.

### **3) Cuban Program for Education**

This could be classified as an “**ongoing** infinite campaign” oriented to increase the culture and knowledge of Cuban population on a continuous basis. In fact the education strategy in Cuba incorporates various programs that incorporate all the Cuban society from **national to municipalities**. A better and well structured education system could increase the capacity for adaptation and to reduce vulnerabilities, creating an enabling environment for the incorporation of the climate change dimension.

**References** on this experience could be finding in <http://www.cip.cu>

### **3) Beach restoration technology.**

Based on the scientific results and experiences in coastal management Cuba developed a technology for **Beach Restoration**, which classify as a hard adaptation option. The technology **has been implemented** in some Cuban beaches with very good results, restoring the natural and functional values of the beaches.

**Reference** Trista E., José L. Juanes, Hermes Salazar y Kenia Hernández 2004, Evaluación de las actuaciones costeras en las playas interiores de Cuba, Ingeniería Civil, No 135, pp. 125-128.

PAPER NO. 4: EL SALVADOR

**Submission by El Salvador  
on adaptation approaches, strategies, practices and technologies for adaptation**

*Mandate*

1. The SBSTA invited Parties and relevant organizations to provide structured submissions, by 15 May 2007, on adaptation approaches, strategies, practices and technologies for adaptation at the regional, national and local levels in different sectors, as well as on experiences, needs and concerns. It requested the secretariat to develop the structure for these submissions and to disseminate it to Parties by 20 January 2007. It further requested the secretariat to compile these submissions into a miscellaneous document to be made available to the SBSTA by its twenty-seventh session (FCCC/SBSTA/2006/L.26, paragraph 44).

*Framework*

2. One of the results of the GEF-regional project, named *Strengthening capacities for Stage II Adaptation to Climate Change in Central America, México and Cuba*<sup>1</sup>, was, in the case of El Salvador, the development of a local adaptation strategy, based on vulnerability assessments and socio-economic and environmental scenarios for current and future climate conditions.
3. The referred adaptation strategy, including 7 actions lines for adaptation and 28 adaptation measures, is developed in the research paper named *Vulnerability and Adaptation to Climate Change of rural people living in the central coastal plain of El Salvador*, whose purpose was to explore more appropriate conceptual frameworks and methodologies to assess current and future climate vulnerability. The previous, to facilitate the incorporation of adaptation into local endogenous development processes, including actions that influence the policy and decision-making process at the national and municipal level.
4. The selected territory, whose adaptation strategy was developed, is located in the Salvadoran Central Coastal Plain, which is strongly influenced by several watersheds located in the neighbouring volcanic foothills. The local natural landscapes include: bays and estuaries, agricultural alluvial valleys and volcanic massifs. An important river system goes through the territory, including five watersheds and the *Lempa River*<sup>2</sup> delta. Most of the local people, who are beneficiaries of the adaptation strategy, are settled in the coastal plain and their livelihoods are mainly based on local natural resources. The territory includes the most important aquifers of the country, and local natural systems provide valuable environmental functions, such as: drinking water, energy, food security (agriculture, livestock, aquiculture, fisheries, traditional hunting, shells capture), forestry and tourism, among others.

*Methodological Approach*

5. The methodology to develop the aforementioned adaptation strategy in the selected territory (further referred to as territory) includes the following steps: a) identification of the human system to be assessed and whose adaptation strategy is to be developed, b) integrated assessment of current climate vulnerability, considering baseline socioeconomic and climate scenarios, c) integrated assessment of future climate vulnerability including local projected socioeconomic dynamics and climate change, and d) development of an adaptation strategy to address the projected local climate change and to be considered and incorporated within the existing local development plans, and eventually at the national or municipal level.

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<sup>1</sup> PS 14290-RLA/01/G31 (July 2003-April 2007)

<sup>2</sup> The largest watershed in the Salvadoran country, covering about 50% of the national territory. It is a tri-national watershed shared with Guatemala and Honduras.

6. Vulnerability of a natural or human system to climate exposure is defined as a dependant variable of three first order-explicative variables, namely: *climate exposure* (local climate threats), *resilience*<sup>3</sup> and *adaptive capacity*<sup>4</sup>. Second order-variables, associated to the first order-explicative variables are: flexibility, mechanisms of control and structural coupling, associated to *resilience*; potential of resources, experimentation and innovation and complexity of organization, associated to *adaptive capacity*. Current and projected conditions of the territory were determined, through the setting of a 69-indicator system linked to the first and second order variables, whose values were calculated by 2004 and 2015.
7. The integrated assessment incorporates natural and social<sup>5</sup> explicative factors that produce or increase current and future climate vulnerability. The previous facilitates identification and prioritization of adaptation measures and strategies that prevent or minimize impacts related to climate variability and change. The increase of local *resilience* and *adaptive capacity* constitutes the basis for the local adaptation strategy.

#### *Adaptation Strategy & Measures*

8. In order to develop the local adaptation strategy to face climate change, its nature and scope were defined, including the geographical, temporal and thematic scope. As well, the principles, beneficiaries, responsible for implementation and the outline of the monitoring and evaluation system were defined. Three specific objectives, linked to the socio-cultural, natural and economic local environments respectively, were identified, to which 7 lines of action for adaptation and 28 adaptation measures were associated and prioritized, based on categorized values of the whole 69-indicator system by 2015.
9. Local rural families would be the direct beneficiaries of the adaptation strategy, and their social local organizations would be directly responsible for promoting the strategy and to follow up appropriate implementation and further replication. The strategy looks for articulating socio-cultural, natural and economic local environments. For that, it incorporates in an integrated manner, adaptation into the local plans and initiatives.
10. The strategy was developed by the research team<sup>4</sup>, together with local actors, who actively participated in identifying, prioritizing, structuring and validating the set of adaptation measures. This process was built on the results of the integrated assessment of current and future vulnerability. Adaptation measures were selected through the identification and prioritization of the main problems associated to the various dimensions for each local environment. Lines of action for adaptation and adaptation measures were defined with the view to overcome the identified main problems which were expressed through the projected values of the 69 indicators by 2015.
11. The scope for each adaptation measure was developed, including specific actions, geographic location and responsibilities for implementation. In that regard, some measures would be adopted and implemented directly by rural families and their local organizations; others, by the municipal or national public entities, as per their legal mandates. However, local rural people would assume the role of taking steps to influence and participate in the policy or decision-making process, to incorporate adaptation into the development agenda.
12. The three fundamental principles of the United Nations Framework Convention on Climate Change (UNFCCC) were the basis for developing the local adaptation strategy, with the view to

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<sup>3</sup> Resilience is the attribute allowing the system to absorb, within a coping range, natural or social shocks and to further recover from disturbances or impacts, conserving the same stability domain

<sup>4</sup> Adaptive capacity refers to the potential of the system to progress and adapt to changes without collapsing, through learning processes that increase its coping range and capacity to self-organization

<sup>5</sup> Social refers to economic and socio-cultural human activities, including political, technological and scientific issues.

<sup>4</sup> It was established under the responsibility of the Ministry of Environment and Natural Resources of El Salvador.

increase resilience and adaptive capacity of socio-cultural, natural and economic environments. The previous, to prevent, reduce or minimize projected impacts of climate change (*precautionary principle*). As well, adaptation measures were thought to strengthen efforts to improve the quality of life of rural local people (*equity principle*), and to support local efforts directed to take steps to obtain technical and financial support within the UNFCCC multi-lateral process (*polluter pay principle*).

13. The purpose of the strategy is to strengthen organization and capacities of local rural people to incorporate in their socio-economic activities adaptation to climate change, within a land planning framework for the territory located in the central coastal plain of El Salvador. The specific objectives of the strategy are: i) to increase the climate change coping range of rural local livelihoods through economic diversification and the adoption of appropriate productive systems, technologies and practices; ii) to strengthen local capacities to incorporate climate change into land management through the improvement of local knowledge on land planning and the setting of criteria and management plans; and iii) to enhance local organization and capacities to influence public policies and priorities at the municipal and national level, through the strengthening, dissemination and appropriate implementation of the relevant legal framework.
14. Relevant structured information on the adaptation strategy, lines of action for adaptation and adaptation measures, is summarized in Table 1 (format developed by the UNFCCC secretariat).

**Table 1: Structured information at the local level (selected territory), including coastal zone, agriculture and water resources dynamics**

Type of adaptation action	Title of the adaptation action	Status of adaptation action	Needs in order to successfully implement the adaptation action	Concerns/ Barriers	Experiences/ Lesson learned	References
<p><b>A. Local adaptation strategy</b></p> <p>To be led by local people living in the selected territory, and to be implemented at the family, local, municipal and national level, through local actions to influence the policy and decision-making process, to incorporate adaptation into the development agenda</p>	<p>“Strategy &amp; Measures to Adapt to Climate Change”, of rural people living in the Central Coastal Plain of El Salvador (Section 6 of the comprehensive study quoted in the “references” column)</p> <p><b>Purpose:</b> To strengthen organization and capacities of local rural people to incorporate in their socio-economic activities adaptation to climate change, within a land planning framework for the territory located in the central coastal plain of El Salvador.</p> <p><b>Specific objectives:</b></p> <ol style="list-style-type: none"> <li>To increase the climate change coping range of rural local livelihoods through economic diversification and the adoption of appropriate productive systems, technologies and practices;</li> <li>To strengthen local capacities to incorporate climate change into land management through the improvement of local knowledge on land planning and the setting of criteria and management plans;</li> <li>To enhance local organization and capacities to influence public policies and priorities at the municipal and national level, through the strengthening, dissemination and appropriate</li> </ol>	<p>The adaptation strategy has already been developed and will be published mid June 2007.</p> <p>Direct beneficiaries of the strategy, who had a leading role in its elaboration, have developed a PIF<sup>7</sup>, to be submitted before the Special Climate Change Fund. The PIF is currently under revision within the UNDP-GEF system</p>	<p>The Special Climate Change Fund should be fully operational with transparent criteria and procedures based on the COP guidance.</p> <p>Adaptation strategies submitted by local actors should be fully eligible, as per the COP guidance.</p> <p>Participation in policy and decision making process should be broaden, in order to facilitate the inclusion of adaptation initiatives into development policies, at the municipal, national, regional and international level.</p> <p>Local and national capacities should be enhanced to improve knowledge concerning climate vulnerability and adaptation, through training, technical assistance, co-operative research, postgraduate programs, among others.</p> <p>Local traditional and empirical knowledge should be rescued, appreciated and fully incorporated into climate vulnerability studies and adaptation proposals, to facilitate the adoption of adaptation initiatives by local people.</p>	<p>The weaknesses of the national climate observing network, which should play a relevant role within the national early forecasting and local warning systems</p> <p>The lack of national scientific research programmes to address vulnerability and adaptation to climate change, on a permanent basis</p> <p>Prevailing criteria, procedures and frameworks to submit and implement adaptation projects within current financing mechanisms and implementing agencies, are rigid and inappropriate to the nature of the adaptation processes</p> <p>There are limited adaptation initiatives set by Annex I Parties as bilateral programmes, to transfer technical and financial resources to developing countries (as per Art.4 of the UNFCCC)</p>	<p>The adoption of a conceptual framework, integrating natural and social processes and identifying the explicative factors of climate vulnerability, supported the development of the local adaptation strategy, including the prioritization of the adaptation measures.</p> <p>The development of a methodological approach appropriate to national circumstances, with the required transparency and effective local participation, facilitated to local actors the adoption of the process and outcomes, playing progressively a leading role.</p> <p>There is a local knowledge, which has been either transmitted by oral tradition or empirically acquired, concerning the history and current trends of natural and social processes, which was rescued, appreciated and incorporated into the analysis and prospecting processes to enrich and complete technical knowledge and proposals.</p> <p>The scope of the local adaptation strategy extends beyond the territory through activities directed to influence the public policy-making process, in order to incorporate adaptation to climate change within the development agenda at the national or municipal</p>	<p>“Vulnerability &amp; Adaptation to Climate Change of Rural People living in the Central Coastal Plain of El Salvador”, to be published mid June 2007.</p> <p>It will be uploaded in the website: <a href="http://www.mam.gob.sv">http://www.mam.gob.sv</a> once it is published.</p>

<sup>7</sup> Project Idea Format, developed by the GEF.

Type of adaptation action	Title of the adaptation action	Status of adaptation action	Needs in order to successfully implement the adaptation action	Concerns/ Barriers	Experiences/ Lesson learned	References
	implementation of the relevant legal framework.				level.	
<b>B. Local lines of action for adaptation</b> (per specific objective)	<p><b>Objective 1:</b> <u>Line of Action 1.1:</u> Diversification and incorporation of additional added value to agricultural activities to increase the coping range to climate change of local livelihoods</p> <p><u>Line of Action 1.2:</u> Promotion of non agricultural economic initiatives to decrease impacts associated to agriculture sector-related climatic sensitivity</p> <p><u>Line of Action 1.3:</u> Experimentation, validation and adoption of processes and technologies to increase the coping range to climate change of agricultural activities</p> <p><b>Objective 2:</b> <u>Line of Action 2.1:</u> Improvement of capacities to manage local environment, based on the appropriate criteria and indicators related to climate change impacts, among others, validated and adopted by local people</p> <p><u>Line of Action 2.2:</u> Improvement of local knowledge on natural systems, including climate sensitivity, to develop criteria and indicators for their restoration and conservation, and to maintain rural livelihoods, taking into consideration</p>					



Type of adaptation action	Title of the adaptation action	Status of adaptation action	Needs in order to successfully implement the adaptation action	Concerns/ Barriers	Experiences/ Lesson learned	References
	<p>climate change impacts</p> <p><b>Objective 3:</b> <u>Line of Action 3.1:</u> Improvement of territory functionality to assure security of rural families and to favor the incorporation of climate change adaptation into local development initiatives</p> <p><u>Line of Action 3.2:</u> Strengthening of the legal and institutional framework at the municipal level, promoting its effective application to support local development and sustainable land management, including adaptation to climate change</p>					
<b>C. Adaptation measures per line of action</b>	28 adaptation measures were defined and classified within the 7 lines of action for adaptation, and linked to the economic, socio-cultural or natural environments, as appropriate.					

PAPER NO. 5: GERMANY ON BEHALF OF THE EUROPEAN COMMUNITY  
AND ITS MEMBER STATES

**Subject: Nairobi Work Programme on impacts, vulnerability, and adaptation to climate change  
Information on approaches, strategies, practices and technologies for adaptation**

***1. Introduction***

Under para 44 of the Nairobi Work Programme (document FCCC/SBSTA/2006/L26), the Subsidiary Body for Scientific and Technological Advice (SBSTA) invited Parties and other relevant organizations to provide structured submissions, by 15 May 2007, on adaptation approaches, strategies, practices and technologies for adaptation at the regional, national and local levels in different sectors, as well as on experiences, needs and concerns

The EU is taking this opportunity to respond to this request.

***2. Adaptation approaches, strategies, practices and technologies in the EU***

**2.1 General remarks**

The EU endorses the Nairobi Work Programme to collect information on approaches, strategies, practices and technologies for adaptation. As the Fourth Assessment Report of the IPCC shows, both developed and developing countries are affected by climate change. Since the publications of the Third Assessment Report, there has been a significant improvement in the understanding of climate impacts and adaptation needs. The European Union anticipates a growing demand for systematic approaches, strategies, practices and technologies for adaptation all over the world.

1. The EU aims to facilitate access to information on such approaches, strategies, practices and technologies. EU Member States (MS) therefore took the opportunity to list own experience with these issues. The EU suggests having the information of the submissions compiled in an updateable and user friendly way. The EU puts emphasis on the deepening of existing cooperation and the initiation of new cooperation with developing countries based on this submission.

**2.2 Spreadsheet responses by Member States (MS)**

In preparation for this submission, the German Presidency asked EU MS to provide information on approaches, strategies, practices and technologies for adaptation. The secretariat developed the structure for these submissions and disseminated it to Parties by 20 January 2007 (FCCC/SBSTA/2006/11, paragraph 56).

Ten MS and the European Commission responded: Finland, France, Germany, Italy, Latvia, the Netherlands, Portugal, Spain, Sweden and the United Kingdom. The German Presidency added further contributions from other MS in relation to the Water-Conference<sup>1</sup> and the Report by the European Environment Agency<sup>2</sup>. The German Presidency collected all contributions into one document. See Annex A.

Further information on activities on national level in MS, such as National Adaptation Strategies

<sup>1</sup> <http://www.climate-water-adaptation-berlin2007.org/>

<sup>2</sup> [http://reports.eea.europa.eu/technical\\_report\\_2007\\_2/en](http://reports.eea.europa.eu/technical_report_2007_2/en)

and specific vulnerabilities, are in the extended country report prepared under the CIRCLE project<sup>3</sup>.

The preparation of information on EU level activities for this submission was supported by the European Environment Agency's Topic Centre for Air and Climate Change.

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<sup>3</sup> [http://www.circle-era.net/uploads/media/CIRCLE\\_Del\\_Ia1\\_Extended\\_Country\\_Report\\_1stISSUE\\_Final\\_DRAF\\_.pdf](http://www.circle-era.net/uploads/media/CIRCLE_Del_Ia1_Extended_Country_Report_1stISSUE_Final_DRAF_.pdf)

**Information supplied by EU Member States on approaches, strategies, practices and technologies for adaptation**

- 1. Introduction.....
- 2. Adaptation approaches, strategies, practices and technologies in the EU.....
- Austria.....
  - Scope of adaptation action:.....
    - national level* .....
  - Sectoral level.....
    - Sector: agriculture*.....
- Belgium.....
  - Scope of adaptation action:.....
    - regional (sub-national) level* .....
- Cyprus.....
  - Scope of adaptation action:.....
    - national level* .....
- EU-Commission.....
  - Sectoral level.....
    - Sector: agriculture*.....
    - Sector: water resources*.....
    - Sector: Forestry*.....
    - Sector: biodiversity, environment* .....
    - Cross cutting activities*.....
- Finland.....
  - Scope of adaptation action:.....
    - national level* .....
  - Sectoral level.....
    - Sector: Forestry*.....
    - Sector: Water*.....
    - Sector: Transport*.....
    - Sector: Biodiversity, spatial planning, buildings, waste management* .....
    - Sector: cross-sectoral issues* .....
- France.....
  - Scope of adaptation action.....
    - regional level* .....
    - national level* .....
    - local (community) level* .....
  - Sectoral level.....

	<i>Sector: agriculture</i> .....
	<i>Sector: water resources</i> .....
	<i>Sector: health</i> .....
	<i>Sector: coastal zones (settlements)</i> .....
	<i>Sector: biodiversity, environment</i> .....
	<i>Sector: transport, built-environment</i> .....
	<i>Energy production</i> .....
Germany	.....
	Scope of adaptation action: .....
	<i>national level</i> .....
	<i>regional (sub-national) level</i> .....
	Sectoral level .....
	<i>Sector: water resources</i> .....
	<i>Sector: coastal zones (settlements)</i> .....
	<i>Sector: biodiversity, environment</i> .....
	<i>Cross cutting activities</i> .....
	Programmes and activities with developing countries .....
	<i>Sector: agriculture</i> .....
	<i>Sector: water resources</i> .....
	<i>Sector: coastal zones (settlements)</i> .....
	<i>Cross cutting activities</i> .....
Hungary	.....
	Scope of adaptation action: .....
	<i>national level</i> .....
Ireland	.....
	Scope of adaptation action: .....
	<i>national level</i> .....
Italy	.....
	Scope of adaptation action: .....
	<i>Level (National, Regional)</i> .....
	Sectoral level .....
	<i>Sector: Desertification</i> .....
	<i>Sector: Water</i> .....
	<i>Sector: Agriculture</i> .....
	<i>Sector: Human Health</i> .....
	<i>Sector: Coastal protection</i> .....
	<i>Sector: Alpine area protection</i> .....
Latvia	.....
	Scope of adaptation action: .....

*regional level* .....  
*national level* .....  
*local (community) level* .....

**Sectoral level** .....  
*Sector: agriculture*.....  
*Sector: water resources*.....  
*Sector: health*.....  
*Sector: coastal zones (settlements)* .....  
*Sector: biodiversity, environment* .....  
*Sector: transport, built-environment*.....  
*Cross cutting activities* .....

**Malta**.....  
Scope of adaptation action: .....  
*regional level* .....  
*national level* .....  
*local (community) level* .....

**Sectoral level** .....  
*Sector: agriculture*.....  
*Sector: water resources*.....  
*Sector: health*.....  
*Sector: coastal zones (settlements)* .....  
*Sector: biodiversity, environment* .....  
*Sector: transport, built-environment*.....  
*Cross cutting activities* .....  
*Sector: weather monitoring*.....

**Netherlands**.....  
Scope of adaptation action: .....  
*national level* .....

**Sectoral level** .....  
*Sector: water resources*.....  
*Sector: health*.....  
*Sector: coastal zones (settlements)* .....  
*Sector: biodiversity, environment* .....  
*Sector: transport, built-environment*.....  
*Cross cutting activities* .....

**Portugal**.....  
Scope of adaptation action: .....  
*regional (sub-national) level* .....  
*national level* .....

	<i>local (community) level</i> .....
Sectoral level .....	
	<i>Sector: health</i> .....
	<i>Sector: water resources</i> .....
	<i>Sector: coastal zones (settlements)</i> .....
	<i>Sector: forests</i> .....
	<i>Sector: agriculture</i> .....
	<i>Cross cutting activities</i> .....
Romania .....	
	Scope of adaptation action: .....
	<i>national level</i> .....
	<i>regional level</i> .....
	<i>local (community) level</i> .....
Sectoral level .....	
	<i>Sector: agriculture</i> .....
	<i>Sector: water resources</i> .....
	<i>Sector: health</i> .....
	<i>Sector: coastal zones (settlements)</i> .....
	<i>Sector: biodiversity, environment</i> .....
	<i>Sector: transport, built-environment</i> .....
	<i>Cross cutting activities</i> .....
Slovenia .....	
	Scope of adaptation action: .....
	<i>national level</i> .....
Spain .....	
	Scope of adaptation action: .....
	<i>regional level</i> .....
	<i>national level</i> .....
	<i>local (community) level</i> .....
Sectoral level .....	
	<i>Sector: agriculture</i> .....
	<i>Sector: water resources</i> .....
	<i>Sector: health</i> .....
	<i>Sector: coastal zones (settlements)</i> .....
	<i>Sector: biodiversity, environment</i> .....
	<i>Sector: Forest</i> .....
	<i>Sector: Tourism</i> .....
	<i>Sector: Climate Scenario Development</i> .....
Sweden .....	

Scope of adaptation action: .....

*national level* .....

Sectoral level .....

*Cross cutting activities* .....

United Kingdom .....

Scope of adaptation action: .....

*regional (sub-national) level* .....

*national level* .....

*local (community) level* .....

Sectoral level .....

*Sector: agriculture* .....

*Sector: water resources* .....

*Sector: health* .....

*Sector: coastal zones (settlements) and marine* .....

*Sector: biodiversity, environment* .....

*Sector: transport, built-environment* .....

*Sector: historic environment* .....

*Sector: energy* .....



Type of adaptation action	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns / barriers	Experiences / lessons learned	References i.e. publications, websites etc.
<b>Austria</b>						
Scope of adaptation action: <i>national level</i>						
<b>Approaches / strategies</b>	FloodRisk - integrated flood risk management within model river catchments (e.g., Danube and its alpine tributaries)	ongoing				
	StartClim - extended on a year-to-year basis, with different scientific foci. StartClim 2003 was about extreme weather events and their impacts on Austria. StartClim 2004 focused on heat waves and drought as well as their impacts on Austria, while the focus now in 2005 and 2006 is on health impacts and impacts on Austria's most vulnerable economies, e.g. tourism.	ongoing				
<b>Practices</b>						
<b>Technologies</b>						

Type of adaptation action	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns / barriers	Experiences / lessons learned	References i.e. publications, websites etc.
Source: Water-Conference & EEA Questionnaire						
<b>Sectoral level</b>						
<b>Sector: agriculture</b>						
Approaches / strategies	Change of cropping patterns and agricultural management strategies	under development	Field tests and modelling with regard to new species, cultivars, tillage methods under modified environmental conditions	Little experience with crop species outside of their usual area of dispersion	High economic risk for innovative farmers	Pritchard, S.G. and J.S. Amthor: Crops and Environmental Change. Food Products Press, New York, 2005.
Practices	Focus on water-saving or more efficient irrigation techniques	under development	Overview / mapping of (ground)water resources available for irrigation	Decrease in new formation of groundwater will constrain the irrigation possibilities	Rising energy costs determine the profitability of irrigation	Stock, M. (ed.): KLARA - Klimawandel - Auswirkungen, Risiken, Anpassung. Potsdam-Institut für Klimafolgenforschung, 2005.
Technologies	Development of new cultivars with extended growth periods; multi-stress resistance; improved water use-efficiency	under development	Breeding for heat or chilling tolerance; stress tolerance as a screening parameter;	Prohibition of genetic modification of crop plants retards progress	Crops will face a wider variability in weather conditions - broad-range tolerance will be more important than optimal tolerance to one stressor	Schimel, D.: Climate Change and Crop Yields: Beyond Cassandra. Science 312, 1889-1890, 2006.

Type of adaptation action	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns / barriers	Experiences / lessons learned	References i.e. publications, websites etc.
<b>Belgium</b>						
Scope of adaptation action: <i>regional (sub-national) level</i>						
<b>Approaches / strategies</b>	Walloon: Ban on construction in flood risk areas	ongoing				Report on Demonstrable Progress under the Kyoto Protocol. Available at <a href="http://unfccc.int/essential_background/library/items/3599.php?such=j&amp;symbol=/DPR">http://unfccc.int/essential_background/library/items/3599.php?such=j&amp;symbol=/DPR</a> .
	Brussels: Subsidies for using rain water in homes	ongoing				
	Coastal areas: Sigma Plan for flood protection and control (incl. new controlled flooding zones and assuming SLR of 60cm)	under implementation				
	Veilige Kunst (Flanders): coastal management	under implementation				
<b>Practices</b>	Brussels: Rehabilitation of rivers for water retention and improvement of ground infiltration	ongoing				
	Brussels: Building of new storm water basins	under development				

Type of adaptation action	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns / barriers	Experiences / lessons learned	References i.e. publications, websites etc.
	to reduce flood risks.					
<b>Technologies</b>						

Source: Water-Conference & EEA Questionnaire

<b>Cyprus</b>						
Scope of adaptation action:						
<i>national level</i>						
Cyprus						Charalambous, Bambo. Desalination Developments in Cyprus. Watermark, the newsletter of the Middle East Desalination Center, issue 13, August 2001.
<b>Approaches / strategies</b>	Adaption strategies to combat water shortage: - Increased use of treated and desalinated water - Introduction of severe water restrictions on domestic and agriculture water supplies (treated sewage effluent accounts now for 72% of water supply	ongoing				

Type of adaptation action	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns / barriers	Experiences / lessons learned	References i.e. publications, websites etc.
	and is mainly used for agriculture, desalinated water mainly used for domestic purposes) - Implementation of irrigation programs according to crop irrigation needs					
<b>Practices</b>						
<b>Technologies</b>	- Construction of desalination plants - New and improved irrigation systems	ongoing				

Source: Water-Conference & EEA Questionnaire

<b>EU-Commission</b>						
<i>Sectoral level</i>						
<i>Sector: agriculture</i>						
<b>Approaches / strategies</b>	Thematic Strategy for Soil Protection (COM(2006)231 and proposal for a Soil Framework Directive (COM(2006)232)	Under development (the legislative proposal is currently being discussed in the Council and the EP. The expected adoption date is in 2009)	Concerns about rising atmospheric CO2 levels have prompted considerable interest in recent years regarding the fate of the soil carbon pool. The world's soils are estimated to contain 1500 Gt of soil organic carbon, roughly double	There is a need to identify the best soil management practices from an environmental, social and economic viewpoint that will allow a quick uptake by land users (mainly farmers). Research here plays a key role, not only from a purely	Carbon sequestration in agricultural soils by some land management practices can contribute to mitigating climate change. The European Climate Change Programme (ECCP) Working Group on Sinks Related to Agricultural Soils	For general information: <a href="http://ec.europa.eu/environment/soil/index.htm">http://ec.europa.eu/environment/soil/index.htm</a> . Specific information on adaptation to climate change for soil can be found in the Soil Atlas for Europe. The UK research mentioned can be found in: P. H.

Type of adaptation action	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns / barriers	Experiences / lessons learned	References i.e. publications, websites etc.
			the amount of C in the atmosphere. Recent scientific findings (Bellamy et al, 2005) point in the direction of increasing SOC losses from European soils (in the UK an average of 0.6% per year in the period 1978-2003 for a total loss of 15% SOC within 25 years). It is therefore necessary to implement appropriate soil management practices that will minimise carbon losses, thereby maintaining organic matter in soil to such a level as to keep soil fertility and preserve soil functions.	scientific/technical development aspect, but also considering broader societal aspects and market instruments. A particular concern that needs to be addressed is how to support the uptake of adaptation measures that offer advantages from both the climate change and soil protection angles. Indeed, there are trade-offs between different measures that need to be considered in a balanced approach to climate change adaptation.	estimated this potential at equivalent to 1.5 to 1.7% of the EU's anthropogenic CO2 emissions during the first commitment period under the Kyoto Protocol, which is not negligible considering the 8% overall reduction target subscribed to by the EU.	Bellamy, P. J. Loveland, R. I. Bradley, R. M. Lark, G. J.D. Kirk, 2005. Carbon losses from all soils across England and Wales 1978-2003. Nature 437:245-248.
<b>Sector: water resources</b>						
<b>Approaches / strategies</b>	Effectiveness of adaptation and mitigation measures related to changes of the hydrological cycle and its extremes - Quantify the efficiency (cost and benefits) of current and novel	under consideration - call for projects under the FP7				

Type of adaptation action	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns / barriers	Experiences / lessons learned	References i.e. publications, websites etc.
	adaptation and mitigation measures related to changes of the hydrological cycle and its extremes in Europe. Analysis of the social and economic implications. Develop (adaptive) management strategies (including considerations on resilience and mitigation measures) for risks caused by long term changes of the hydrological cycle taking into account economic and social pressures (e.g. population and GDP growth, land use) under current and future climate conditions.					
<b>Sector: Forestry</b>						
<b>Approaches / strategies</b>	EU Forest Action Plan (COM(2006)302) Key Action 6 addresses climate change issues related to forests, including adaptation. For the Community-level, it stipulates : "The Commission will	The action plan has been adopted. Implementation is on-going.	Adaptation needs in forests will have to be kept on the research agenda. Long-term systematic monitoring networks are particularly useful to trace impacts of climate change and to	The long life cycle of forest species makes it necessary to plan for a long time ahead.	Carbon sequestration in agricultural soils by some land management practices can contribute to mitigating climate change. The European Climate Change Programme (ECCP) Working Group on	For general information: <a href="http://ec.europa.eu/environment/soil/index.htm">http://ec.europa.eu/environment/soil/index.htm</a> . Specific information on adaptation to climate change for soil can be found in the Soil Atlas for Europe. The

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	continue to support research, training and studies on the impact of and adaptation to climate change." Other activities are to be carried out by Member States.		develop appropriate adaptation measures.		Sinks Related to Agricultural Soils estimated this potential at equivalent to 1.5 to 1.7% of the EU's anthropogenic CO2 emissions during the first commitment period under the Kyoto Protocol, which is not negligible considering the 8% overall reduction target subscribed to by the EU.	UK research mentioned can be found in: P. H. Bellamy, P. J. Loveland, R. I. Bradley, R. M. Lark, G. J.D. Kirk, 2005. Carbon losses from all soils across England and Wales 1978-2003. Nature 437:245-248.
<b>Sector: biodiversity, environment</b>						
<b>Approaches / strategies</b>	Impacts and feed-backs of climate policies on land use and ecosystems in Europe - Research to assess the impacts of climate (and other sectoral) policies on land use and ecosystems and the resulting feed-back on the climate system. Regional climate models should be coupled with land use models to improve the representation of explicit biophysical and	under consideration - call for projects under FP7				



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	<p>economic mitigation and adaptation strategies in agriculture and forestry. Improved methodologies should include explicit crop/trees growth models with sufficient, sub-national spatial detail to estimate the responses and adaptation possibilities of crops and trees to scenarios of extreme climate events and changes in weather patterns. Models to include scenarios for the distribution and pressures from socio-economic drivers with sufficient geographical details. Impacts of climate mitigation measures need to be covered with sufficient details on bioenergy sources and pathways. Research should help assess and evaluate the impacts of alternative policy scenarios and estimating the associated costs and</p>					

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	benefits of the policies.					
<b><i>Cross cutting activities</i></b>						
<b>Approaches / strategies</b>	The core objectives proposed by the ADAM (ADaptation And Mitigation) Consortium are: • assess the extent to which existing and evolving EU (and world) mitigation and adaptation policies can achieve a tolerable transition to a world with a global climate within 2°C above pre-industrial levels, and identify the associated costs and effectiveness, (inc. assessment of damages avoided compared to a scenario where climate change continues unchecked to 5°C). • develop and appraise a portfolio of longer term strategic policy options to address identified shortfalls both between existing mitigation policies and the achievement of the	under development (project funded under the FP6)		•time-scales involved between policy implementation and desired outcome are much longer than in other policy areas; • many areas of policy planning need simultaneously to be addressed, therefore placing a greater demand on the integration of policy across different realms; • the opportunities that climate change opens up for technological innovation and comparative economic advantage for first-mover regions, whilst considerable, are not inevitable; • the truly global nature of the problem requires national or regional policies to be designed within some framework of global strategy	Collaboration with 3rd Country partners (in India and China) to ensure that research is grounded in a global perspective, is ensuring that both benefit from and inform non-Annex I insights and positions.	

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	<p>EU's 2°C target, and between existing adaptation policy development and implied EU goals and targets for adaptation.</p> <ul style="list-style-type: none"> <li>• develop a novel Policy-options Appraisal Framework and apply it both to existing and evolving policies, and to new, long-term strategic policy options, so as to inform: European and international climate protection strategy in post-2012 Kyoto negotiations, a restructuring of International Development Assistance, the EU electricity sector and regional spatial planning.</li> </ul>					
	<p>European Climate Change Programme - The European Commission is exploring options to improve Europe's resilience to climate impacts an, including</p>	<p>Under development</p>	<p>The ECCP relies on the latest scientific findings to support adaptation proposals, thus depends on a close partnership with the scientific community in Europe, the EEA</p>	<p>ensuring the full engagement of all sectors in a multi-layered cross-sectoral participation of stakeholders</p>		<p>general information can be found on:  <a href="http://ec.europa.eu/environment/climat/eccp_impacts.htm">http://ec.europa.eu/environment/climat/eccp_impacts.htm</a></p>

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	<p>means to adapt to the impacts of unavoidable climate change and how best to assist local, regional and national efforts. The main objective of the ECCP work on adaptation is to define the European Union role in climate change adaptation, through an intensive stakeholder's engagement process to consider the following sectors:</p> <ul style="list-style-type: none"> <li>• Impacts on water cycle and water resources management and prediction of extreme events;</li> <li>• Marine resources and coastal zones and tourism;</li> <li>• Human health;</li> <li>• Agriculture and forestry;</li> <li>• Biodiversity;</li> <li>• Regional planning, built environment, public and energy infrastructure, Structural funds;</li> <li>• Urban planning and</li> </ul>		and the EC funded research programmes.			

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	construction; • Development cooperation; • Role of insurance industry; • Building national strategies for adaptation (country reports)					
	Full costs of climate change - Quantification of damage, adaptation and mitigation costs for global emission scenarios including those that stabilize atmospheric concentrations covering countries important in international climate negotiations. This includes a coherent, up-to-date representation of socio-economic drivers. Emissions of reactive gases and, air pollutants as well as changes in land cover must be considered. Mitigation costs are to reflect (induced) technological change	under consideration - call for projects under the FP7				

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	<p>and need to include non CO2 greenhouse gases and sinks and consider recent abatement technologies. Emphasis should be on better estimates for damage and adaptation costs. Damage estimates are to include market damage, non-market damage, catastrophic events and damage related to changes in air-quality (co-benefits). Damage needs to be expressed in physical terms and, to the extent possible, monetary terms and needs to cover all relevant sectors. Explicit treatment of uncertainty is essential. Energy aspects need to be covered. The participation of international partners is encouraged.</p>					

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Ministry of Agriculture and Forestry of Finland. Finland's National Strategy for Adaptation to Climate Change. 2005						
<b>Finland</b>						
<b>Scope of adaptation action:</b>						
<i>national level</i>						
<b>Approaches / strategies</b>	National Strategy for Adaptation to Climate Change: - adaptation measures identified as immediate (2005-2010), short-term (2010-2030) and long-term (2030-2080) - immediate: planning of water services, surveying of risk sites, preparation of general plans for risk sites, construction of irrigation systems for agriculture - short-term: improve preparation for exceptional situations and regional co-operation, increase discharge capacity of dams, improve dam safety and re-	ongoing				

Type of adaptation action	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns / barriers	Experiences / lessons learned	References i.e. publications, websites etc.
	evaluate design discharges at major dams, restrictions on water use - long-term: adapt national plans to climate change effects and improve climate forecasting					
	Environmental Impact Assessment of National Climate and Energy Strategy: check, how well current policies work and whether future measures are still applicable	ongoing				
<b>Practices</b>						
<b>Technologies</b>						
Source: Water-Conference & EEA Questionnaire						
<b>Approaches / strategies</b>	National Strategy for Adaptation to Climate Change: A comprehensive strategy. Aim: increasing national adaptive capacity, Key issue: mainstreaming adaptation. Covers 18 sectors and cross-sectoral issues.	ongoing	Need to carry out the necessary analytical stages in order to identify proper action  Need to learn from current weather-related phenomena in different sectors; case studies are useful		Interministerial cooperation is most useful also for implementation purposes.  Strong backing from research is useful, and on-going science-policy interface is needed for implementation.	www.mmm.fi/ISTO



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	Impacts described, adaptation measures identified as immediate (2005-2010), short-term (2010-2030) and long-term (2030-2080)				Mainstreaming can be facilitated by development of risk assessment tools.	
<b>Sectoral level</b>						
<b>Sector: Forestry</b>						
Forestry	Mainstreaming adaptation into national forest policy. Both current weather related concerns (e.g. preparedness to deal with storms) and future risks of forest ecosystems and forestry are considered.	on-going				
<b>Sector: Water</b>						
Water	- immediate and short term: surveying of risk sites, preparation of general plans improving preparation for exceptional	- ongoing			Involvement of stakeholders in the analytical phase is useful	

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	situations, improving dam safety and re-evaluation of design discharges at major dams, - long-term: adapt national plans to climate change effects and improve climate forecasting					
<b>Sector: Transport</b>						
<b>Transport</b>	Case studies are used to assess climate impacts to transport in current climate. These, together with assessments including climate change impacts can be used for adaptation planning both now and in the longer run.	Road transport; case study completed and Rail, sea and air transport – case studies planned.			Involvement of stakeholders in the analytical phase is useful	
<b>Sector: Biodiversity, spatial planning, buildings, waste management</b>						
<b>Biodiversity, spatial planning, buildings, waste management</b>	Ministry of the Environment is preparing an adaptation program for the environmental administration. The work is based on the adaptation strategy. It includes biodiversity,	under preparation			A systematic approach within the environment administration is facilitating a thorough adaptation planning	

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	spatial planning, waste management, built environment					
<b>Sector: cross-sectoral issues</b>						
<b>Research programme on adaptation</b>	The aim of the five-year research programme is to support the implementation of the National Adaptation Strategy. Fifteen projects in forestry, agriculture, spatial planning, built environment, floods, drought and biodiversity were started in 2006	on-going				<a href="http://www.mmm.fi/ISTO">www.mmm.fi/ISTO</a>
<b>France</b>						
<b>Scope of adaptation action</b>						
<i>regional level</i>						
<b>Approaches / strategies</b>	Adaptation plan within the climate plan of Rhône-Alpes Region	Under development	Approval by the regional parliament	Lack of available tools for effective implementation	Process has only recently been implemented, so too early to comment.	
	Adaptation plan within the climate plan of Réunion region	Under implementation	Approval by the regional parliament	Lack of available tools for effective implementation	Process has only recently been implemented, so too early to comment.	

Type of adaptation action	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns / barriers	Experiences / lessons learned	References i.e. publications, websites etc.
	Adaptation plan within the climate plan of Martinique Département	Under consideration	Approval by the general council	Lack of available tools for effective implementation	Process has only recently been implemented, so too early to comment.	
<b>Practices</b>						
<b>Technologies</b>						
<i>national level</i>						
<b>Approaches / strategies</b>	National observatory on climate change impacts (ONERC): collects information from research and informs policy makers (including local communities) on impacts, vulnerability and adaptation	Ongoing since 2002				<a href="http://onerc.gouv.fr">http://onerc.gouv.fr</a>
	National adaptation strategy	Ongoing	Implementation of strategy recommendations, within the framework of an Adaptation plan		Process has only recently been implemented, so too early to comment.	<a href="http://onerc.gouv.fr">http://onerc.gouv.fr</a>
	National adaptation plan	Under development	Completion of cross-sectoral and regional negotiations		Process has only recently been implemented, so too early to comment.	<a href="http://onerc.gouv.fr">http://onerc.gouv.fr</a>
	Research program GICC (Management and impacts of climate change) of Ministry of ecology and sustainable development	ongoing since 1999				<a href="http://medias.obs-mip.fr/GICC/">http://medias.obs-mip.fr/GICC/</a>

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	Assessment of costs of impacts and adaptation at national level	Under development	Development of a database and of consistent approaches among sectors and regions			
Practices	National heat wave plan from Ministry of Health "Plan canicule"	Ongoing			Large reduction in casualties during heatwaves	<a href="http://www.sante.gouv.fr">www.sante.gouv.fr</a>
Technologies						
<i>local (community) level</i>						
Approaches / strategies	City of Paris climate plan	Under development				<a href="http://www.paris.fr">http://www.paris.fr</a>
Practices						
Technologies						
<i>Sectoral level</i>						
<i>Sector: agriculture</i>						
Approaches / strategies						
Practices						
Technologies						
<i>Sector: water resources</i>						
Approaches / strategies	Scientific studies of climate change impacts on the Rhône and Seine rivers	completed				<a href="http://medias.obs-mip.fr/GICC/">http://medias.obs-mip.fr/GICC/</a>
Practices						
Technologies						

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<b>Sector: health</b>						
<b>Approaches / strategies</b>	Heat wave plan	Ongoing	Centralised organisation by the Ministry of Health and social affairs, with excellent cooperation between organisations from different ministries and local governments.			<a href="http://www.sante.gouv.fr">www.sante.gouv.fr</a>
<b>Practices</b>	Improved coordination between the services of the central and local governments	Ongoing		Lack of cross-sectoral cooperation	This plan has been implemented after the 2003 heatwave which caused 15,000 casualties in France. This plan already helped to save many lives during another strong heatwave which occurred in July 2006.	
<b>Technologies</b>	Improved weather prediction and information, tailored to the needs of the health system in heat waves situations	Ongoing	Sufficiently reliable local weather prediction			
<b>Approaches / strategies</b>	Creation of a research centre on emerging diseases in La Réunion	Ongoing	Finance	Cooperation between different fields of science, lack of specialists in many fields such as entomology and biodiversity		

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Practices						
Technologies	Epidemiology, medical research, links with biodiversity, entomology etc					
<i>Sector: coastal zones (settlements)</i>						
Approaches / strategies						
Practices						
Technologies						
<i>Sector: biodiversity, environment</i>						
Approaches / strategies						
Practices						
Technologies						
<i>Sector: transport, built-environment</i>						
Approaches / strategies						
Practices						
Technologies						
<i>Energy production</i>						
Approaches / strategies						
Practices						
Technologies						

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<b>Germany</b>						
<b>Scope of adaptation action:</b>						
<i>national level</i>						
<b>Approaches / strategies</b>	KomPass - "Competence centre" on climate change impacts and adaptation	ongoing	collection of data and information on climate change impacts and adaptation, making it available to decision-makers and the public, support information exchange and networking among relevant stakeholders			See the Federal Environment Agency's website at <a href="http://www.anpassung.net">http://www.anpassung.net</a>
	National Adaptation Strategy	under development				
	National Strategy on Integrated Coastal Zone Management (ICZM)	ongoing	ICZM is an management approach, trying to reduce conflicts on the development of costal areas, to maintain eco-quality and to orientate on a sustainable development approach			<a href="http://www.ikzm-strategie.de/">http://www.ikzm-strategie.de/</a>
	IPCC coordination office	ongoing	coordination office for Germany's part on the IPCC process			<a href="http://www.de-ipcc.de">www.de-ipcc.de</a>
	KLIMZUG	under implementation	KLIMZUG has just been announced and will be a funding programme dealing	programme has just been announced	aspect of partner regions may play a leading role in possible training opportunities,	



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			with the regional aspect on adaptation to climate change. The goal is to create regional networks in Germany and use joint forces to deal with climate change. In addition, networks in Germany shall find partner regions worldwide to share knowledge and profit from one another.		but since KLIMZUG has just been announced no concrete information can be given at this time	
<b>regional (sub-national) level</b>						
<b>Approaches / strategies</b>	Klimastudie Brandenburg (Brandenburg)	ongoing	Guideline about support for the improvement in the landscape water balance. Furthermore the study points on impacts of moderate climate change on semi-natural ecosystems, managed forests, agricultural yields and other economic aspects.			<a href="http://www.mluv.brandenburg.de/cms/detail.php/lbm1.c.212281.de">http://www.mluv.brandenburg.de/cms/detail.php/lbm1.c.212281.de</a> <a href="http://www.mluv.brandenburg.de/cms/media.php/2328/kstudi03.pdf">http://www.mluv.brandenburg.de/cms/media.php/2328/kstudi03.pdf</a> <a href="http://www.mluv.brandenburg.de/cms/media.php/2320/fb_i104.pdf">http://www.mluv.brandenburg.de/cms/media.php/2320/fb_i104.pdf</a>
	INKLIM (Hesse)	ongoing	Second module of INKLIM (climate change and climate impacts) deals with the assessment of present			<a href="http://www.hmuv.hessen.de/irj/HMULV_Internet?cid=5ec6add988184f55ce1af07e8e8b96bd">http://www.hmuv.hessen.de/irj/HMULV_Internet?cid=5ec6add988184f55ce1af07e8e8b96bd</a>

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			climate change and climate projections till 2012. Climate impacts includes possible adaptation measures in different sectors (water resources management, agriculture and forestry, biodiversity and human health)			<a href="http://www.hlug.de/medien/luft/inklim/index.htm">http://www.hlug.de/medien/luft/inklim/index.htm</a> <a href="http://www.hlug.de/medien/luft/inklim/dokumente/abschlussbericht_I1.pdf">http://www.hlug.de/medien/luft/inklim/dokumente/abschlussbericht_I1.pdf</a>
	KLIWA (Bavaria, Baden-Wuerttemberg)	ongoing	investigations concerning climate change and its impacts on water resources management			<a href="http://www.kliwa.de/">http://www.kliwa.de/</a> <a href="http://www.kliwa.de/download/KLIWA.pdf">http://www.kliwa.de/download/KLIWA.pdf</a> <a href="http://www.kliwa.de/index.php?pos=ergebnisse/hefte/">http://www.kliwa.de/index.php?pos=ergebnisse/hefte/</a>
	KLARA (Baden-Wuerttemberg)	finished	KLARA assesses the climate impacts where BW is most vulnerable. This includes water, agriculture, forestry, nature conservation, air quality, economy, infrastructure and urban planning			<a href="http://www.lubw.baden-wuerttemberg.de/servlet/is/14503/">http://www.lubw.baden-wuerttemberg.de/servlet/is/14503/</a> <a href="http://www.lubw.baden-wuerttemberg.de/servlet/is/1454/">http://www.lubw.baden-wuerttemberg.de/servlet/is/1454/</a>
	ESPACE (European Spatial Planning: Adapting to Climate Events)	ongoing	raises awareness of decision-makers, experts and the public to the problems of climate change in the river Main area. Development of adaptation strategies,			

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			e.g. case study of Bavarian Environment Agency in "Fränkische Saale" on water resources management with the focus on flood protection adapted to climate change.			
<b>Sectoral level</b>						
<b>Sector: water resources</b>						
<b>Approaches / strategies</b>	KLIWA (Bavaria, Baden-Wuerttemberg)	ongoing	investigations concerning climate change and its impacts on water resources management			<a href="http://www.kliwa.de/">http://www.kliwa.de/</a> <a href="http://www.kliwa.de/download/KLIWA.pdf">http://www.kliwa.de/download/KLIWA.pdf</a> <a href="http://www.kliwa.de/index.php?pos=ergebnisse/hefte/">http://www.kliwa.de/index.php?pos=ergebnisse/hefte/</a>
	ESPACE (European Spatial Planning: Adapting to Climate Events)	ongoing	raises awareness of decision-makers, experts and the public to the problems of climate change in the river Main area. Development of adaptation strategies, e.g. case study of Bavarian Environment Agency in "Fränkische Saale" on water resources management with the focus on flood protection adapted to climate change.			

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<b>Sector: coastal zones (settlements)</b>						
<b>Approaches / strategies</b>	Integrated Coastal Defence Management (Schleswig-Holstein)	update	Safeguarding coastal lowlands and irreversible land loss (coastal erosion)			<a href="http://www.ikzm-strategie.de/schleswig-holstein.php">http://www.ikzm-strategie.de/schleswig-holstein.php</a>
	Regional Planning Concept (Lower Saxony)	update	ICZM is an management approach, trying to reduce conflicts on the development of costal areas, to maintain eco-quality and to orientate on a sustainable development approach			<a href="http://www.ikzm-strategie.de/niedersachsen.php">http://www.ikzm-strategie.de/niedersachsen.php</a>
<b>Sector: biodiversity, environment</b>						
<b>Practices</b>	Development of an ecological network system consisting of core areas, connecting areas and connecting elements	Under development	Concepts have to be developed at various spatial scales, taking landscape characteristics and development potentials into account. There are still remaining research needs on the efficacy of various forms of networks for facilitating migration and distribution of species.	Ecological networks can mitigate the impacts of climate change on biodiversity only to a limited extent, because not all species are able to shift their distribution by using the habitat structures provided. Also, ecological networks cannot prevent threats to species and populations in cases where their potential distribution area significantly declines or even		<a href="http://www.bfn.de/0311_biotopeverbund.html">http://www.bfn.de/0311_biotopeverbund.html</a> <a href="http://www.bfn.de/0308_gebietsschutz.html">http://www.bfn.de/0308_gebietsschutz.html</a>

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				disappears as a consequence of climate change.		
<b>Cross cutting activities</b>						
<b>Approaches / strategies</b>	Klimastudie Brandenburg (Brandenburg)	ongoing	Guideline about support for the improvement in the landscape water balance. Furthermore the study points on impacts of moderate climate change on semi-natural ecosystems, managed forests, agricultural yields and other economic aspects.			<a href="http://www.mluv.brandenburg.de/cms/detail.php/lbm1.c.212281.de">http://www.mluv.brandenburg.de/cms/detail.php/lbm1.c.212281.de</a> <a href="http://www.mluv.brandenburg.de/cms/media.php/2328/kstudi03.pdf">http://www.mluv.brandenburg.de/cms/media.php/2328/kstudi03.pdf</a> <a href="http://www.mluv.brandenburg.de/cms/media.php/2320/fb_i104.pdf">http://www.mluv.brandenburg.de/cms/media.php/2320/fb_i104.pdf</a>
	INKLIM (Hesse)	ongoing	Second module of INKLIM (climate change and climate impacts) deals with the assessment of present climate change and climate projections till 2012. Climate impacts includes possible adaptation measures in different sectors (water resources management, agriculture and forestry, biodiversity and human health)			<a href="http://www.hm.ulv.hessen.de/irj/HMULV_Internet?cid=5ec6add988184f55cc1af07c8e8b96bd">http://www.hm.ulv.hessen.de/irj/HMULV_Internet?cid=5ec6add988184f55cc1af07c8e8b96bd</a> <a href="http://www.hlug.de/medien/luft/inklim/index.htm">http://www.hlug.de/medien/luft/inklim/index.htm</a> <a href="http://www.hlug.de/medien/luft/inklim/dokumente/abschlussbericht_I1.pdf">http://www.hlug.de/medien/luft/inklim/dokumente/abschlussbericht_I1.pdf</a>
	KLIWA (Bavaria,	ongoing	investigations			<a href="http://www.kliwa.de/">http://www.kliwa.de/</a>

Type of adaptation action	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns / barriers	Experiences / lessons learned	References i.e. publications, websites etc.
	Baden-Wuerttemberg)		concerning climate change and its impacts on water resources management			<a href="http://www.kliwa.de/download/KLIWA.pdf">http://www.kliwa.de/download/KLIWA.pdf</a> <a href="http://www.kliwa.de/index.php?pos=ergebnisse/hefte/">http://www.kliwa.de/index.php?pos=ergebnisse/hefte/</a>
	KLARA (Baden-Wuerttemberg)	finished	KLARA assesses the climate impacts where BW is most vulnerable. This includes water, agriculture, forestry, nature conservation, air quality, economy, infrastructure and urban planning			<a href="http://www.lubw.baden-wuerttemberg.de/servlet/is/14503/">http://www.lubw.baden-wuerttemberg.de/servlet/is/14503/</a> <a href="http://www.lubw.baden-wuerttemberg.de/servlet/is/1454/">http://www.lubw.baden-wuerttemberg.de/servlet/is/1454/</a>
	ESPACE (European Spatial Planning: Adapting to Climate Events)	ongoing	raises awareness of decision-makers, experts and the public to the problems of climate change in the river Main area. Development of adaptation strategies, e.g. case study of Bavarian Environment Agency in "Fränkische Saale" on water resources management with the focus on flood protection adapted to climate change.			
<b>Programmes and activities with developing countries</b>						
<b>Sector: agriculture</b>						
<b>Approaches /</b>	Tunisia (national) :	ongoing	• Ensure the multi-		• The diagnosis phase	<a href="http://www.gtz.de/climate">www.gtz.de/climate</a>

Type of adaptation action	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns / barriers	Experiences / lessons learned	References i.e. publications, websites etc.
strategies	Assistance to the national government developing a national adaptation strategy for the sectors agriculture, water and ecosystems		disciplinarity of experts • Building capacities for modelling work to better determine regional climate change		is important and should create cooperation among experts and institutions. If this phase is not political, but remains scientific, differences will occur. • A major element for success is obtaining a national consensus with regard to guiding images. It is important to inform the institutional knowledge acquired in a sectoral way.	
Approaches / strategies	Vietnam: • Increase productivity of paddy farming for new climate conditions • Expand non-farm economic activities	completed	Public policy for recognizing the importance of climate change in rice research	It requires a lot of time-consuming research and reform of policies and institutions to create convenient conditions for the development process.	Any climate change adaptation options should work broadly within the framework of development strategies, which are consistent with enhancing resilience to society to withstand the anticipated climate change risks. The adaptation options need to be spatially and temporally differentiated considering socio-economic settings, emerging	<a href="http://www.gtz.de/de/dokumente/en-climate-adaptation-vietnam.pdf">http://www.gtz.de/de/dokumente/en-climate-adaptation-vietnam.pdf</a>

Type of adaptation action	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns / barriers	Experiences / lessons learned	References i.e. publications, websites etc.
					environmental threats, industrialization, and urbanization trends in various regions. Adaptation options should consider the "medium term" up to 2025, though climate change is likely to pose risks beyond this time horizon. The gradual shifting of economic activity from climate-sensitive agricultural and shrimp/fish culture to the climate-insensitive industry and service sectors is a viable option to minimize risks and conserve natural resources for sustainable development.	
<b>Practices</b>						
<b>Technologies</b>						
<b>Sector: water resources</b>						
<b>Approaches / strategies</b>	India (sectoral) : Integrated watershed management	completed			Participatory Impact Monitoring, Capacity Building and Training ensures sustainability	www.gtz.de/climate
<b>Practices</b>	Northwest Benin (local): Improved	ongoing			Development of "awareness creating"	www.gtz.de/climate



Type of adaptation action	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns / barriers	Experiences / lessons learned	References i.e. publications, websites etc.
	watershed management to enable the rural population to manage the resource water sustainable.				workshop modules directed towards the rural population	
<b>Technologies</b>						
<b>Sector: coastal zones (settlements)</b>						
<b>Approaches / strategies</b>						
<b>Practices</b>	Mekong Delta (Vietnam, Cambodia, Thailand and Laos/regional): Improvement of flood and disaster risk management	completed			The program has an educational component, which is especially directed at women and children as they tend to stay in the high risk areas while the men go off to find work elsewhere.	<a href="http://www.gtz.de/en/themen/uebergreifendethemen/krisenpraevention/2913.htm">http://www.gtz.de/en/themen/uebergreifendethemen/krisenpraevention/2913.htm</a>
<b>Practices</b>	Mozambique, Búzi (local): People oriented, inter-district early warning system for the catchment area of the Rio Búzi: participatory risk analysis; establishment of local Disaster Management Committees and integration of climate change topics in the school curricula's	completed			<ul style="list-style-type: none"> <li>• Participatory risk analyses: Identification of one third of the population being disaster-prone; detailed maps depict high-risk areas and elevated grounds for emergency evacuation.</li> <li>• Effective regulations for cyclone-proof buildings</li> <li>• Establishment of Disaster Management Committees/ Early</li> </ul>	<a href="http://www.gtz.de/en/themen/umweltinfrastruktur/umweltpolitik/16057.htm">http://www.gtz.de/en/themen/umweltinfrastruktur/umweltpolitik/16057.htm</a>

Type of adaptation action	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns / barriers	Experiences / lessons learned	References i.e. publications, websites etc.
					Warning System The people of the Búzi have shown that climate-driven disasters and threats can be effectively met by concentrated, decentralised community action and self-organisation at own cost.	
<b>Technologies</b>						
<i>Cross cutting activities</i>						
<b>Approaches / strategies</b>	Indonesia: Assistance to the national government developing a national adaptation strategy	under development				<a href="http://www.gtz.de/climate">www.gtz.de/climate</a>
<b>Approaches / strategies</b>	India (sectoral): • Risk assessment and integration into investment planning • Implementation-oriented technical measures for adaptation • Insurance Market Infrastructure • Potentials for policy assessment and development	under development	Risk management tools to help cope with/adapt to climate change impacts through effective integration into major investment planning/programmes; Insurance Market Infrastructure	Integration of adaptation into various sectoral policy decisions		<a href="http://www.gtz.de/climate">www.gtz.de/climate</a>
<b>Approaches / strategies</b>	Establishment of CEPREDENAC as a	completed			Development of instruments for disaster	<a href="http://www.gtz.de/de/dokumente/en-DRM-">http://www.gtz.de/de/dokumente/en-DRM-</a>

Type of adaptation action	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns / barriers	Experiences / lessons learned	References i.e. publications, websites etc.
	regional capacity to facilitate Disaster Risk Management in Central America (regional)				risk management in rural areas of Latin America and the Caribbean	instruments-1.pdf <a href="http://www.gtz.de/de/dokumente/en-community-based-drm.pdf">http://www.gtz.de/de/dokumente/en-community-based-drm.pdf</a>
<b>Practices</b>	Nicaragua (local): municipalities of Waspan, Bonanza, Rosita and Santa Teresa: Adaptation to climate change through disaster risk management (risk assessment and improvement of early warning systems)	completed			The most important tool to date has been the carrying out of a series of participatory risk analyses involving 550 citizens from five Miskito communities. These were facilitated by employees from the environmental unit of the municipalities of Bonanza and Santa Teresa, assisted by the local authorities. They had received special training on this new tool, which creates anticipation in order to ensure preparedness. In addition to several workshops in the communities, a contest of drawing local risk-maps was conducted and well received.	<a href="http://www.gtz.de/en/themen/umweltinfrastruktur/umweltpolitik/16057.htm">http://www.gtz.de/en/themen/umweltinfrastruktur/umweltpolitik/16057.htm</a>
<b>Technologies</b>	Tajikistan, Zeravshan Valley (local): Establishment of an	ongoing				<a href="http://www.gtz.de/en/themen/uebergreifendethemen/krisenpraeventi">http://www.gtz.de/en/themen/uebergreifendethemen/krisenpraeventi</a>

Type of adaptation action	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns / barriers	Experiences / lessons learned	References i.e. publications, websites etc.
	early warning system and capacity building for disaster risk management					on/1817.htm

Hungary						
Scope of adaptation action:						
<i>national level</i>						
Approaches / strategies	VAHAVA project: coordination, publication/dissemination, expert debates on climate change issues					
	The New Vásárhelyi Plan: emergency reservoirs along Upstream- and Middle Tisza sections to enhance flood safety. Focus on flood control, conservation and env. protection, ecotourism, agro-ecological farming, rural development.					
Practices						
Technologies						
Source: Water-Conference & EEA Questionnaire						

Type of adaptation action	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns / barriers	Experiences / lessons learned	References i.e. publications, websites etc.
<b>Ireland</b>						
Scope of adaptation action:						
<i>national level</i>						
Approaches / strategies	Inter Basin Water Transfer of water resources from Lough Ree on the Shannon to Dublin City	under consideration				
Practices						
Technologies						
Source: Water-Conference & EEA Questionnaire						

<b>Italy</b>						
Scope of adaptation action:						
<i>Level (National, Regional)</i>						
Approaches / strategies						
<i>Sectoral level</i>						
<i>Sector: Desertification</i>						
Establishment of a National Action Plan (IMELS, Dec. 1999) & a National Committee to Combat Desertification.  10 Regions and 11	Launch in 2006 (through the Operative Plan 2005) of Local Action Plans in 6 Regions including: studies and researches, infrastructures and training and	Status: ongoing  Additional info: The plan implementation does not include the allocation of financial resources specifically				Italian Ministry of Environment, Land and Sea (IMELS) – General Direction for Soil defence; National Committee to Combat Desertification “Operative Plan 2005”

<p>Basin Authorities (covering, in total, 87% of the national territory) have presented their programmes to the National Committee to Combat Desertification. Based on these Programmes, priorities (most vulnerable areas and the prevention, mitigation and adaptation strategies) and financial requirements of the National Plan have been identified. The plan implementation does not provide specific financial resources, but it provides them through the relevant sectoral policies.</p>	<p>information activities on several sectors (land protection, sustainable management of water resources, reduction of the stress by productive activities, and restoration of the territorial balance) and <b>further 6 Projects:</b>  - Education, training, awareness raising  - Training for Regional governments' heads  - Dissemination and awareness raising in Italy on the basic knowledge to combat desertification  - Monitoring and functional assessment of the interventions of reforestation and olive tree cultivation to combat desertification in Italy  - Methodology for the assessment of the economic and environmental damages caused by desertification-related drought events  - Preparation of a National thematic GIS for the environmental vulnerability to desertification.</p>	<p>to combat desertification, but it provides it through sectoral policies having an impact on desertification.)</p> <p>Status: ongoing</p> <p>Status: ongoing</p> <p>Status: ongoing</p> <p>Status: ongoing</p> <p>Status: ongoing</p> <p>Status: ongoing</p>				<p>(19 Dec. 2005)</p> <p><i>[Ministero dell'Ambiente e della Tutela del Territorio - Direzione Generale per la Difesa del Suolo, Comitato Nazionale per la Lotta alla Siccità ed alla Desertificazione Piano Operativo 2005 (19 Dic. 2005)]</i></p>
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**Sector: Water**

<b>Ordinance on water emergencies</b>	Address water crises, providing both technical and financial emergency measures.  <b>Ad hoc organizations for crisis management and management of water resources:</b> - 'Drought control room' for drought events in the Po river basin; - Coordination Unit for the management of water resources shared between the Puglia and Basilicata regions.	ongoing  ongoing  ongoing				EEA Technical report No 2/2007 "Climate change and water adaptation issues" (Chap. 3.2 Activities in relation to drought and scarcity; 3.2.3 Examples of action, pp 39-40)
<b>Project (Research Programmes with relevance at the National level - PRIN)</b>	DECISION SUPPORT SYSTEMS IN THE MANAGEMENT OF WATER SYSTEMS WITH CONFLICTUAL USES DURING DROUGHTS	Finished (2005-2006)				Project Type: <i>PRIN (Research Programmes with relevance at the National level)</i> Funding Institution: MIUR (Ministry for University and Research)
<b>Sector: Agriculture</b>						
<b>National Plan for irrigation</b>	<i>National Plan for irrigation and specific funds are allocated to alleviate the effects of extreme events (including droughts).</i>	ongoing				EEA Technical report No 2/2007 "Climate change and water adaptation issues" (Annex 1. Country level activities on climate change in relation to water
<b>Rural Development</b>	The Ministry of	ongoing				

<b>Plan</b>	Agriculture and Forests identified quantitative protection and improvement of water resources as a main objective <b>to be tackled at the regional scale</b> . As a consequence, the National Strategic Plan includes specific measures for water quantitative protection especially under the issues: "Improvement of agricultural sector and forestry competitiveness" and "Environmental and rural areas improvement".					resource issues; A1.16 Italy , pp. 86-87)
<b>Project</b>	<i>CLIMAGRI – CLIMATE CHANGE AND AGRICULTURE</i> <u>Aim</u> : improve the knowledge of linkages between agriculture and climate change <u>Focus</u> : climate change impacts, but in a view to support implementation of response measures, and draw recommendations for adaptation. <u>Subprojects</u> : 1: climatic analysis and future scenarios 2: Italian Agriculture and climate change	Finished : 2001-2004				Funding Institution: Ministry for Agriculture and Forestry Policies (MIPAF) CLIMAGRI ( <a href="http://www.climagri.it/presentazione.htm">http://www.climagri.it/presentazione.htm</a> )



	3: Drought, desertification and water resources management 4: Data dissemination and communication					
<b>Sector: Human Health</b>						
<b>National Project of the Department for Civil Protection (2004) for the prevention of heat health effects</b>	Establishment of City-specific Heat Health Watch Warning Systems (HHWWS) & a Daily mortality surveillance system.	Ongoing				Proceedings of the Conference "Improving Public Health responses to extreme weather events", Bonn 21-24 April 2007
<b>Heat Health Prevention National Operative Plan (Ministry of Health and CCM, 2005)</b>	2005 Ministry of Health and <u>Main aims:</u> extending the above systems for preventing heat effects on health over the whole territory; definition of local response plans oriented to classes of the vulnerability registry	Ongoing				Section: "ITALY MINISTRY OF HEALTH /CCM (National Centre for Disease Prevention and Control) - INITIATIVES DEVELOPED IN ITALY FOR HEAT WAVE HEALTH PREVENTION AND FOR SUMMER PREPAREDNESS PLANNING"
<b>Establishment of the National Working group of experts (Ministry of Health, 2004) coordinated by the Operative Director of the Health Prevention</b>	<u>Aim:</u> to provide Local Authorities with the tools to prepare Surveillance and Action Plans to prevent and combat heat wave damage to the health. <u>Outcomes:</u> 2004, Guidelines "for the preparation of surveillance and response plans to	Ongoing				

<p><b>Project of the Social Guardians Service (Ministry of Health, 2004-2005) in four large cities (Rome, Turin, Milan and Genoa)</b></p>	<p>combat health effects from anomalous heatwaves”, updated in 200. Since 2006 a larger number of Regions, and municipalities have made similar plans; Preparation of the <b>vulnerability registry.</b></p>	<p>Finished: 2004-2005</p>				
<p><b>Special website of the Ministry of health and CCM - HEAT LAB, 2004</b></p>	<p><u>Aim:</u> to verify the effectiveness of the assistance model based on “social guardian” figure: a person of support for the elderly living alone or in difficulty and in disadvantaged conditions.</p>	<p>Ongoing</p>				
<p><b>National Call Centre Service number “fifteen hundred”. National toll-free service active all</b></p>	<p><u>Aim:</u> to facilitate an exchange of knowledge between regions, districts, municipality and health/social workers and all organisations and institutions which work in the area of health prevention and social welfare.</p>	<p>Ongoing</p>				
<p><b>National Call Centre Service number “fifteen hundred”. National toll-free service active all</b></p>	<p><u>Aim:</u> to give to the population, advices, recommendations to prevention and</p>					

summer long, every day from 8 a.m to 8 p.m.	information regarding social and health services for the elderly available in all regions.					
<b>Sector: Coastal protection</b>						
<b>Practices/approaches</b>	<p><b>Channelling and drainage units</b> (almost all the Italian coastal plains with depressed areas)</p> <p><b>Sand feeding</b> (due to coastal erosion, to rebuild the sand mantle for tourist purposes only).</p> <p><b>ICZM:</b> Some Italian Regions (e.g. Emilia-Romagna) also have an Integrated Coastal Zone Management Plan which does not tackle directly climate change, but could be beneficial to adapt.</p>					Italian Third National Communication to UNFCCC, 2002
<b>Sector: Alpine area protection</b>						
<b>Ratification of the Convention for the Alps (Salzburg, Nov. 1991)</b>	The framework Convention is aimed at ensuring a global policy for Alps protection and preservation, including consideration of CC.	ongoing				The Alpine Convention ( <a href="http://www.convenzionedellealpi.org/page1_en.htm">http://www.convenzionedellealpi.org/page1_en.htm</a> )
<b>Project</b>	<i>ClimChAlp - Climate</i>	ongoing: March 2006 -				ClimChAlp

(INTERREG III B ALPINE SPACE PROGRAMME)	<i>Change, Impacts and Adaptation Strategies in the Alpine Space</i> <u>Aim:</u> Assessment of climate change in the Alpine area and of its impacts on natural risks, spatial and economic development & Development of a flexible net of trans-national response, & <b>drawing of Strategic recommendations for adaptation.</b>	March 2008				( <a href="http://www.climchalp.org/">http://www.climchalp.org/</a> )
Project (INTERREG III B ALPINE SPACE PROGRAMME)	<i>FORALPS</i> <u>Aim:</u> Meteo-Hydrological Forecast and Observations for improved <b>water resource management in the ALPS</b>	Ongoing: Jan. 2005 – Dec. 2007				FORALPS ( <a href="http://www.unitn.it/foalps/">http://www.unitn.it/foalps/</a> )

<b>Latvia</b>						
<b>Scope of adaptation action:</b>						
<i>regional level</i>						
Approaches / strategies	HELCOM Convention	Ongoing				Ministry of the Environment: <a href="http://www.vidm.gov.lv/eng/">http://www.vidm.gov.lv/eng/</a>
	Project ASTRA - Developing Policies & Adaptation Strategies to Climate Change in the Baltic Sea Region	Ongoing			Cross sectoral and sustainable development approach: strengthening integrated development	ASTRA project: <a href="http://www.astra-project.org/cms/">http://www.astra-project.org/cms/</a> ; Latvian University Faculty of Geography

	(2005-2007)				of coastal zones, islands and other specific areas; raise awareness of climate change (CC) impacts and adaptation issues; link CC adaptation to spatial planning mechanism; recommend suitable adaptation policies and strategies at national, regional and local levels	and Earth Science: <a href="http://www.lu.lv/eng/general/structure/faculties/geography/index.html">http://www.lu.lv/eng/general/structure/faculties/geography/index.html</a>
<b>Practices</b>						
<b>Technologies</b>	Latvian Environmental Protection Fund financial support to relevant projects	Ongoing				Latvian Environmental Protection Fund: <a href="http://www.lvaf.gov.lv/">http://www.lvaf.gov.lv/</a>
	Latvian Environmental Investment Fund financial support to relevant projects	Ongoing				Latvian Environmental Investment Fund: <a href="http://www.lvif.gov.lv/?object_id=372">http://www.lvif.gov.lv/?object_id=372</a>
<b><i>national level</i></b>						
<b>Approaches / strategies</b>	National Security Conception (new version, draft)	Under development	Assess all risks concerning climate change as well as, for example, terrorism, and transpose them in common risk management system		Until now, all natural disasters have been managed by civil protection system, and the nature of them concerns consequences - post factum, not as much prevention policies and measures	Ministry of the Environment: <a href="http://www.vidm.gov.lv/eng/">http://www.vidm.gov.lv/eng/</a> ; Ministry of the Interior: <a href="http://www.iem.gov.lv/?lng=en">http://www.iem.gov.lv/?lng=en</a>
	National Programme on Prevention Environmental Risks	Under development			There are four planning levels - National, Regional, District and Local planning level in Latvia, each	Ministry of the Environment: <a href="http://www.vidm.gov.lv/eng/">http://www.vidm.gov.lv/eng/</a>

					<p>represented by territorial plans in appropriate scale. National Plan determines national interests and requirements for use and development of the whole territory of the country. Plans of five Planning Regions determine development possibilities, trends and restrictions of the territory of these regions. District Plans of twenty six districts determine development possibilities, trends and restrictions of the territory of these districts and design current and define planned (permitted) use of the territory, as well as specifies requirements, territories and objects of higher planning level. Local Plans determines development possibilities, trends and restrictions of the territory and design current and define planned (permitted) land-use, as well as specify requirements,</p>	
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					territories and objects of higher planning level. Detailed Plans specify the requirements of the land-use set by the Local Plan within designed territory	
<b>Practices</b>	Hydrological and meteorological observations	Ongoing			In Latvia, the first hydrological observations in the territory of Latvia date back to the 16th century when the recording of ice moving phenomena on the river Daugava near Riga began in 1530. Observations of the water level in the coastal area of the Baltic Sea started in 1841 in Daugavgriva by applying a water level-meter. Later in 1865, water level observations with a level-meter started also in Liepaja, in 1873- Ventspils and in 1884- Kolka. Hydrological observations, as well as meteorological observations (made by Latvian Environment, Geology and Meteorology Agency) of terrestrial rivers are carried out in 53	

					<p>observation stations located near rivers and reservoirs of Latvia, monitoring water level, flow, water temperature, ice phenomena and ice thickness.</p> <p>Measurements of water level, temperature, salinity, wave and ice phenomena in the Baltic Sea and the Gulf of Riga are carried out in 9 stations. Modern technical equipment, automatic observation sensors and mobile communication devices provide the possibility to receive water level and temperature data in real time regime and perform operative information follow-up and correction of possible inaccuracies.</p>	
	Spatial planning			<p>Necessity regularly updated Latvian hazard and risk maps - the newest ones are dated by 2001 (in State Civil Protection Plan); the better situation is with risk maps in forestry and in the newest strategic environmental assessment reports concerning spatial</p>		



				planning.		
<b>Technologies</b>	Protecting dikes to reduce threatening floods along the Daugava					
	JSC LATVENERGO annual payments for Dagava River bank fortification	Ongoing				
	Latvian Environmental Investment Fund financial support to relevant projects	Ongoing				Latvian Environmental Investment Fund: <a href="http://www.lvif.gov.lv/?object_id=372">http://www.lvif.gov.lv/?object_id=372</a>
	Latvian Environmental Protection Fund financial support to relevant projects	Ongoing				Latvian Environmental Protection Fund: <a href="http://www.lvaf.gov.lv/">http://www.lvaf.gov.lv/</a>
<b>local (community) level</b>						
<b>Approaches / strategies</b>	Management plans for the individual protected nature areas	Under implementation, ongoing		As a result of slow development of land and area reform, a large amount of economically and administrative weak municipalities, unable carried out all their functions, still remain in Latvia	Practically in all plans chapters on risk areas (mainly concerning flood risk) and its management measures are involved	Ministry of the Environment: <a href="http://www.vidm.gov.lv/eng/">http://www.vidm.gov.lv/eng/</a>
	Conception on Measures to prevent Flood Risk in Jekabpils Town after Plavini HPP and its Reservoir Construction (2006)	Under implementation				Ministry of the Interior: <a href="http://www.iem.gov.lv/?lng=en">http://www.iem.gov.lv/?lng=en</a>
	Riga Development Plan for 2006-2018 (2005) - Strategic Environmental	Under implementation				

	Assessment					
<b>Practices</b>	Life-NATURE project "Protection and Management of Coastal Habitats in Latvia" (2002-2005)		The needs to prevent coastal erosion are: enforcement of beach dune belt; reconstruction of land drainage systems; to meet the requirements of regularly state monitoring on geological processes of the sea-coast; to dump the regularly dredged sediments from harbour aquatories and ship route canals in the shallow water belt (0-6m depth)		In Latvia, a total of 45 % of the proposal project territory is in Latvia's legally protected territory system - the Baltic Sea coastal protection belt. The Project area was the entire Baltic Sea coast – an approximately 300 m wide coastal zone beginning from the waterline in the terrestrial direction. In areas where threatened habitats of Community importance (dunes, coastal meadows) continue outside of this belt, project actions extend to cover the entire areas of the habitats. The total surface area of the project was 18,000 ha. Particular attention was devoted to public education. Management plans for the individual protected nature areas were elaborated as the main results of the project.	Protection and Management of Coastal Habitats in Latvia: <a href="http://piekraste.daba.lv/EN">http://piekraste.daba.lv/EN</a>
<b>Technologies</b>	Protecting dikes to reduce threatening floods along the Daugava	Under implementation, ongoing				Ministry of Economics: <a href="http://www.em.gov.lv/em/2nd/?lng=en&amp;cat=3&amp;lng=en">http://www.em.gov.lv/em/2nd/?lng=en&amp;cat=3&amp;lng=en</a>

	Latvian Environmental Protection Fund financial support to relevant projects	Ongoing				Latvian Environmental Protection Fund: <a href="http://www.lvaf.gov.lv/">http://www.lvaf.gov.lv/</a>
	Latvian Environmental Investment Fund financial support to relevant projects	Ongoing				Latvian Environmental Investment Fund: <a href="http://www.lvif.gov.lv/?object_id=372">http://www.lvif.gov.lv/?object_id=372</a>

**Sectoral level**

**Sector: agriculture**

<b>Approaches / strategies</b>	Latvian Rural Development National Strategy Plan 2007-2013 (2006): risk management	Under implementation		Due to insufficient resources – outdated agricultural machinery, buildings and equipment, including that related to environment protection; fragmented production structure competing on the local market. The consequences of the fragmented structure are low productivity in comparison with developed countries and lower than that in other sectors; small proportion of long-term investments (in comparison with short-term); suitability of conditions to agriculture largely vary across the territory; large proportion of undereducated	In Latvia, there is: large land area suitable to agriculture; considerable investment in agricultural production facilities, buildings, machinery and equipment by making use of national and EU support allocated for that purpose; relatively low labour cost; relatively unpolluted environment as a resource available for production of agricultural products; Gross added value in agriculture is growing rapidly; an advisory and education extension system in place to support farmers	Ministry of Agriculture of Republic of Latvia: <a href="http://www.zm.gov.lv/?setl=2">http://www.zm.gov.lv/?setl=2</a>
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				employees in the sector and insufficient knowledge of persons employed in agricultural establishments to establish competitive management systems; large number of aged workers employed in agriculture, which contributes to low business growth incentive; low level of assurance to minimise risks of losses due to natural disasters in agriculture.		
	Risk management conception in agriculture (2007)	Under consideration	Development of mixed (based on public - private partnership) assurance system; effective land-use management; use of the most reasonable cereal varieties	Low level of assurance to minimise risks of losses due to natural disasters in agriculture. Many of the risk factors, being connected with natural disasters and phenomena, resulting in unpredictable losses, and state intervention by irregular compensatory mechanisms are the main reasons why the private insurance system does not function in the field of agriculture yet.	Agricultural and Rural Development Law and its subordinated Regulations On State Support for Agriculture every year estimate compensation extent for damage made in agriculture, but this approach don't include such principles of risk management as subject motivated participation, public - private partnership, elasticity, and support commensurability.	Latvian State Agrarian Economic Institute: <a href="http://www.lvaei.lv/">http://www.lvaei.lv/</a> ; Ministry of Agriculture of Republic of Latvia: <a href="http://www.zm.gov.lv/?setl=2">http://www.zm.gov.lv/?setl=2</a>
	National Programme of	Under implementation			The SFS keeps the	Ministry of Agriculture

	Latvian Forest and Related Sectors				State Register of Forests (SRF) – one of the country’s major forestry databases, representing a unified information system on the forest resources and forest management.	of Republic of Latvia: <a href="http://www.zm.gov.lv/?setl=2">http://www.zm.gov.lv/?setl=2</a>
	SAPARD Subprogramme 1.2 “Afforestation of Agricultural Lands”	Ongoing				
	Latvian Forest Policy (1998)	Under implementation		Unauthorized felling of trees accounts for a substantial part of forest offences. According to the recent data, unauthorized felling of trees tends to go down both as to the number of cases and the volume of timber felled, including the material loss. In 2005 as compared to 2004, the situation with illegal felling has improved considerably: the number of cases has reduced by 61%, the volume by 42.5 %, the loss by 77%. In 2006, totally 535.4 km of forest roads were built and 413.5 km of drainage systems were built or reconstructed. The Forest Law	In Latvia, the total forest-covered area is 2,923,188 ha or 45% of its land area. With the average forest cover in Europe 33%, Latvia is a country rich in forest resources. The forest ownership is as follows: state-owned forests 1,472,054 ha (50.1%); other ownership forests (private, community, etc.) 1,471,518.1 ha (49.9%).	Ministry of Agriculture of Republic of Latvia: <a href="http://www.zm.gov.lv/?setl=2">http://www.zm.gov.lv/?setl=2</a> ; State Forest Service: <a href="http://www.iem.gov.lv/?lng=en">http://www.iem.gov.lv/?lng=en</a> ;

				provides that the forest roads and drainage systems are forest infrastructure objects pertaining to the forestland and making a part of forest value.		
<b>Practices</b>	State Forest Service (SFS): responsible for pursuing a unified forest policy in all the Latvia's forests, controlling observance of the provisions of statutory acts, and implementing support programmes, in the long term aimed at ensuring sustainable forest management, inter alia, keep a watch on forest fire safety and bring forest fires under control, administer the state and internationally financed support programmes related to forestry	Ongoing, under implementation	SFS cooperation with the Prosecutor General, Ministry of the Interior, Ministry of the Environment Protection, the Home Guards, the Border Guards, and the respective departments of the said organisations, the local authorities and other organisations concerned, as well as with the public at large; suppression of large forest fires is time- and labour-intensive, and the operations may last for several days or even weeks, and thereby heavy machinery like excavators and bulldozers must be involved. Because of economic considerations SFS owns no hardware like that.	Because of economic considerations SFS owns no hardware to help bring large scale fires under control	A prompt detection and isolation of fires in all the forests regardless of the ownership are the SFS major objective in forest fire control. For this purpose a national network of lookout towers and fire stations is in place. Nearly all the forest fires are detected from lookout towers normally within half an hour, and a fire brigade of the respective fire station sets off on its mission. Up to 78% of forest fires are detected and suppressed at a short notice, with the burned area no larger than 0.5 ha.	State Forest Service: <a href="http://www.vmd.gov.lv/?sadala=71">http://www.vmd.gov.lv/?sadala=71</a>

	Latvian State Forestry research Institute "Silava" researches on interaction of wind and forest (trees) results in windthrow and storm breakage	Ongoing				Latvian State Forestry research Institute "Silava": <a href="http://www.silava.lv/">http://www.silava.lv/</a>
	State stock Company "Latvia's State Forests" (LVM); Forest Management Plans by regional forestries; cultivating seeds and planting stock	Ongoing		More than 800 land melioration objects (with total length 240 thousand km), regulated moisture, drainage, and area mark off, are managed by LVM. At present, the main task is to keep in order or renovate number of those systems	Forests cover 2.9 million hectares of Latvia's territory. The LVM administrates and manages 1.65 million hectares of the land of the Republic of Latvia. Forests cover 1.37 million hectares of it. State-owned forests take up 50%, privately owned forests 43% and forests of other ownership take up 7% of the total area. Wet mineral soils take up 12%, wet peaty soils 11% of the total forest area. A great deal of biological diversity of Latvia's forests is found in these forests. Drained forests (forests on drained mineral soils and drained peaty soils) occupy 22% of the LVM area. The productivity of these forests has increased 2 to 2.5 times in comparison with the forests on excessively	Company "Latvia's State Forests": <a href="http://www.lvm.lv/eng/lvm/">http://www.lvm.lv/eng/lvm/</a>

					wet mineral and peaty soils before drainage.	
	Latvian State Institute of Agrarian Economics - research on justification on agriculture insurance system development in Latvia (2006)	Under implementation				Latvian State Institute of Agrarian Economics: <a href="http://www.econa.lv/">http://www.econa.lv/</a>
<b>Technologies</b>	Rural Support Service: Annual state subsidies, inter alia, for compensation damage made in agriculture, and for forest and agricultural land (soil) amelioration	Ongoing	Development of mixed (based on public - private partnership) assurance system; effective land-use management		On 2001, the EC Commission made a decision conferring management of aid for pre-accession measures in agriculture and rural development upon the Republic of Latvia. The competent authority has appointed the Rural Support Service for the implementation of the following measures: inter alia, modernisation of agricultural machinery, equipment and construction of buildings; afforestation of agricultural land; development and diversification of economic activities providing for alternative income; improvement of general rural infrastructure	Ministry of Agriculture of Republic of Latvia: <a href="http://www.zm.gov.lv/?setl=2">http://www.zm.gov.lv/?setl=2</a> ; Rural support service: <a href="http://www.lad.gov.lv/index.php?l=2">http://www.lad.gov.lv/index.php?l=2</a>



**Sector: water resources**

<p><b>Approaches / strategies</b></p>	<p>Law on Environmental Impact assessment and Regulations of the Cabinet of Ministers No 87 "Procedures for Strategic Environmental Impact Assessment" (2004)</p>	<p>Under implementation</p>	<p>0</p>	<p>As a result of slow development of land and area reform, a large amount of economically and administrative weak municipalities, unable carried out all their functions, still remain in Latvia</p>	<p>The Law on Environmental Impact Assessment defines procedure for the strategic environmental impact assessment. The State Environmental Bureau is a national competent authority, which supervises strategic environmental assessment. SEA is made for a few policy planning documents in Latvia, e.g., "Riga Development Plan for 2006-2018" (2005), "Strategy on Renewable Energy Sources for 2006 – 2013" (2006), "Strategy on Energy Development for 2007 – 2016" (2006), "National Development Plan" (2006). As a result, for example, for Riga and its district detailed flood risk assessment and relevant maps had been elaborate</p>	<p>Ministry of the Environment:  <a href="http://www.vidm.gov.lv/eng/">http://www.vidm.gov.lv/eng/</a>; Environment State Bureau:  <a href="http://www.vidm.gov.lv/ivnvb/ivnvbe.htm">http://www.vidm.gov.lv/ivnvb/ivnvbe.htm</a></p>
	<p>National Flood Risk Assessment and Management Plan</p>	<p>Under development</p>		<p>Insufficient operation of River Basin Board; irrelevant statistical data concerning WFD reporting mechanism</p>		<p>Ministry of the Environment:  <a href="http://www.vidm.gov.lv/eng/">http://www.vidm.gov.lv/eng/</a>; Ministry of the Interior:</p>

						<a href="http://www.iem.gov.lv/?lng=en">http://www.iem.gov.lv/?lng=en</a> ;
	Nature Protection plans for particular territories	Ongoing		As a result of slow development of land and area reform, a large amount of economically and administrative weak municipalities, unable carried out all their functions, still remain in Latvia		Ministry of the Environment: <a href="http://www.vidm.gov.lv/eng/">http://www.vidm.gov.lv/eng/</a>
<b>Practices</b>	State research programme on climate change impact on water environment, including adaptation (2006-2009)	Under development				Latvian University, Faculty of Geography and Earth Sciences: <a href="http://www.lu.lv/eng/general/structure/faculties/geography/index.html">http://www.lu.lv/eng/general/structure/faculties/geography/index.html</a>
<b>Technologie:</b>	Energy Development Strategy for 2007-2016			In Latvia, a share of three big hydropower plants (HPP) in producing all electric power from renewable energy resources is superlative – 96% (with installed capacity – 1534 MW), and volume of electricity generation directly depends on the through-flow of the river Daugava; for its part the share of renewables in electricity production is 46%. At the same time these HPP together with drift-ice increased flood risk, and demand		Ministry of Economics: <a href="http://www.em.gov.lv/em/2nd/?lng=en&amp;cat=3&amp;lng=en">http://www.em.gov.lv/em/2nd/?lng=en&amp;cat=3&amp;lng=en</a>

				for new protecting dikes increased. That, for its part, is unacceptable for scientists and nature protectors. Therefore cleaning of Daugava runway would be useful as well. It is necessary to take into consideration that in the period after 2009, the current excess capacity generated by energy systems of the neighbouring countries will diminish, as well as Latvia's opportunity to ensure import of electricity.		
	Latvian Environmental Investment Fund financial support to relevant projects					Latvian Environmental Investment Fund: <a href="http://www.lvif.gov.lv/?object_id=372">http://www.lvif.gov.lv/?object_id=372</a>
	Latvian Environmental Protection Fund financial support to relevant projects					Latvian Environmental Protection Fund: <a href="http://www.lvaf.gov.lv/">http://www.lvaf.gov.lv/</a>
	Renewable Energy Resources Strategy for 2006-2013	Under implementation				Ministry of the Environment: <a href="http://www.vidm.gov.lv/eng/">http://www.vidm.gov.lv/eng/</a>
<b>Sector: health</b>						
<b>Approaches / strategies</b>	Strategy for Public Health (2001), Strategy for Public Health Implementing Action Programme 2004-2010	Under implementation	Elaboration and management of all risks concerning healthy and safe environment, and the	Low level of problem's understanding; insufficiency of good governance; bad coordination between		Public Health Agency: <a href="http://www.sva.lv/eng/">http://www.sva.lv/eng/</a> ; Health Ministry of Republic of Latvia: <a href="http://www.vm.gov.lv/">http://www.vm.gov.lv/</a> ;

	(2004)		most vulnerable groups; provided appropriate monitoring	state and private structures, and individuals		
<b>Practices</b>	Centre of Emergency and Disaster Medicine (CEDM)	Ongoing			On the request of health care institutions CEDM specialists perform medical evacuation from any health care institution to an appropriate specialized hospital within the borders of Latvia. The mobile intensive care units of CEDM are used for the transportation of patients. Since 2000 CEDM in cooperation with the National Armed Forces of the Republic of Latvia has developed air medical transportation of seriously injured and critically ill patients with the rescue helicopter of the Air Forces.	Centre of Emergency and Disaster Medicine: <a href="http://www.emergency.lv/index.php?lang=en">http://www.emergency.lv/index.php?lang=en</a>
<b>Technologies</b>						
<b>Sector: coastal zones (settlements)</b>						
<b>Approaches / strategies</b>	Integrative Coastal Management Plan for Baltic States and Poland (1998-1999)	Under implementation	The needs to prevent coastal erosion are: enforcement of beach dune belt; reconstruction of land drainage systems; to meet the requirements of regularly state			

			monitoring on geological processes of the sea-coast; to dump the regularly dredged sediments from harbour aquatories and ship route canals in the shallow sea water belt (0-6m depth);			
	National monitoring of geological processes of the seacoast	Ongoing				Latvian Environmental, Geological and Meteorological Agency: <a href="http://www.meteo.lv/public/26902.html">http://www.meteo.lv/public/26902.html</a>
<b>Practices</b>	Dump the regularly dredged sediments from harbour aquatories and ship route canals in shallow belt	Ongoing				
<b>Technologies</b>	Latvian Environmental Protection Fund financial support to projects for enforcement of beach dune belt	Ongoing				Latvian Environmental Protection Fund: <a href="http://www.lvaf.gov.lv/">http://www.lvaf.gov.lv/</a>
	Latvian Environmental Investment Fund financial support to relevant projects	Ongoing				Latvian Environmental Investment Fund: <a href="http://www.lvif.gov.lv/?object_id=372">http://www.lvif.gov.lv/?object_id=372</a>
<b>Sector: biodiversity, environment</b>						
<b>Approaches / strategies</b>						
<b>Practices</b>	Nationally and internationally protected nature territories in the coastal	Under implementation				Ministry of the Environment: <a href="http://www.vidm.gov.lv/eng/">http://www.vidm.gov.lv/eng/</a>

	belt						
<b>Technologies</b>	Registry on Protected Territories according to the Water Framework Directive (WFD)	Ongoing				<p>Specially protected nature territory system, incorporated in the NATURA 2000 network, covers 12.24% of the territory of Latvia. The majority of the specially protected areas in Latvia is covered by forests – 49% and agricultural lands – 24%, then follows water – 12%, marshes – 14%, and other biotopes – 1%.</p> <p>Environment is rich in protected biotopes of European significance. There are 18 047 species of animals, 5396 species of plants and about 4000 species of mushrooms established in Latvia. According to scientists, about 907 species (3.3 % of all species) are rare and endangered.</p>	Latvian Environmental, Geological and Meteorological Agency: <a href="http://www.meteo.lv/public/26902.html">http://www.meteo.lv/public/26902.html</a>
	Latvian Environmental Investment Fund financial support to relevant projects	Ongoing				Latvian Environmental Investment Fund: <a href="http://www.lvif.gov.lv/?object_id=372">http://www.lvif.gov.lv/?object_id=372</a>	
	Latvian Environmental Protection Fund financial support to relevant projects	Ongoing				Latvian Environmental Protection Fund: <a href="http://www.lvaf.gov.lv/">http://www.lvaf.gov.lv/</a>	

<b>Sector: transport, built-environment</b>						
<b>Approaches / strategies</b>	Riga Public Transport Development Conception for 2005-2018	Under implementation	32% from all Latvia's population live in Riga plus a large number works in Riga; thus it is necessary to improve the public transport system in Rīga		Conception prescribes the development of an integrated public transportation system, including further development of the electric transport network and introduction of low floor tram, integration of railroad transport in the common transportation network of the city, etc.	Riga City Municipality: <a href="http://www.riga.lv/EN/Channels/Riga_Municipality/Executive_authority/default.htm">http://www.riga.lv/EN/Channels/Riga_Municipality/Executive_authority/default.htm</a>
	National Programme of Transport Development for 2000-2013	Under implementation				Ministry of Transport: <a href="http://www.sam.gov.lv/satmin/content/?cat=134">http://www.sam.gov.lv/satmin/content/?cat=134</a>
<b>Practices</b>						
<b>Technologies</b>						
<b>Cross cutting activities</b>						
<b>Approaches / strategies</b>	Precautionary and risk management principles are involved in several overall legislative acts: Law on Environment Impact Assessment (1998), Law on Protected Belts (1997), in regulations on Methodology Establishment to Protected Belts of the Baltic Sea and the Gulf of Riga, in Law on Water Management (2002), in Law on	Under implementation				Ministry of the Environment: <a href="http://www.vidm.gov.lv/eng/">http://www.vidm.gov.lv/eng/</a> ; Ministry of Regional Development and Local Government (MRDLG): <a href="http://www.rapl.gov.lv/eng/">http://www.rapl.gov.lv/eng/</a>

	Territory Planning (2002), in Law on Regional development (2002)					
	Sub-monitoring Programme on Climate Change and Adaptation	Under development				Latvian Environmental, Geological and Meteorological Agency: <a href="http://www.meteo.lv/public/26902.html">http://www.meteo.lv/public/26902.html</a>
	Strategy for the Development of Industry, 2004 – 2013	Under implementation				Ministry of Economics: <a href="http://www.em.gov.lv/em/2nd/?lng=en&amp;cat=3&amp;lng=en">http://www.em.gov.lv/em/2nd/?lng=en&amp;cat=3&amp;lng=en</a>
	National Concept on Innovations	Under implementation				Ministry of Economics: <a href="http://www.em.gov.lv/em/2nd/?lng=en&amp;cat=3&amp;lng=en">http://www.em.gov.lv/em/2nd/?lng=en&amp;cat=3&amp;lng=en</a>
	National Programme of Innovations for 2003-2006	Under implementation				Ministry of Economics: <a href="http://www.em.gov.lv/em/2nd/?lng=en&amp;cat=3&amp;lng=en">http://www.em.gov.lv/em/2nd/?lng=en&amp;cat=3&amp;lng=en</a>
<b>Practices</b>						
<b>Technologies</b>	Latvian Environmental Investment Fund financial support to relevant projects	Ongoing				Latvian Environmental Investment Fund: <a href="http://www.lvif.gov.lv/?object_id=372">http://www.lvif.gov.lv/?object_id=372</a>
	Latvian Environmental Protection Fund financial support to relevant projects	Ongoing				Latvian Environmental Protection Fund: <a href="http://www.lvaf.gov.lv/">http://www.lvaf.gov.lv/</a>



<b>Malta</b>						
<b>Scope of adaptation action:</b>						
<i>regional level</i>						
Approaches / strategies						
Practices						
Technologies						
<i>national level</i>						
Approaches / strategies					Process has only recently been implemented, so too early to comment.	<a href="http://www.defra.gov.uk/environment/climatechange/uk/adapt/policyframe.htm">http://www.defra.gov.uk/environment/climatechange/uk/adapt/policyframe.htm</a>
Practices						
Technologies						
<i>local (community) level</i>						
Approaches / strategies						
Practices						
Technologies						
<b>Sectoral level</b>						
<b>Sector: agriculture</b>						
Approaches / strategies	The draft National Rural Development Strategy for the period 2007-2013 recognises that the impact of inundation, increased risk of flooding,	Strategy is under development (consultation).	Approval of the Strategy.	Limited awareness on need to adapt to climate change.	Consultation with stakeholders is crucial for ownership of decisions.	<a href="http://www.agric.gov.mt/rural_dev.htm">www.agric.gov.mt/rural_dev.htm</a>

	deterioration and erosion of soil, accelerating desertification processes, as well as damage to the landscapes, agriculture and animal husbandry operations and to natural terrestrial and marine ecosystems with loss of biodiversity. It also highlights the shortage of water supplies expected to be further exacerbated. The Strategy outlines priority actions to be undertaken in order for agriculture to adapt to climate change.					
<b>Practices</b>						
<b>Technologies</b>						
<b>Sector: water resources</b>						
<b>Approaches / strategies</b>	PRODIM is a transnational co-operation project financed under the EU Programme – Interreg III B Archimed. The overall objective of the PRODIM project is to develop a comprehensive proactive management plan to combat drought and water scarcity in	under implementation	Water efficiency and conservation measures to be fully integrated within general water policy and other national policies eg land-use, CAP, urban-planning, tourism, industry etc.	Practices and consumer behaviour	sharing of ideas/concerns and learning from foreign experiences	www.project-prodim.eu

	drought-prone areas of the Mediterranean region with particular reference to the islands and coastal areas.					
	WATER-MAP is a transnational co-operation project financed under the EU Programme – Interreg III B Archimed. The overall objective of the PRODIM project is the application of the DRASTIC method in the Archimed area in order to produce vulnerability maps related to groundwater pollution, and the utilisation of these maps in a spatial model for the monitoring and management of groundwater resources.	under implementation	Support to a strategy for groundwater protection and heightened public awareness campaigns	Land-use activities	learning from the difficulties of incorporating physical and human induced factors into groundwater vulnerability maps; integrating maps into the planning process.	
	INWATERMAN is a project financed under the EU Programme – Interreg III A - cooperation between Italy and Malta 2004-2006. The overall objective of the INWATERMAN project is the sustainable management of conventional and non-conventional water	under implementation	Guidelines for different reuse applications, quality standards and code of good practice. Legal requirement for the re-use of non-conventional water sources; need for further data gathering	Public acceptance, health and safety issues, cost-effectiveness.	sharing of ideas/concerns and learning from foreign experiences	<a href="http://www.inwaterman.eu/">www.inwaterman.eu/</a>

	resources in arid and semi-arid insular settings.					
<b>Practices</b>	In the context of the implementation of the European Union (EU) Water Framework Directive (WFD), the Malta Resources Authority (MRA) has launched a project for the development of the programme of measures in the Maltese Water Catchment District. The project focuses on groundwater resources and water supply and aims at identifying the most cost-effective option for restoring the status of groundwater resources in line with the requirements of the WFD.	under implementation	Will be integrated within the Water Catchment management Plan	Economic impact of measures on current water-supply practices. Sectoral demand High cos	Need for stakeholder involvement throughout the process of identification of possible measures	<a href="http://www.mra.org.mt/wfd_introduction.shtml">http://www.mra.org.mt/wfd_introduction.shtml</a>
	The Water Framework Directive (2000/60/EC), transposed into Maltese Legislation by Legal Notice 194 of 2004 (Water Policy Framework Regulations, 2004) provides for the long-term sustainable management of water resources on the basis of a high level of	Under implementation				

	protection of the aquatic environment.					
	Storm Water Management National Plan	Under preparation				
<b>Technologies</b>	Reverse Osmosis,	Upgrading of facilities with new membranes and energy recovery devices to improve unit cost of desalinated product	Financing	Cost of water		<a href="http://www.wsc.com.mt/default.aspx?MLEV=4&amp;MDIS=15">http://www.wsc.com.mt/default.aspx?MLEV=4&amp;MDIS=15</a>
	Water catchment technologies	Cleaning of dams and maintenance of reservoirs	Financing	Preservation of ecosystems		
	Leakage detection technologies	Increased investment in "smart" devices to control pressure and flow thru the network; intensification of leakage detection programmes by the utility, meter replacement	Financing	Urban activity		<a href="http://www.wsc.com.mt/default.aspx?MLEV=4&amp;MDIS=15">http://www.wsc.com.mt/default.aspx?MLEV=4&amp;MDIS=15</a>
	Sewage treatment technologies	Construction of two facilities, in Malta and Gozo to be completed by 2007. Third facility in planning application stage.	Financing	Public acceptance, cost of product, cost recovery, health and safety		
<b>Sector: health</b>						
<b>Approaches / strategies</b>						
<b>Practices</b>	In relation to the need to adapt to hot weather conditions, information campaigns are regularly carried out targeted at vulnerable groups (eg	Under implementation.	Not yet evaluated	Early status of implementation	Not yet available	<a href="http://www.health.gov.mt/dph/ehuhome.htm">http://www.health.gov.mt/dph/ehuhome.htm</a>

	elderly) and the general public. Malta also publishes and communicates UV and heat stress indices. It is regular practise to take care in planning of events for vulnerable groups (eg school sports days moving from June to April). Alerting public when heat waves expected, informing people not to go outdoors during midday hours.					
<b>Practices</b>	In relation to increased risk of disease with climate change, there are various practises which would contribute to the adaptation effort. These include monitoring and information campaigns related to quality of bathing water, vaccination programmes; regular surveillance for specific climate change related diseases such as lyme borreliosis and tickborne encephalitis; fumigations of all aeroplanes coming from malaria zones; mandatory vaccination	Under development	Not yet evaluated	Early status of implementation	Not yet available	<a href="http://www.health.gov.mt/dsu/index.htm">http://www.health.gov.mt/dsu/index.htm</a>

	certificates for travellers coming from areas prone to yellow fever, awareness-raising programmes on food hygiene and diseases such as salmonella.					
<b>Sector: coastal zones (settlements)</b>						
<b>Approaches / strategies</b>	In the framework of the Mediterranean Action Plan (MAP) and within its Coastal Area Management Programme (CAMP), a project for Malta was launched in November 1999. The Project was oriented towards sustainable management of the coast of Malta (in the Northwest area) and considered climate change and adaptation within its scenarios. A Soil erosion / desertification control management activity was implemented within the CAMP Malta Project.	implemented	Long-term benefits of conservation and restoration of resources and habitats. There is a greater need for a more active involvement and participation of NGOs, when dealing with coastal zone issues.	New tools and techniques of ICAM were introduced and applied during this Project. It was observed that however, the methodologies have to be adapted to the small scale of Malta.	Project was a success in that it brought together all concerned regulatory and implementing agencies, stakeholders, NGOs discussing one goal; Greater need for multidisciplinary approach towards sustainable coastal zone management; Inter disciplinary appro	<a href="http://www.pap-thecoastcentre.org/about.php?blob_id=36&amp;lang=en">http://www.pap-thecoastcentre.org/about.php?blob_id=36&amp;lang=en</a>
<b>Practices</b>						
<b>Technologies</b>						
<b>Sector: biodiversity, environment</b>						
<b>Approaches / strategies</b>	In the analysis of land-use issues, landscaping	Under implementation			The integration of habitats and species	

	and in the management of sites (including habitat types and species) the 'ecosystem approach' is considered a method of adjusting to the impacts of climate change on biodiversity.				into one aspect (as in the implementation of the Habitats Directive) and the integration of land-use planning and environment protection within the Malta Environment and Planning Authority is an advantage in this re	
	The NBSAP process and the National Plan for Sustainable Development in Malta raise the issue of the habitat fragmentation and habitat/species restoration.	Under consideration	Investments in the field of habitat restoration and creation.	Provision of human and financial resources.		
<b>Practices</b>	Effective Management of the Natura 2000 Network: Aspects related to the impacts of climate change will be included in new management plans for Natura 2000 sites including defragmentation and connectivity, and monitoring.	Under consideration	More information is required, in the absence of which the precautionary approach will be adopted.			
<b>Technologies</b>	Appropriate urban and infrastructure planning devices (e.g. canals, bridges, road route assessments) can be used to safeguard the integrity and connectivity of			Lack of consideration at transport planning phases		



	ecosystems.					
<b>Sector: transport, built-environment</b>						
<b>Approaches / strategies</b>	The Structure Plan for the Maltese Islands (replacement) will envisage land use planning opportunities to reduce hazards, which may include latent conditions from natural processes such as geological e.g. subsidence and hydro meteorological e.g. flooding and sea level rise and reduce risks by directing development location, density and expansion, in particular the siting of key installations, roads, water, sewage and other critical facilities, in hazard-prone areas such as built up areas located in valleys, on clay slopes, cliff edges, ridges and low lying coastal areas.	Being completed				
	Within Local Plans, the Malta Environment and Planning Authority identifies flood prone areas to highlight risks for development in these areas, encourage better storm water management practices	Under consideration				

	and calls for flood risk assessments for large projects.					
<b>Practices</b>						
<b>Technologies</b>						<a href="http://www.solaterm.eu">http://www.solaterm.eu</a>
<b><i>Cross cutting activities</i></b>						
<b>Approaches / strategies</b>	The Civil Protection Department of Malta developed a flood warning system giving a warning for a certain amount of precipitation and intensity which will lead to a volume of water that is hazardous for safety of humans in urban and specific areas which are prone to flooding.	Implemented				
<b>Practices</b>	The government is planning a major flood relief project for Birkirkara which will involve the catchment of storm water coming from Mosta, Naxxar, Iklin, Attard and Balzan, its storage in galleries and its use for irrigation. The galleries built recently would be used to carry pipes to pump this water to different parts of Malta where it could be used by farmers. This would	Under consideration				

	mean that less water would be extracted from the aquifer, giving it time to recharge itself in volume and quality.					
<b>Technologies</b>						
<b>Sector: weather monitoring</b>						
<b>Approaches / strategies</b>						
<b>Practices</b>	Activities currently underway mainly involving ongoing monitoring, data storage and forecasting on expected changes in temperature and precipitation, as well as weather forecasting.	Ongoing			Ongoing monitoring is instrumental in predicting heat waves and severe weather.	<a href="http://www.maltairport.com/weather">http://www.maltairport.com/weather</a>
<b>Technologies</b>						

<b>Netherlands</b>	The Netherlands. National Spatial Strategy: Creating space for development. Available at <a href="http://www.vrom.nl/pagina.html?id=2706&amp;sp=2&amp;dn=4179">http://www.vrom.nl/pagina.html?id=2706&amp;sp=2&amp;dn=4179</a> .					
<b>Scope of adaptation action:</b>						
<i>national level</i>						
<b>Approaches / strategies</b>	National Spatial Strategy: Strong emphasis on co-operation with local and regional authorities - Regional plans must include "water test", ensuring that spatial plans consider water management from the start	ongoing				

	Space for the Rivers Policy Programme: - Creation of extra space for rivers to adapt to higher levels of river discharge, thus reducing flooding risk - Zoning of land around major rivers to reduce groundwater and surface water pollution	under implementation				
	Adaptation strategies to reduce risk of coastal flooding: - Restrictions on development near and inside dykes, i.e. expansion ban within 100 metres inside the dykes and 175 metres outside the dykes - Designation of 8 sites along coastal foundations as high-priority for maintenance and improvements to strengthen sea defences	ongoing				
	NBW: Agreement between authorities on incorporating climate change into planning for 2015	ongoing				
<b>Practices</b>						
<b>Technologies</b>	Additional pumping capacity at pumping station IJmuiden (realised 2003)	ongoing				
	Doubling of the	under consideration				

	discharge capacity of the sluices in the Afsluitdijk (IJsselmeer) (planned for 2008)					
	Strengthening of the coastal defence (zwakke schakels) also incorporation sea level rise	ongoing				
	Extension of beach nourishment programme	ongoing				
	Replacement of revetments Oosterschelde and Westerschelde	ongoing				
	Spatial reservation for the coastal zone taking into account a sea level rise of 85 cm and a time horizon of 200 year.	ongoing				

Source: Water-Conference & EEA Questionnaire

**Sectoral level**

<b>Approaches / strategies</b>	The agricultural sector has the responsibility to cope with climate change. This means that farmers should optimize their production process. This involves choices about what to produce and where. The government has an supportive task to provide alternatives through science and	ongoing	It is very important that farmers are well equipped to make micro economic choices. This means that information about the actual impact of climate change in an area, policy actions, and adaptation possibilities are essential.	Identified knowledge gap has not only limits to the possible effects of various management strategies but also included knowledge on when to act or when not to act in order to improve effectiveness of management and policies. These management strategies require a continuous awareness of the		For more information on adaptation practices: The Netherlands Environmental Assessment Agency (MNP) organizes for the Netherlands Ministry of Housing, Spatial Planning and the Environment (VROM) the Scientific Assessment and Policy Analysis programme (WAB)
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	make instruments climate proof. Adapting to changing conditions is to a large extent normal agricultural practice. Dutch farmers have been highly successful in doing so given that they have adequate technical training and financial resources.			possible and actual impacts of climate change and the time frame needed to develop, implement and activate adaptation strategies.		( <a href="http://www.mnp.nl/en/themasites/wab/index.html">http://www.mnp.nl/en/themasites/wab/index.html</a> ) MNP has compiled the report 'Climate adaptation in the Netherlands' this can be found on <a href="http://www.mnp.nl/en/publications/2006/ClimateAdaptationintheNetherlands.html">http://www.mnp.nl/en/publications/2006/ClimateAdaptationintheNetherlands.html</a>
<b>Practices</b>	The Dutch government and the agricultural sector reached agreement on a state guarantee for insurance policies for damage as a result of heavy rainfall. In return the sector will not longer apply for government compensation in the case of an extreme event. As a result crop damage caused by heavy rainfall is an insurable risk in the Netherlands since 2004.	ongoing		There is not enough data available of weather related damages and the changes of this damages as a result of climate change. This makes a sufficient basis for instruments hard.	Rain insurances are ongoing and it's under consideration to enlarge insurance possibilities to damages related to drought, snow and frost events. Studies show that farmers are not using the available tools adequately. It is important to raise the awareness of farmers of the impact of risk exposure has on their business and of the tools they can use to manage these risks	
<b>Sector: water resources</b>						
<b>Approaches / strategies</b>	Water managers throughout the Netherlands, both Rijkswaterstaat for the large river, lake and coastal water systems and the regional Water	ongoing	Attention should be given to the design of suitable strategies in order to integrate successfully water management and nature. Next to the	It is worth looking at the meaning of natural processes for adapting to climate change. Costs will depend on the strategy taken into account. 'More space'	In recent Dutch history, the original surface area of natural river floodplains has decreased by more than 90%, which has contributed to both the	National policy documenta 'Ruimte voor de Rivier', "Zwakke Schakels", can be found on <a href="http://www.vrom.nl">www.vrom.nl</a> . More information about

	Boards for the smaller backwater systems, are currently developing several adaptation strategies, aimed at re-arranging the spatial design of the landscape to enhance its flexibility to retain and store freshwater surpluses at times of high precipitation and/or peak river discharges and, at the meantime, to enhance flow capacities of the river systems to ensure their ability to cope with higher peak discharges.		costs for designing a successful strategy, there will be construction and management costs to take into account.	for water and nature implies the acquisition of land and the potential loss of income due to a change in land use. Due to the high costs of land, the investment costs are expected to be high. Further concerns are future climate changes and the ability to cope with for example more extreme climate scenarios (several metres sea level rise) instead of 85 cm in 2100?	lessened resilience of the river system to high peak discharges and the development of valuable ecosystems and habitats in close proximity to the river that do, however, not allow frequent inundations. Moreover, riverine forests are considered a threat to water quantity managers, because they increase the so-called 'roughness' of the floodplain and thus enhance any occurring discharge peaks. Therefore, although more 'space' for the natural river does offer opportunities for enhancing 'robustness' of riverine nature and opportunities for nature development, the programme as a whole will have to be carefully implemented in order to avoid irreversible damages to existing conservation values.	financing mechanisms and payments/rewards for ecosystem services can be found at <a href="http://www.naturevaluation.org">http://www.naturevaluation.org</a> . Some attempts to involve the private sector have been made within the WINN program ( <a href="http://www.waterinnovatiebron.nl">http://www.waterinnovatiebron.nl</a> ), however the program pertains mainly to the water sector. The general outline of this new concept of water management (Water Management of the 21st Century) is described in a policy paper called 'Treating with water differently'. The water sector is covered by the Climate Adaptation in the Netherlands <a href="http://www.mnp.nl/en/publications/2006/ClimateAdaptationintheNetherlands.html">http://www.mnp.nl/en/publications/2006/ClimateAdaptationintheNetherlands.html</a>
<b>Practices</b>	Used technologies re-enforcement of dikes and embankments) to rather more innovative ways like enhancing					

	the floodplain areas of the rivers (e.g. by re-allocating the dikes of the major embankments) and designate certain rural areas especially for storage of freshwater surpluses					
<b>Technologies</b>	adjustment of retention, storage and discharge systems changing of dredging regimes to maintain navigability modification of sluices and pumping stations adjustment of drinking water systems creation of compartments, to lower the risks of flooding					
<b>Sector: health</b>						
<b>Approaches / strategies</b>	Within the Netherlands the following possible impacts were identified: increase in heat-related mortality, increase of air pollutants; risk of more Lyme disease cases, food poisoning and allergic disorders.	under consideration	Attention should be given to the design of suitable strategies and the integration in to the ongoing health care planning			
<b>Sector: coastal zones (settlements)</b>						
<b>Approaches / strategies</b>	Integrated Coastal management; Sea level rise and flooding are main threats in the	under development		The last decades (since the 1953 flood) the attention was strongly focused on the height		<a href="http://www.verkeerenwaterstaat.nl">www.verkeerenwaterstaat.nl</a>



	coastal areas, especially in low-lying areas. These weak links in coastal areas area addressed by insurance of the safety against flooding by a 'sandy strategy', which is: suppletion of sand in front of the coastline and on beaches.			and the strength of the dikes. However, the economic risk has increased; the economic value of the Netherlands increased with a factor 6 since the fifties. A second factor is the population growth and subsequently, the chance of a larger number of casualties has increased.		
<b>Practices</b>	Re-establishment of the natural dynamics of the dunes. Use of natural areas (e.g. peatlands). These natural areas, besides enhancing the natural functions of the coastline, can increase the water retention capacity of the coastal zone, reduce the risk of salt water intrusion caused by sea level rise (Van Ierland, 2001) and prevent damage to the natural system.	under development				
<b>Technologies</b>	maintaining the shoreline and controlling of coastal erosion rates by dredging and sand supply water level control in polders to prevent increasing salinization and to slow	under development				

	down land subsidence					
<b>Sector: biodiversity, environment</b>						
<b>Approaches / strategies</b>	In order to cope with climate change the connections/corridors between natural reserves are reinforced and enlarged.	under implementation	to examine what provision is already being made to enable biodiversity to adapt to climate change and to identify approaches which can assist wildlife to survive. The aim is to find solutions that minimize the impacts of climate change on biodiversity. The modeled scenarios and potential adaptation solutions will be tested in the province of Limburg and also in other areas in the UK and Germany	Are The Netherlands able to cope with the rapid change of ecosystems? How can we change our 'static' preservation strategy in a more 'dynamic' preservation/migration strategy? The costs for the design and the implementation of a climate change proof National Ecological Network are unknown.		Nota Ruimte, <a href="http://www.vrom.nl">www.vrom.nl</a> Information about ecological network programmes in Central and Northern Europe can be found at <a href="http://iucnce.org/econets/database/">http://iucnce.org/econets/database/</a> . (more information on the monitoring of the effectiveness can be found at <a href="http://branchproject.org/">http://branchproject.org/</a> ). Alterra Green World research is currently analyzing strategies in order to optimize the potential of the NEN under predicted climate change scenarios (more information can be found at <a href="http://www.onderzoekinformatie.nl/en/">http://www.onderzoekinformatie.nl/en/</a> )
<b>Practices</b>	The effectiveness of the ecological networks as adaptation strategy is currently (Branch, INTERREG III project) reviewing policy plans across the UK, France and the Netherlands.	under development				
<b>Technologies</b>						
<b>Sector: transport, built-environment</b>						
<b>Approaches /</b>	Pilot 'building with	under development	A broadly supported	The 'Deltametropool'		

<b>strategies</b>	water' with integrated water management and urban functions. The innovative knowledge development that can be applied in areas at home and abroad with similar problems		design for a "building with water' that sets a good example. A demand driven generation of the knowledge.	in the West of the Netherlands faces a number of problems in the field of water management and use of space that hamper a sustainable solution. 1. space is scarce 2. dehydration or hydration (location dependent) 3. Increasing costs for traditional construction 4. Pilot projects for water-conscious construction get insufficiently off the ground		
<b>Cross cutting activities</b>						
<b>Approaches / strategies</b>	National Spatial Adaptation Strategy to Climate Change (national government in cooperation with waterships, regional and local governments): This strategy focusses on the effects of climate change in the Netherlands, main themes: safety (against flooding), the environment, biodiversity and economic sectors. The strategy is stressing the need for spatial	under development	A successful implementation of the national adaptation policy is depending on awareness/sense of urgency of politicians and society.	Are The Netherlands able to cope with more extreme climate scenarios (several metres sea level rise) instead of 85 cm in 2100.	It is worth looking at the meaning of natural processes for adapting to climate change.	<a href="http://www.versnellingark.nl">www.versnellingark.nl</a>

	adaptation to climate change and is using leading principles in order to spatially adapt to climate change. It also stresses the need for a transition within society (awareness -> action). In 2007 the national government will decide on the national strategy and on a national adaptation agenda.					
	Support to governments in developing countries to develop and implement climate policies. Furthermore climate quick scans have been carried out, this lead to a climate risk scening in three countries: bolivia, bangladesh, Ehtiopie	implemented, follow up under consideration	more support, awareness raising needed from practitioners; making results more tangible and specific; follow up will indicate the succes of the quick scan approach		quick scans seems a good tool to set priorities for adaptation measures at relative low cost, no prescribed tool was used, leaving flexibility for the consultants to work on a taylor made basis, using their own knowledge and experience in development	see the website for more information <a href="http://www.nlcap.net">www.nlcap.net</a>

<b>Portugal</b>						
<b>Scope of adaptation action:</b>						
<i>regional (sub-national) level</i>						
<b>Approaches / strategies</b>	Integration of the General Directorate of Health in the National Committee for					

	Droughts					
	Development of a Contingency Plan for Heath Waves. The main objective is to reduce the morbidity and mortality related to heat waves.					
	Protection of health during cold spells					
<b>Practices</b>	the ones mentioned in the other sheet					
<b>Technologies</b>						
<i>national level</i>						
<b>Approaches / strategies</b>	Integration of the General Directorate of Health in the National Committee for Droughts					
	Development of a Contingency Plan for Heath Waves. The main objective is to reduce the morbidity and mortality related to heat waves.					
	Protection of health during cold spells					
<b>Practices</b>	the ones mentioned in the other sheet					
<b>Technologies</b>						
<i>local (community) level</i>						
<b>Approaches / strategies</b>	Integration of the General Directorate of Health in the National Committee for Droughts					

	Development of a Contingency Plan for Heath Waves. The main objective is to reduce the morbidity and mortality related to heat waves.					
	Protection of health during cold spells					
<b>Practices</b>	the ones mentioned in the other sheet					
<b>Technologies</b>						
<b>Sectoral level</b>						
<b>Sector: health</b>						
<b>Approaches / strategies</b>	Integration of the General Directorate of Health in the National Committee for Droughts, comprising:	Ongoing (the Committee has been set up in 2005)		Lack of epidemiological studies on the effect of droughts on human morbidity and mortality	The articulation between public health services and the entities responsible for the protection of water sources and for water distribution is very important in what protection of health is concerned	1. General Directorate of Health website www.dgs.pt 2. Institute of Water website www.inag.pt 3. Orientation to public health services concerning measures to be taken during drought periods (Orientation issued by the General Directorate of Health numb. 16, 10th of May 2005).
<b>Practices</b>	1. Increased monitoring of the quality of water sources and of the water distributed for consumption					
	2. Inventory of alternative drinking water sources					
	3. Monitoring of the					

	drinking water provided by alternative sources such as water tank trucks and wells					
	4. Increased monitoring of the bathing water quality					
	5. Leaflet for population awareness with recommendations related to: - Disinfection of containers used in the collection of water provided by water tank trucks - Disinfection of water provided by private sources of water such as wells - Risks associated to contaminated bathing areas					Leaflet " Drought, health risks". General Directorate of Health, 2005
	6. Protection of water sources, namely, from leftovers of forest fires and other sources of pollution					
<b>Approaches / strategies</b>	Development of a Contingency Plan for Heat Waves. The main objective is to reduce the morbidity and mortality related to heat waves. The plan includes:	Ongoing (developed in 2004 and updated every year)	Involvement of entities other than the ones indicated, such as the entity that runs private nursery homes.	Lack of epidemiological studies on the effect of heat waves on morbidity and mortality	The involvement of different entities responsible for the protection of the population such as hospitals, health centres, social security (responsible for the protection of the elderly living in nursery homes),	Contingency Plan for Heat Waves. General Directorate of Health.(the plan for 2007 has been approved by the Ministry of Health and will be launched on the 18th of April)

					municipalities (responsible for providing shelters that can be used during heat waves) is crucial for the protection of health	
<b>Practices</b>	1. Participation of other entities responsible for people's protection, such as the Institute of Social Security and the Civil Protection Service					
	2. Development of a heat wave awareness system by the General Directorate of Health and based on information provided by the Meteorological Service (ex. temperatures, UV), the Institute of Environment (ex. trophospheric ozone), the National Institute of Health (responsible for ICARO Index that predicts mortality according to predicted temperatures). The heat wave awareness system comprises 3 levels of alert, corresponding to different actions to be taken by the entities involved.		Improvement of the criteria used for the definition of levels of alert based on the relation among temperatures, ozone and UV levels on morbidity and mortality	Difficulty in establishing criteria for the definition of alerts related to the impacts of temperatures, ozone and UV levels on human health		
	3. Awareness of the population and its					1. Leaflet " Heat: Danger to Health".



	<p>vulnerable groups (elderly, isolated people, people with heart and respiratory diseases), through:</p> <ul style="list-style-type: none"> <li>- leaflets and posters</li> <li>- call centre providing information related to heat waves and recommendations for health protection</li> </ul>					<p>General Directorate of Health.  2. Poster " Heat: Danger to Health. How to protect your health". General Directorate of Health.  3. Call Centre 808 211 311 - Linha Saúde Pública</p>
	<p>4. Implementation of measures by local health services, prior to summer time such as:</p> <ul style="list-style-type: none"> <li>- identification of places that can be used as shelters during heat waves</li> <li>- identification of vulnerable groups such as elderly, people living alone and isolated, people with heart and respiratory diseases</li> <li>- installation of air conditioning in hospitals and health centres</li> <li>- provision of adequate stocks of pharmaceutical products, and human resources during periods of increased number of patients due to heat waves</li> </ul>					

	5. Implementation of measures by local health services during heat waves, such as: - transport of people to shelters - health care in shelters - health protection during special events such as concerts, festivals, sports activities					
	6. New informatic's channels of information between public health services at different geographical levels, to provide information on: - alerts - activities developed by health services related to heat waves such as the ones mentioned above)					
	7. Monitoring of the demand for emergency services in hospitals and health centres during heath periods (this is done through specific software - SINUS and SONHO)		1. Integration of all hospitals and health centres in SINUS and SONHO 2. Identification of the cause of morbidity of people going to emergency services during heat periods	Lack of information concerning the cause of morbidity of people going to emergency services during heat periods		
	8. Monitoring of mortality during heat periods		Identification of the cause of mortality	1. Lack of updated information concerning mortality 2. Lack of information		

				concerning the cause of mortality during heat periods		
	9. Courses for hospitals, health centres, nursery homes and day centres on the identification of health symptoms related to heat and on treatment procedures					
	10. Research on the impact of heat on the elderly living in nursery homes	under development				
<b>Approaches / strategies</b>	Protection of health during cold spells					General Directorate of Health website <a href="http://www.dgs.pt">www.dgs.pt</a>
	Awareness of the population on how to protect their health during cold spells	ongoing				
	Research on the impact of cold on the elderly living in nursery homes	under development				
<b>Technologies</b>						
<b>Sector: water resources</b>						
<b>Approaches / strategies</b>	Legal and institutional systems restructuring, following the approval of a new Water Law; The new legal and institutional framework reinforces the role of economic instruments in water management, promotes stakeholders involvement and	Under implementation		The new legal and institutional framework is the necessary background for effective water management strategy and policies; It does not directly address climate change concerns, vulnerabilities, impacts		<a href="http://www.inag.pt">www.inag.pt</a>

	enhances public awareness and participation			and risks.		
<b>Approaches / strategies</b>	National Adaptation Plan for the Water Resources Sector closely integrated with the National Climate Change Adaptation Plan and the new Generation of River Basin Plans	Under consideration		The success of this approach requires a close integration of several strategies and instruments in order to produce a clear implementation plan with concrete actions to be taken in a wide variety of sectors.		
<b>Approaches / strategies</b>	National Program for an Efficient Use of Water (PNUEA)	Under implementation		The program was not specifically designed as an adaptation strategy but its goals and measures address the demand management concerns .		www.inag.pt
<b>Approaches / strategies</b>	Explicit consideration of Climate Change Scenarios in the new generation of River Basin Plans (PGRH)	Under implementation	A clear, practical and well accepted guide to include climate change concerns in this major water planning exercise is needed.			
<b>Approaches / strategies</b>	Explicit consideration of Climate Change Scenarios in the ongoing restructuring effort of the Water Supply and Drainage Sector (PEASAAR)	Under consideration	A clear, practical and well accepted guide to include climate change concerns in this major construction effort is needed, based on a sound cost-benefit analysis.			
<b>Approaches / strategies</b>	Research and developments efforts on Climate Change, Climate Change Impacts and Adaptation	Ongoing		Mainly performed in universities, sponsored by the European R&D Framework Programs; more applied research		

				is needed.		
<b>Practices</b>	Several ad-hoc specific measures in the licensing, land use management and infrastructure domains which enhance the country adaptation capacity	Under implementation	There is a need to organize these disparate measures in a coherent and permanent strategy.			
<b>Practices</b>	Operational bodies for water management and emergency situation management	Ongoing		Although not a adaptation action it is an existing asset which is crucial to promote climate change adaptation		
<b>Technologies</b>	National Water Resources Monitoring System (SNIRH) and Forecast system (SVARH) for an effective water management policy and for flood and drought forecast and management	Ongoing		Although not a adaptation action it is an existing asset which is crucial to promote climate change adaptation		snirh.inag.pt
<b>Technologies</b>	National Inventory of Water Supply, Drainage and Treatment Infrastructures (INSAAR) for an effective water management policy	Ongoing		Although not a adaptation action it is an existing asset which is crucial to promote climate change adaptation		svarh.inag.pt
<b>Technologies</b>	National Water Usage Licensing System (SNITURH)	Under implementation		Although not a adaptation action it is an asset which is crucial to promote climate change adaptation		

**Sector: coastal zones (settlements)**

<b>Approaches / strategies</b>	The new legal and institutional framework, following the approval of a new Water Law, reinforces the need for a Coastal Authority and a legal instrument is being planned for coastal protection by ruling, among others, land uses in areas directly related with coastal risk of flooding.	Under implementation				
<b>Approaches / strategies</b>	Portugal coast is ruled by Coastal zone management plans, which had already taken in to account studies about flooding risk in coastal areas and other risks related to cliffs and dunes stability. Areas of coastal protecting barriers were established where constructions are not permitted. The principal goal of these plans is the protection of the coastal systems. According with UE, Portugal is working on the approach of Integrated Coastal Zone Management, that recommend a strategic	Ongoing	There is a need to organize all the principle in a coherent and permanent strategy.	The success of this approach requires a close integration of several strategies and instruments in order to produce a clear implementation plan with concrete actions to be taken in a wide variety of sectors.		

	approach and reinforces the importance of promotes stakeholders involvement and enhances public awareness and participation and also the scientific knowledge of the coastal systems.					
<b>Practices</b>	The implementation of the coastal zone management plans depend on several institutions, and government has established "Priorities Plans for 2007-2013", where national priority actions has been identified. There were identified 3 categories of actions: A- Coastal Defence/ Risk Areas; B- Intervention Plans for Requalification of Urban areas, where demolitions are identified; C- Management and Monitoring.	Ongoing	A consideration of climate change concerns in this major effort is needed	The success of the implementation of these actions requires a close integration of several authorities.		
<b>Technologies</b>						
<b>Sector: forests</b>						
<b>Approaches / strategies</b>	National Strategy for Forests:1 Protection of forests against wildfires	Ongoing; Under implementation and development				Resolution of Ministry Conseil 114/2006; <a href="http://www.dgrf.min-">www.dgrf.min-</a>

	<p>(National plan for the protection of forest against wildfires; Fuel management by grazing; Use of biomass as a source of renewable energy); 2 Protection of forests against pests, diseases and invasive species; Restoration of affected ecosystems; 3 Territory specialization; 4 Productive improvement through sustainable forest management (Increase the productivity of forest stands through sustainable management; Increase the productivity of other forest products; Management advisory and support services); 5 Reducing market risks and raising the value of forest products (Forest certification; Raising the value of forest products); 6 General improvement of forest sector efficiency and competitiveness (Information about the sector; Land registry; Sector organization; Sector agents' qualification;</p>					agricultura.pt
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	Application of scientific knowledge); 7 Rationalization and simplification of politic instruments ( Organic, legal and planning instruments; Financial support to competitiveness) 8 Strategy execution (Responsibility matrix and indicators; Evaluation).					
	National Plan for the Protection of Forest against Wildfires: 1. Increase territory resilience against wildfires; 2.Reduction of Fires incidence; 3.Improve the efficiency and organization of attack.	Ongoing; Under implementation and development				www.dgrf.min-agricultura.pt;
<b>Sector: agriculture</b>						
<b>Technologies</b>	Implementation of several new irrigation schemes, private or collective	under implementation				
	Rehabilitation of existing irrigation schemes to improve irrigation efficiency	under implementation				
	Groundwater abstraction for animal husbandary in drought conditions	under implementation				

<i>Cross cutting activities</i>						
<b>Approaches / strategies</b>	Portuguese National Action Program to Combat Desertification - Axes of intervencion: Soil and water conservation; Recovery of areas most threatened by desertification; Research, experimentation and diffusion; Ensuring that desertification is included in development policy; implementation, monitoring and assessment.	Ongoing; Under implementation and developmen				<a href="http://www.dgrf.min-agricultura.pt">www.dgrf.min-agricultura.pt</a> ; <a href="http://panda.igeo.pt/pand/">http://panda.igeo.pt/pand/</a> ; <a href="http://www.unccd.int/main.php">http://www.unccd.int/main.php</a>

<b>Romania</b>						
Scope of adaptation action:						
<i>national level</i>						
<b>Approaches / strategies</b>	National Action Plan on Climate Change (2005); highlights the need for an Action Plan on Adaptation by 2007	under consideration				Source: Water-Conference & EEA Questionnaire
<b>Approaches / strategies</b>	Research National Program to asses the Romanian agroclimatic potential and establishing the	under consideration (proposal for a reserch project in the framework of the National Research Plan	to strenghten the relationship between research units and the beneficiaries of the results;	limited human and co-financing resources, difficulties in involving young researchers	the number of projects in competition is big comparing with the allocated financial resources	

	favorableness for the main crops in order to initiate a sustainable management system in the agricultural domain, according current climate and climate change scenarios	Partners: National Meteorological administration, Agricultural and Forestry Science Academy and other Agricultural Reserch Units located in different climatic areas				
<b>Practices</b>	A new agro climatic mapping "AROCLIMA ROMANIA" containing a new regionalization and classification of vulnerable areas to extreme events, with different risk degrees, e.g. degree I - when more than 3-4 limitative conditions are meat in the same time (high temperatures, low precipitations, drought seasons, most vulnerable areas to drought	under consideration	ToRs, Programme draft, identification of fincing sources (internal, external)			
<b>Technologies</b>	implementation of "dry-farming" technologies in the most vulnerable areas to drought: to develop crop schemes, with better limitative	under consideration	the necessity to change the structure of crop systems	limited collaborationbetween authorities, limited awareness of farmers	to early to comment	

	climate conditions tolerance					
<b>regional level</b>						
<b>Approaches / strategies</b>	the implementation of pilot studies, CEEX, INISA Project, 2006-2008	ongoing	the identification and development of researches based on environmental friendly technologies and bioresearches, in order to be used in economic activities	low institutional collaboration being a new technology, there were difficulties to raise awareness of potential beneficiaries	need to increase the institutional cooperation	the project was presented as a case study in WG1/Crissoupolis-INTERREG IIB-ACCRETE <a href="http://www.accrete.eu">http://www.accrete.eu</a>
<b>Practices</b>	the use of wind energy for the irrigation of the drought vulnerable areas	under implementation a study was developed in order to identify the areas with wind potential < 4m/s and vulnerable to drought	to organise a successful awareness campaign to ensure a funding system in order to allow the farmers to use this system	limited financial resources for farmers farmers limited access to information and difficulties in the dissemination of the results of the project	to early to comment	the results will be disseminated in 2008, by workshops and meeting with farmers to make them aware about the benefits of such a system.; a dedicated webpage will be created (INCAS CO))
<b>Technologies</b>	wind meals to be placed in areas with wind potential < 4m/s and vulnerable to drought, the irrigated surface < 1ha	under consideration the system will be tested	to organise a successful awareness campaign to ensure a funding system in order to allow the farmers to use this system	limited financial resources for farmers farmers limited access to information and difficulties in the dissemination of the results of the project	to early to comment	the results will be disseminated in 2008, by workshops and meeting with farmers to make them aware about the benefits of such a system.; a dedicated webpage will be created (INCAS CO))
<b>local (community) level</b>						
<b>Approaches / strategies</b>	River basin management plans					
	Specialised assistance dedicated to local communities regarding the adaptation of the	ongoing	Meeting with "end-users", awareness campaign	"users perception"	Change of the "attitude" toward environment, reorientation toward	<a href="http://www.accrete.eu">http://www.accrete.eu</a> <a href="http://.accrete.inmh.ro">http://.accrete.inmh.ro</a>

	technologies and agricultural practices to climate change - Attitude Code for Farmers				unconventional resources valorification, bio-ecological	
<b>Practices</b>	Chapter 3 of the "Attitude Code for Farmers" contains brief description of practices, benefits and dangers. Topics: soil and land use, water management in agriculture, diseases and pests.	ongoing	Evaluation on current studies in this field, cross-cutting analyses and options selections.	high number of studies, different references periods, the necessity of regional approach and evaluation based on reference indicators		<a href="http://www.accrete.eu">http://www.accrete.eu</a> <a href="http://accrete.inmh.ro">http://accrete.inmh.ro</a>
<b>Technologies</b>	Minimum tillage system bio-ecological land works	ongoing	Evaluation on current studies in this field, cross-cutting analyses and options selections.	high number of studies, different references periods, the necessity of regional approach and evaluation based on reference indicators		<a href="http://www.accrete.eu">http://www.accrete.eu</a> <a href="http://accrete.inmh.ro">http://accrete.inmh.ro</a>
<b>Sectoral level</b>						
<b>Sector: agriculture</b>						
<b>Approaches / strategies</b>	Assessment of climate change impact on agriculture, recommendations for good practices to mitigate effects of climate change, to combat drought and desertification, and to efficient water use in agriculture. Ongoing projects: ACCRETe: "Agriculture and Climate Changes: how to Reduce human	- under implementation	Improve the international collaboration through research projects and increase technology transfer by experience exchange		integration of the agro meteorological stations in a unique network that allows centralized collection of data, analysis, and interpretation is crucial for climate change impact assessment; periodical training of the agro meteorologists and efficient dissemination of the information to end-users are key factors	<a href="http://www.accrete.eu">http://www.accrete.eu</a> <a href="http://www.cecilia-eu.org/">http://www.cecilia-eu.org/</a>

	Effects and Threats” - 2005 – 2007, INTERREG III B CADSES, Measure 4.2.: “Promoting risk management and prevention of disasters”; CECILIA: “Central and Eastern Europe Climate Change Impact and Vulnerability Assessment”, SIXTH FRAMEWORK PROGRAMME, Sub-priority 1.1.6.3 “Global Change and Ecosystems”				for success of adaptation measures	
	Research sectoral programmes aimed to the elaboration of specialized agricultural systems/reference climatic regions taking into account their vulnerability to extreme events and impact on vegetal production. Changes of the crop systems and structure, obtaining new genotypes with high tolerance to extreme events, annual planning and establishing of the crops, including plant species and hybrids with different	under consideration	Assessment of the needs based on dedicated surveys, to support technology adaptation measures and their implementation Farmers access to information and their level of knowledge on adaptation to climate change	to early to comment		

	vegetation periods					
	Improve land management approaches and planning at local, regional and national scale towards "climate neutral" land use patterns	under consideration	review research results, promote appropriate legislation, produce guidelines for decision makers at different levels financial incentives for afforestation of degraded lands of private land owners, improve the share of forest area in poor forest regions	low capacity to manage the private sector in agriculture, sectoral thinking, unclear ownership of land, lack of cadaster, expensive maps and databases. Lack of training programs and integration of sectors activity		
	National Action Plan on Adaptation	under development	strengthening cooperation between involved authorities			
<b>Practices</b>	Monitoring of meteorological parameters (160 weather stations) and agro meteorological parameters at 55 stations with agro meteorological program, for the most important agricultural crops (winter wheat, maize, sunflower, potato, fruit-trees, etc.); Research and elaboration of case-studies related to climate-change impact on agriculture and environment. Training of agro meteorology specialists in the framework of National	- under implementation	Develop the best practices guides for farmers to increase the awareness of climate change threats for agriculture; Increase the communication and feed-back level with end-users.	Limited man/hour resources and difficulties in covering with accurate observations large agricultural areas		

	School of Meteorology (NSM). Dissemination of information to end-users and decision factors.					
<b>Technologies</b>	Measurements at 160 meteorological stations (89 automatic and 71 classical). In-situ measurements of soil-moisture using portable dielectric probes, in platforms with the major crops (wheat, maize) where also phelological observations are performed. State of the art communication network (for data, voice, fax, e-mail, video). Use of simulation models for crop-weather relationships in order to assess the impact of climate change on yield and plant water use: CERES DSSAT, CROPWAT, HYDRUS. Use of GIS and remote sensing tools to determine spatial variability of agro meteorological parameters: (NDVI maps, thematic map layers).	- ongoing - under implementation	Continue the development of a reliable meteorological observation network including automated stations with real-time observations and a good spatial representation; Improve and develop methodologies of data collection and processing procedures (instrument calibration, data collection and storage, accuracy and quality control of observations, data flow, etc); Improve the analysis and modeling of long-term observations and agro-climatic data in order to establish the risk factors and to spot the areas with high vulnerability;			
	crop rotation, dropping	under development	specific data bases,	access to equipment	too early	



	irrigation, ferti-irrigation (Code of good practices)		validation and implementation	and specialized instalation		
<b>Sector: water resources</b>						
<b>Approaches / strategies</b>	SOP Environment - Priority Axis 5 "Implementation of adequate infrastructure of natural risk prevention in most vulnerable areas" Objectives: Contribute to a sustainable flood management in most vulnerable areas	under aproval				www.mmediu.ro
	Central and Eastern Europe Climate Change Impact and Vulnerability Assessment/	Under development	From the impact viewpoint, the most important sectors for the economies and welfare of individual region will be selected			www.mmediu.ro
	Flood Risk Management Strategy (short term)	under implementation	From the impact viewpoint, the most important sectors for the economies and welfare of individual region will be selected	A short term Investment strategy was developed and now we are under the process of rizing funds	For flood prevention, implementing the strategy , mair and prefect manuals were developed and a training programme was prepared. The flood action plan was established for preparing the population for flood management. 40 ecocenters for training children were established in schools and summer scools are	www.mmediu.ro

					planned for environment applications.	
	Drought management strategy	Under development				
	Hazard Risk Mitigation & Emergency Preparedness Project Through its components the project will: 1) strengthen and enhance the capacity of Romanian authorities to better prepare for, respond to, and recover from natural or man-made disasters, through modernization of information technology and communications systems, public awareness and preparedness, and technical feasibility work, and institutional framework for launching of the Romanian Catastrophe Insurance Program; 2) reduce flood risk and vulnerability in critical areas in Romania, to improve safety of large and small dams, in order for these to function as designed, and, to map and model the risk of landslides, so as to reduce losses,	under implementation (IBRD support) 2004-2009				

	providing better land use planning tools;					
	Ecological and economic re-shaping Programme in the Romanian sector of Danube Meadow and its financing; the Programme aims at the strategic coordination, at the level of the entire Romanian sector of Danube, of the investment works to prevent and fight floods, as well as of the future economic development measures.GD on the approval	under implementation				
	Flood Risk Management Strategy (long term)	to be prepared with PHARE assistance				
<b>Practices</b>	<ul style="list-style-type: none"> <li>• Collecting, assess and make available for first local impact studies the scenarios and climate simulations;</li> <li>• Adaptation and development very high resolution RCMs for the region (10 km grid spacing);</li> <li>• Verifying the model results, compare RCM and statistical downscaling results analyze and develop</li> </ul>	Under development	For the quantitative estimation of the climatic change impact upon the water resources, the following steps can be taken: - the use of a general atmospheric circulation model allowing the estimation of the changes of the main climatic parameters considering certain	Short time series of hydrological data, limits of hydrological modeling using te global models results (different scales and different precisions)	The researches on other hydrographic basins located in hill and flat areas emphasise the following modifications of the hydrological cycle due to the climatic changes: - the increase of the evapotranspiration especially in the summer months due to the increase of the air temperature; - the reduction of the	<a href="http://www.inmh.ro/cercetare/schimbari_climatice">www.inmh.ro/cercetare/schimbari_climatice</a>

	<p>the methods for verification;</p> <ul style="list-style-type: none"> <li>• Estimation the effect of global climate change on the occurrence of extreme events (heavy precipitation, heat waves, droughts) in the region;</li> <li>• Evaluation uncertainties in regional climate change projections;</li> <li>• Assessment of the impacts of climate change on the hydrological cycle and water resources over selected catchments in the region; to study the effects of climate change on the Black Sea</li> <li>• To study the impacts of climate change on agriculture and forestry;</li> <li>• To study the impacts of climate change on health and air quality;.</li> </ul>		<p>scenarios;</p> <ul style="list-style-type: none"> <li>- the comparison and corroboration of the climatic model outputs with the evolution trends of the climatic parameters obtained on the basis of by processing long climatological observation series;</li> <li>- the use of a rainfall-runoff mathematical model applied in two cases: stationary regime and changing regime of the climatic conditions.</li> </ul> <p>Centralized water supply of localities using the water treatment procedures for cleaning water during low flows and when rivers are polluted during floods Small plants cleaning locally water and biological treatment procedures to avoid soil and groundwater pollution.</p>		<p>depth and duration of the snow cover due to the increase of the air temperature during winter time. This will lead to the reduction of the pollution risk due to the stagnation of the pollutant agents in the snow cover;</p> <ul style="list-style-type: none"> <li>- the reduction of the mean runoff on rivers by 10-20% due especially to the increase of the evapotranspiration;</li> <li>- the early occurrence of the floods and the reduction of the mixed spring floods (snow and rain) by the desynchronisation of the snow melting with the rainfall occurrence;</li> <li>- the decrease of the soil moisture leads to the reduction of the minimum runoff (in the summer and autumn months) fact which contributes to the increase of the pollution frequency and restrictions of the water supply.</li> </ul> <p>The results of the researches carried out on the impact of the climatic changes on the</p>	
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					<p>water resources involve the consideration of the following aspects:</p> <ul style="list-style-type: none"> <li>- the development of new criteria and techniques for the designing of hydraulic structures to make the water management systems more sensitive to the modifications of the hydrological regime, due to the impact of the climatic variability and climatic changes;</li> <li>- the elaboration of the new procedures for the operation of the water management systems to take into consideration the uncertainty of the hydrological regime evaluation, due especially to the climatic changes;</li> <li>- the development of researches on the impact of the climatic changes on the water quality.</li> </ul>	
<b>Technologies</b>				<p>Taking into account the monthly flow estimated as trend of demands in future for agriculture, industry and water supply under the circumstances of the</p>		

				<p>climate change, a water balance “resources-demand” model (Amaftiesei, 1988) was applied. This model allows the simulation of some storage reservoir exploitation according to some pre-established scenarios. For each time step the model applies the balance equation for each storage reservoir in the cascade from upstream to downstream.</p> <p>The application of this model results in the assessment of the vulnerability for the analysed basins: Arges River, Siret River and Târnava River.</p> <p>Taking into account the existing water management works, the climate change impact is sensitive only for the Arges River Basin, one of the most important from economico-social development and environmental issues.</p> <p>The capital of Romania - Bucharest City (about 2,000,000 inhabitants) is located within the Arges River Basin. The</p>		
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				<p>adaptation measures proposed in this basin referee to:</p> <ul style="list-style-type: none"> <li>• Non structural measures: Newly proposed operational rules for the strategic reservoir Vidraru (live storage 420•106 m3) according to the time development of the user demands combined with a gradual reduction of the water loses in the water supply network.</li> <li>• Structural measures: From a certain number of reservoirs and water diversion works possible to be built in the future 15 combinations of the most economical ones have been analysed. On the basis of an economic analysis 3 sets of combinations have been selected</li> </ul>		
<b>Sector: health</b>						
<b>Approaches / strategies</b>						
	National Action Plan on Adaptation	under development	strenhtening cooperation between involved authorities			
<b>Practices</b>						
<b>Technologies</b>						

<i>Sector: coastal zones (settlements)</i>						
<b>Approaches / strategies</b>	SOP Environment: Priority Axis 5 "Implementation of adequate infrastructure of natural risk prevention in most vulnerable areas": Objective: ensure protection and rehabilitation of Black Sea shore	under aproval				
	Master Plan and Programme for Romanian Black Sea Coast protection with the horizon time by 2020 is . Feasibility studies are currently being prepared with JICA support.	near completion				
<b>Practices</b>						
<b>Technologies</b>						
<i>Sector: biodiversity, environment</i>						
<b>Approaches / strategies</b>	Update national forest inventory (NFI)	ongoing	NFI outputs must be integrated in the decision making system	Absence of GHG approach in current forest management, agriculture practices. Low understanding of the connection between NFI and GHG reporting. Institutional inconsistency in financial support of the NFI activities	Based on another countries, NFI is able to provide independent forest related data for the purpose of GHG inventory under UNFCCC, mandatory and supplementary reporting under KP	
	National Action Plan on Adaptation	under development	strengthening cooperation between			



			involved authorities			
<b>Practices</b>	aforestation of degraded lands and establishment of forest belts	under implementation				
	Develop research on the adaptability of forest species to climate change and integrate them in technical recommendations	under implementation				
<b>Technologies</b>	Review the ability of local population to manage the drought issues and encourage the use of traditional	under implementation				
<b>Sector: transport, built-environment</b>						
<b>Approaches / strategies</b>	adapting waterway infrastructure and management of waterways	under implementation				
	National Action Plan on Adaptation	under development	strengthening cooperation between involved authorities			
<b>Practices</b>						
<b>Technologies</b>						
<b>Cross cutting activities</b>						
<b>Approaches / strategies</b>						
<b>Practices</b>						
<b>Technologies</b>						

<b>Slovenia</b>						
<b>Scope of adaptation action:</b>						
<i>national level</i>						
<b>Approaches / strategies</b>	Strategies for flood and drought mitigation under National Environmental Programme (determination of risk areas, regulation of land use)	ongoing				
<b>Practices</b>						
<b>Technologies</b>						
Source: Water-Conference & EEA Questionnaire						

<b>Spain</b>						
<b>Scope of adaptation action:</b>						
<i>regional level</i>						
<b>Approaches / strategies</b>	Iberoamerican Programme on Impacts Assessment, Vulnerability and Adaptation to Climate Change (PIACC), in the framework of the Iberoamerican Network of Climate Change Offices (RIOCC). Reference document of the PIACC can be downloaded from: <a href="http://www.mma.es/por">http://www.mma.es/por</a>	ongoing under development	Strengthening of the institutional frameworks; Search for synergies with regional institutions and initiatives working on adaptation to climate change in Ibero America; Support climate and climate change research, and systematic observation; Empower exchange and availability of	One of the challenge of the PIACC is the identification of trans-boundary projects, trans-sectorial projects and/or pan-sectorial projects. Other important issues for the Programme is to promote an Outreach strategy, in order to inform and communicate the activities of the PIACC	The Programme has identified the map of priority sectors and systems in the region by means of a structured stock taking process. The report of this analysis can be downloaded from: <a href="http://www.mma.es/portal/secciones/cambio_climatico/areas_tematicas/cooperacion_cc/coop_iber/piacc.htm">http://www.mma.es/portal/secciones/cambio_climatico/areas_tematicas/cooperacion_cc/coop_iber/pdf/analisis_piacc</a>	In the following website of the Spanish Ministry of the Environment ( <a href="http://www.mma.es/portal/secciones/cambio_climatico/areas_tematicas/cooperacion_cc/coop_iber/piacc.htm">http://www.mma.es/portal/secciones/cambio_climatico/areas_tematicas/cooperacion_cc/coop_iber/piacc.htm</a> ) you can find complete information about the PIACC.

	tal/secciones/cambio_climatico/areas_tematicas/cooperacion_cc/coop_iber/pdf/marco_piacc.pdf		knowledge, experiences, methods and tools to evaluate impacts, vulnerability and adaptation to climate change; Promote the development of participative projects on adaptation to climate change in priority sectors and systems	and to produce periodically evaluation reports compiling the outcomes from the PIACC on the impacts, vulnerability and adaptation to climate change in Ibero America	.pdf. Annual meetings of the RIOCC allow permanent coordination and reporting on progress, fulfilling the aim of the Network to serve as an instrument for exchanging knowledge and experiences within the Iberoamerican Climate Change Offices. Besides this, the PIACC can contribute to climate change adaptation issues within the UNFCCC framework, due to the multiple connexions between adaptation initiatives carried out under both initiatives. A strong point of the PIACC is its high level political support from all the Environmental Ministers of the region.	
<b>Practices</b>						
<b>Technologies</b>						
<i>national level</i>						
<b>Approaches / strategies</b>	National Adaptation Programme to Climate Change (PNACC)	ongoing	To develop elements, methods and tools in order to enhance adaptation to climate change capacity in all those public administrations, institutions and private	There are many initiatives and projects ongoing to assess climate change impacts in different sectors and systems without coordination among them; Raising awareness,	PNACC has only recently been implemented, (2006), after a wide public participatory process and a strong administrative coordination scheme,	<a href="http://www.mma.es/portal/secciones/cambio_climatico/areas_tematicas/impactos_cc/pnacc.htm">http://www.mma.es/portal/secciones/cambio_climatico/areas_tematicas/impactos_cc/pnacc.htm</a>

			organization with responsibility in planning and management sectors and systems potentially affected by climate change. To coordinate all those actives in the field of assessing climate change impacts. To promote participation processes among all stakeholder involved (at national, regional and local level, public or private) to establish the better adaptation options to climate change. To mainstream climate change in all activities at national, regional and local levels	Capacity building;	which provide it a strong support. Four main activities are in the First Programme of Work: generation of regional climate change for Spain, assessment of climate change impacts in water resources, assessment of climate change impacts in coastal areas and assessment of climate change impacts in the Spanish biodiversity.	
	Coordinated Programme between National and Regional Spanish Governments on Climate Change Impacts and Adaptation R&D	under development	Coordination among the National and Regional Governments in R&D issues retated to climate change impacts, vulnerability and adaptation assessment in key sectors. This initiative belongs to the general framework of the PNACC.	Coordination among all R+D groups at regional and national level is fundamental to avoid duplicated efforts.	The Programme is in its first stage	
<b>Practices</b>						
<b>Technologies</b>						

<i>local (community) level</i>						
<b>Approaches / strategies</b>	Spanish Network of Cities for Climate	ongoing and under development	Willingness of local policymakers to consider climate change as a priority in their cities.	Most of the ongoing activities of the network are focused to mitigation rather than adaptation. Local policymakers awareness need to be done in order to increase adaptation activities and mainstream them in all the activities at local level.	Outreach activities, local strategies against climate change, water save management plan in several cities are some experiences that have been carried out under this network	<a href="http://www.redciudadesclima.es/The-Network_en.html">http://www.redciudadesclima.es/The-Network_en.html</a>
<b>Practices</b>						
<b>Technologies</b>						
<i>Sectoral level</i>						
<i>Sector: agriculture</i>						
<b>Approaches / strategies</b>	Coordinated Programme between National and Regional Spanish Governments on Climate Change Impacts and Adaptation R&D	under development	Consolidate research groups into core groups and guide research activities to obtain the expected results for the policymakers: Identification, recopilation, database management; observed climate change impacts analysis; assessment of future climate change impacts; identification of the most vulnerable subsectors and geographic areas; possible adaptation options and relationship among the	Coordination among all R+D groups at regional and national level is fundamental to avoid duplicated efforts.	The Programme is in its first stage	

			sectors considered in the Coordinated Programme (Agriculture, Health, Tourism and Forest) and the different phases of the Spanish National Adaptation Programme to Climate Change (PNACC).			
<b>Practices</b>						
<b>Technologies</b>						
<b>Sector: water resources</b>						
<b>Approaches / strategies</b>	First Programme of Work of the Spanish National Adaptation Programme to Climate Change (PNACC).	under development	Coordination among this sector and the crosscutting issues of other sectors is a priority. It is also essential to share common input climate data for running the different sectoral models in the PNACC. The output data from the Climate Scenarios Development will be the input data for water resources models.	Water resources models use higher resolution than the resolution of the regional scenarios. Socioeconomic scenarios along 21st century also necessary at high resolution	The project has a strong institutional coordination which support its development	<a href="http://www.mma.es/portal/secciones/cambio_climatico/areas_tematicas/impactos_cc/pnacc.htm">http://www.mma.es/portal/secciones/cambio_climatico/areas_tematicas/impactos_cc/pnacc.htm</a>
<b>Practices</b>					Adaptation to climate change is being mainstreaming into the main planning instruments for water resources in Spain: specific references have been introduced in Technical Guidelines	

					for Water Planning in Spanish River Basins and specific consideration of climate change have been included into the Special Plans for Management of Drought in major river basin in Spain	
<b>Technologies</b>						
<b>Sector: health</b>						
<b>Approaches / strategies</b>	Coordinated Programme between National and Regional Spanish Governments on Climate Change Impacts and Adaptation R&D	under development	Consolidate research groups into core groups and guide research activities to obtain the expected results for the policymakers: Identification, recopilation, database management; observed climate change impacts analysis; assessment of future climate change impacts; identification of the most vulnerable subsectors and geographic areas; possible adaptation options and relationship among the sectors considered in the Coordinated Programme (Agriculture, Health, Tourism and Forest) and the differents phases of the Spanish	Coordination among all R+D groups at regional and national level is fundamental to avoid duplicated efforts.	The Programme is in its first stage	

			National Adaptation Programme to Climate Change (PNACC).			
<b>Practices</b>						
<b>Technologies</b>						
<b>Sector: coastal zones (settlements)</b>						
<b>Approaches / strategies</b>	First Programme of Work of the Spanish National Adaptation Programme to Climate Change (PNACC).	under development	Coordination among this sector and the crosscutting issues of other sectors is a priority.	There are many actors at all levels (national, regional, local) involved in the planning and management of coastal areas that need strong coordination.	Many outcomes have been developed under this study, mapping the impacts in relative big segments of the Spanish coastline. Local climate change effects have to be studied taking into consideration the specificities of single locations.	<a href="http://www.mma.es/portal/secciones/cambio_climatico/areas_tematicas/impactos_cc/pnacc.htm">http://www.mma.es/portal/secciones/cambio_climatico/areas_tematicas/impactos_cc/pnacc.htm</a>
<b>Practices</b>					The Central Government with responsibility of planning and management of coastas áreas (General Directorate of Coast from the Ministry of Environment) has included in its main planning instrument, the Management Director Plan for the Coast, the consideration of climate change impacts and vulnerabilities.	
<b>Technologies</b>						



<b>Sector: biodiversity, environment</b>						
<b>Approaches / strategies</b>	First Programme of Work of the Spanish National Adaptation Programme to Climate Change (PNACC).	under development	Connect the results in the identification of the most vulnerable habitat and taxa to climate change with the policies and measures for nature conservation in Spain, taking into account the distribution of competences and responsibilities in this field at national, regional and local levels	There are multiple pressures factors to biodiversity and climate change is only one of them		<a href="http://www.mma.es/portal/secciones/cambio_climatico/areas_tematicas/impactos_cc/pnacc.htm">http://www.mma.es/portal/secciones/cambio_climatico/areas_tematicas/impactos_cc/pnacc.htm</a>
<b>Practices</b>						
<b>Technologies</b>						
<b>Sector: Forest</b>						
<b>Approaches / strategies</b>	Coordinated Programme between National and Regional Spanish Governments on Climate Change Impacts and Adaptation R&D	under development	Consolidate research groups into core groups and guide research activities to obtain the expected results for the policymakers: Identification, recopilation, database management; observed climate change impacts analysis; assessment of future climate change impacts; identification of the most vulnerable subsectors and geographic areas; possible adaptation options and relationship among the sectors considered in	Coordination among all R+D groups at regional and national level is fundamental to avoid duplicated efforts.	The Programme is in its first stage	

			the Coordinated Programme (Agriculture, Health, Tourism and Forest) and the different phases of the Spanish National Adaptation Programme to Climate Change (PNACC).			
<b>Practices</b>						
<b>Technologies</b>						
<b>Sector: Tourism</b>						
<b>Approaches / strategies</b>	Coordinated Programme between National and Regional Spanish Governments on Climate Change Impacts and Adaptation R&D	under development	Consolidate research groups into core groups and guide research activities to obtain the expected results for the policymakers: Identification, recopilation, database management; observed climate change impacts analysis; assessment of future climate change impacts; identification of the most vulnerable subsectors and geographic areas; possible adaptation options and relationship among the sectors considered in the Coordinated Programme (Agriculture, Health, Tourism and Forest) and the different phases of the Spanish	Coordination among all R+D groups at regional and national level is fundamental to avoid duplicated efforts.	The Programme is in its first stage	

			National Adaptation Programme to Climate Change (PNACC).			
<b>Practices</b>						
<b>Technologies</b>						
<b>Sector: Climate Scenario Development</b>						
<b>Approaches / strategies</b>	First Programme of Work of the Spanish National Adaptation Programme to Climate Change (PNACC).		As a first step in the PNACC, it is essential the development of future climate change scenarios for Spain. Various AOGCM models and the application of different downscaling techniques to these models to obtain regional and local data which will be used as input for the impacts models of the different sectors and systems initially identified in the PNACC.	Time constrains, spatial resolution, uncertainties are some of the problems identified for this sector.	In the first stage, already finished, a collection of regional climate scenarios have been compiled and made available to the impact assessment community, and for the next stage a coordinated programme with the Spanish research community active in this field will participate in the generation of better regional climate change scenarios	<a href="http://www.inm.es; http://www.mma.es/portal/secciones/cambio_climatico/areas_tematicas/impactos_cc/pnacc.htm">www.inm.es; http://www.mma.es/portal/secciones/cambio_climatico/areas_tematicas/impactos_cc/pnacc.htm</a>
<b>Practices</b>						
<b>Technologies</b>						

<b>Sweden</b>						
<b>Scope of adaptation action:</b>						
<i>national level</i>						
<b>Approaches / strategies</b>	Survey on vulnerability of society	ongoing				
	Permit system for water users	ongoing				

<b>Practices</b>						
<b>Technologies</b>						
Source: Water-Conference & EEA Questionnaire						
<b>Sectoral level</b>						
<b>Cross cutting activities</b>						
<b>Approaches / strategies</b>	<p>The Commission on Climate and Vulnerability</p> <p>Internet-based adaptation Guideline</p>	<p>Commissioned by the Government the vulnerability of the society due to the climate change is investigated. The commission will calculate the costs of damage, propose actions to decrease vulnerability of the society and estimate the costs and describe the needs for organisational changes and better preparations at authorities. The commission will also analyse the needs for more research and propose legislation when needed. The commission will leave its recommendations the 1st of October 2007 and serve as a ground for a Swedish National Adaptation Strategy.</p> <p>The Swedish EPA is coordinating a joint inter-sectoral adaptation network</p>				

		<p>with the National Board of Housing, Building and Planning, the Swedish Rescue Services Agency, the Swedish Meteorological and Hydrological Institute and the Swedish Geotechnical Institute. The aim is to promote and develop the adaptation work in Sweden. In this context the agencies are developing a Internet-based Guideline for adaptation in order to stimulate the local and regional level, mainly the municipalities and CABs, in their adaptation work. The webb-site encourage the municipalities and CABs to develop local and regional adaptation strategies and to integrate the needs for adaptation in the daily work in different sectors. The webb-site will be launched in summer 2007.</p>				
<b>Practices</b>	Local and regional adaptation actions	In some counties and municipalities there are already an adaptation				

		work going on and measures has been taken to adapt. These counties and municipalities are often already affected by the climate change e.g. by floodings, landslides or storms.				
<b>Technologies</b>	Constructing barriers to protect cities against the sea, lakes and streams. Upgrading dimensions for drain and sewage system, strengthen roads and railroad embankment and bury electric cables. Ascend the lowest level for buildings in the spatial planning	Depending on municipality or county: - Ongoing - Under implementation - Under development - Under consideration				

<b>United Kingdom</b>						
<b>Scope of adaptation action:</b>						
<b><i>regional (sub-national) level</i></b>						
<b>Practices</b>	The 4-year ESPACE (European Spatial Planning: Adapting to Climate Events) project aims to promote awareness of the importance of adapting to climate change and to recommend that it is	Under implementation.	Input from 4 European partners to ensure best practice is shared. These then need to be communicated effectively to planners and policy makers throughout the EU	Such a multi national approach could lead to generic guidance which is difficult to apply to each member state involved. This is recognised by the project and through country level projects it	Very useful to draw on the expertise of other countries, as it challenges fundamental planning approaches due to the diversity of historical influences on each countries planning systems.	<a href="http://www.espace-project.org/">http://www.espace-project.org/</a> The ESPACE project will be launching the Common Transnational Strategy and Policy Guidance at a conference being held in London on

	incorporated within spatial planning mechanisms at local, regional, national and European levels. Funded by INTERREG NW Europe and UK Department for Communities and Local Government.			hopes to overcome this issue.		29th June 2007
	The BRANCH (Biodiversity Requires Adaptation in Northwest under a CHanging climate) project advocates change to the spatial planning and land use systems to allow wildlife to adapt to climate change, demonstrating the need for change based on science, and recommending policies and tools to be developed in collaboration with planners. BRANCH is funded by INTERREG NW Europe.	Under implementation - completion: September 2007.	Embedding of conclusions and recommendations of BRANCH project into planning policy at European, national, regional and local levels. Implementation of policies and mechanisms already available to planners to increase biodiversity's robustness to climate change.	Lack of understanding and mechanisms within planning community to implement policies which will conserve biodiversity in the future. Timescales in planning decisions are not in tune with climate change timescales.	Planners require clear, implementable, prioritised recommendations. The importance of biodiversity can be promoted through its wider benefits to society.	<a href="http://www.branchproject.org.uk">www.branchproject.org.uk</a>
<b>national level</b>						
<b>Approaches / strategies</b>	Adaptation Policy Framework (APF). Co-ordination of adaptation activities across UK Government,	Under development.	This is a cross-Government framework for incorporating adaptation into climate-sensitive policies and	That climate change is viewed as an environmental (as opposed to cross-sectoral) issue by other Departments - although	Phase 1 public consultation of APF ended in 2006. A second phase of consultation, based on analysis of activities	<a href="http://www.defra.gov.uk/environment/climatechange/uk/adapt/policyframe.htm">http://www.defra.gov.uk/environment/climatechange/uk/adapt/policyframe.htm</a> Pages 132-133 of UK Climate Change

	<p>involving: comprehensive coverage of sectors; coherent approach across departments, levels of government, and wider public sector; provision of strategic direction, without duplication of existing efforts; definition of roles and responsibilities; provision of sound evidence base for decision-making; identification of threats and opportunities.</p>		<p>plans, and therefore buy-in from officials and ministers in all Departments across Government is essential for delivery. Sufficient staff and other resources are necessary to manage the time-consuming process of arranging meetings, facilitating cross-Departmental discussions, publishing reports, etc.</p>	<p>this is an increasingly outmoded view in UK Government. That appropriate and proportionate resources are not targeted towards ensuring climate-sensitive areas are adapted. Climate change will change the type and severity of impacts which we should plan to respond to. The normal approach for contingency planning in the UK is to adopt an all-hazards approach and prepare a response which is flexible and can be ramped up, if necessary. However, not all planners would be able to claim that they had an understanding of how climate change may pose problems. All levels of Government (and all Departments) need to factor-in the possible changes which climate change could bring about in respect of contingency planning but that is easy to say and much more of a challenge in practice. The</p>	<p>taking place and an assessment made of the reasons why some sectors are adapting more successfully than others, will be launched in 2007. A third phase, based on identification of areas where adaptation is not occurring and what incentives and assistance may be required to ensure that it is considered appropriately in future planning and development, will be launched in 2008, to complete the APF work.</p>	<p>Programme 2006: <a href="http://www.defra.gov.uk/environment/climatechange/uk/ukccp/pdf/ukccp06-all.pdf">http://www.defra.gov.uk/environment/climatechange/uk/ukccp/pdf/ukccp06-all.pdf</a></p>
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				Adaptation Policy Framework will help to address this.		
	<p>UK Climate Impacts Programme. Set up in 1997 and funded by the UK Department for Environment, Food and Rural Affairs (DEFRA), UKCIP helps organisations assess how they might be affected by climate change, so they can prepare for its impact. Based at the University of Oxford, UKCIP works with stakeholders/partners and co-ordinates research - based on the stakeholder's needs - on how climate change will have an impact on their activities, and ways in which they can adapt to minimise these impacts. UKCIP provides a bridge between researchers and decision-makers in government organisations and business.</p>	Under implementation.	<p>Although UKCIP doesn't implement adaptation actions (but provides informed advice), many organisations have and continue to use this resource, so sufficient staff and financial resources are required to maintain a high level of service. Furthermore, the tool-kit needs to be regularly updated and improved, in line with scientific developments - for example, the next set of UK climate change scenarios, which will involve extensive climate modelling activity at the UK Met Office (Hadley Centre). UKCIP aims to bridge the gap between research and policy so that decisionmakers take control to produce research in ways that are useful to them. The Programme has been flexible and was developed incrementally, with</p>		<p>The approach taken should be consistent with the governance and political culture, and build on/emphasize priority drivers/levers of change. The Programme's results suggest that if decision makers are supported, capacity is built for assessments, and crucially, research outputs are directly applicable to their ongoing work and strategic planning. This capacity-building has worked across scales and sectors and is an effective route to mainstreaming climate change adaptation. The implication, therefore, is that more support should be given by funding agencies to develop institutional capacity to support adaptation to climate change in both the private and public sectors. (see Hedger, Connell and Bramwell, 2006, Bridging the gap: empowering decision-</p>	<p><a href="http://www.ukcip.org.uk">www.ukcip.org.uk</a> for list of publications, etc.</p>

			increased scientific understanding, taking advantage of collaborative funding and facilitating long-standing partnerships. Whilst the core framework of scenarios and other tools, methods and guidance has been developed centrally, most studies have been stakeholder-funded and led.		making for adaptation through the UK Climate Impacts Programme, Climate Policy, Vol 6)	
	Implications of Climate Change for Defra	Under implementation/complete.	Resources at Directorate/Divisional level, to address adaptation measures necessary within climate-sensitive areas of business.	That appropriate and proportionate resources are not targeted towards ensuring climate-sensitive areas are adapted.	It is important to ensure that report publication isn't viewed as the final step, and that the converse is true: the report serves as a first step towards obtaining a better idea of the impacts of climate change on areas of Departmental business, and implementing adaptation measures to mitigate potentially unacceptable impacts. It's very important to maintain momentum beyond report publication.	Report 'The Impacts of Climate Change: Implications for Defra': <a href="http://www.defra.gov.uk/environment/climatechange/pubs/impacts/index.htm">http://www.defra.gov.uk/environment/climatechange/pubs/impacts/index.htm</a>
	Nottingham Declaration on Climate Change and Scotland's Climate Change Declaration	Ongoing with continued efforts to have all local councils to become signatories.	Both contain a commitment for the local councils to develop plans that both address the causes of, and risks/opportunities	The efforts to date have been primarily bottom-up although signatories to the declarations do include central government/devolved	Support from central government/devolved administration executive is essential for continued success as is a supportive set of	<a href="http://www.sustainable-scotland.net/climatechange/">http://www.sustainable-scotland.net/climatechange/</a> ; and <a href="http://www.nottinghamdeclaration.org.uk">www.nottinghamdeclaration.org.uk</a>

			associated with climate change. Also included is an effort to monitor and communicate the results of efforts	administration executive signatories. A consistent and achievable set of targets and indicators for adaptation will be needed to monitor and report on the effectiveness of the various plans.	guidance (e.g., Nottingham Declaration Action Pack).	
	UK Department of Work and Pensions (DWP): climate change adaptation	Under development.	The paper is in its infancy and being developed in conjunction with the Hadley Centre (Met Office). The intention is to produce a document with an overlay of scientific input, describing what climate change effects will have on the DWP and its business delivery. Adaptation plans can then be formulated.	None yet.	None yet.	None yet.
	Effects of Climate Change on Fire and Rescue Services in the UK	Published research report.	N/A	N/A	Fire & rescue services should begin to plan for climate change. Climate change will make existing challenges more severe and more frequent, but is unlikely to provide new challenges.	<a href="http://www.communities.gov.uk/index.asp?id=1505324">http://www.communities.gov.uk/index.asp?id=1505324</a>
	Responding to our Changing Climate - a consultation on an action plan to adapt to	Under development - currently out to consultation.				<a href="http://new.wales.gov.uk/consultations/currentconsultation/envandco/uncurrcons/1252231/?l">http://new.wales.gov.uk/consultations/currentconsultation/envandco/uncurrcons/1252231/?l</a>

	climate change in Wales					ang=en
	Trade Association Climate Change Declaration - includes a commitment to action on both adaptation and mitigation	Under development.	Buy on by trade associations and a mechanism to monitor and review actions and continued relevance	The acceptance of the specifics of the commitment by a broad range of trade associations	Need for engagement of a variety of trade associations in the development of the declarations and the associated terms and conditions that come with signing on to the declaration	
	Environment Agency National Adaptation Strategy - which seeks to integrate climate change consideration into the entire business	Under implementation.	Acceptance for the need of such a process at all levels, and then resource to apply it. Once this acceptance has been gained to progress the issue further it is essential to be able to have examples of impacts or financial/social costs of inaction to justify the need for change. Case studies at a suitable level are invaluable.	Climate adaptation, when tackled at a generic national level is very difficult to engage stakeholders with as required changes on the ground to operational practice are often site specific and difficult to generalise.	Need to be open about the timescales and uncertainty involved and build on the opportunities for incorporating adaptation actions at little or no extra cost.	Copy of the strategy available from <a href="mailto:roger.hoare@environment-agency.gov.uk">roger.hoare@environment-agency.gov.uk</a>
	Preparing for a Changing Climate in Northern Ireland This report examined the impacts of climate change and identified the threats and opportunities together with the adaptive strategies required over 13 different sectors.	Under implementation.	Commitment, resourcing and collaboration - sub-national governments, business and industry, and the support of those who should be considering their risks, vulnerabilities and needs with respect to adaptation.	Lack of data in some sectors. Further research needed		Further details of the adaptation report are available on the DOENI web site ( <a href="http://www.doeni.gov.uk">www.doeni.gov.uk</a> ) and also on <a href="http://www.sniffer.org.uk">www.sniffer.org.uk</a> under project code UKCC13
<b>Practices</b>	BRANCH research report: Spatial planning	Under implementation.	Existing tools and mechanisms			<a href="http://www.branchproject.org/available/repor">http://www.branchproject.org/available/repor</a>

	for biodiversity in our changing climate		highlighted in report to be implemented by planners.			tsandpublications/ENRR677Spatialplanningforbiodiversityinourchangingclimate.pdf
	UK climate change partnerships	Under implementation.	Commitment, resourcing and collaboration - sub-national governments, business and industry, and the support of those who should be considering their risks, vulnerabilities and needs with respect to adaptation.	The ability to mobilise sufficient resources including that for a full-time regional coordinator can limit the scope and effectiveness of the regional partnerships.	The hiring of a full-time coordinator has enhanced the scope of activities, the integration of adaptation into associated policies/strategies and the introduction of adaptation measures.	Further details on these partnership are available through the UKCIP web site ( <a href="http://www.ukcip.org.uk">www.ukcip.org.uk</a> ) where there are also links to the websites with further information. Example: London Climate Change Partnership - <a href="http://www.london.gov.uk/climatechangepartnership/aims.jsp">www.london.gov.uk/climatechangepartnership/aims.jsp</a> <a href="http://www.london.gov.uk/climatechangepartnership/adapting-jul06.jsp">www.london.gov.uk/climatechangepartnership/adapting-jul06.jsp</a>
	National Planning Policy Statements (PPS) and code for sustainable homes	Ongoing. Planning Policy Statement 25 (PPS25) sets out Government policy on development and flood risk. It's aims are to ensure that flood risk (incorporating climate change projections, such as mean sea-level rise) is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding, and to direct development	See various entries on sectoral spreadsheet, in "Sector: transport, built-environment" section.	See various entries on sectoral spreadsheet, in "Sector: transport, built-environment" section.	See various entries on sectoral spreadsheet, in "Sector: transport, built-environment" section.	<a href="http://www.communities.gov.uk/index.asp?id=1143803">http://www.communities.gov.uk/index.asp?id=1143803</a>

		away from areas of highest risk. Where a new development is, exceptionally, necessary in such areas, the policy aims to make it safe, without increasing flood risk elsewhere, and, where possible, reducing flood risk overall. The Department for Communities and Local Government (DCLG) lead the process of developing planning guidelines and statements.				
	Environment Agency flood guidance. Around 5 million people, in 2 million properties, live in flood risk areas in England and Wales. The Environment Agency has an important role in warning people about the risk of flooding in England and Wales, and in reducing the likelihood of flooding from rivers and the sea.	Under implementation.				<a href="http://www.environment-agency.gov.uk/subjects/flood/1217883/?version=1&amp;lang=_e">http://www.environment-agency.gov.uk/subjects/flood/1217883/?version=1&amp;lang=_e</a>
	Impact of Climate Change on UK energy Sector - scoping study of potential components of demand, production	Under development. Scoping study completed by UK Met Office consultancy wing. Phase 2 involves designing research to				<a href="http://www.metoffice.gov.uk/consulting/case-studies/index.html">http://www.metoffice.gov.uk/consulting/case-studies/index.html</a>

	and distribution that may change in future climate	underpin adaptation choices prioritised in scoping study.				
	As part of BRANCH project, modelling of coastal vulnerability.	Complete.		Need to recognise importance of policy integration to reduce pressures on biodiversity; we need a national climate change adaptation strategy that addresses the needs of biodiversity. We lack a national ecological network approach. Also difficult to engage with national departments and planning sector.	Would be good to have a priority list when it comes to biodiversity; we cannot have all we ask for due to pressures from other sectors (e.g. development).	<a href="http://www.branchproject.org">www.branchproject.org</a>
<b>Technologies</b>	Nottingham Declaration Action Pack (NDAP) - a one stop web based action pack which draws together guidance and tools to aid both mitigation and adaptation work	Under implementation.	Uptake by Local Authorities, national targets recognise NDAP role and the two are integrated. Actions linked to delivering change rather than 'green wash'. It also needs all key partners to be involved to ensure suitable information is available.	Current lack of sufficient resource put towards climate change adaptation within local authorities.	A lot of appetite currently for action to be taken but this is often not backed up by allocation of resource at an application level.	<a href="http://www.nottinghamdeclaration.co.uk">www.nottinghamdeclaration.co.uk</a>
	Environment Agency on-line, searchable flood risk map. Gives detail of what areas are most likely to be affected by flooding when waters rise, throughout England					<a href="http://www.environment-agency.gov.uk/subjects/flood/?lang=_e">http://www.environment-agency.gov.uk/subjects/flood/?lang=_e</a>

	and Wales. Searches (free) can be by post-code or town.					
<b>local (community) level</b>						
<b>Approaches / strategies</b>	Environment Agency of England and Wales is developing regional climate change strategies for each of its English Regions and Wales.	Under development.	Cross sector working in water resource management, flood risk, land quality and conservation. Organisational change to incorporate adaptation actions into business planning and operational practice, plus communications strategy for internal and external audiences.	Adaptation actions are not fully integrated into business planning and operational practice. Some sector specialists still regard climate change as an 'add-on' rather than a core part of future work planning.	Proactive communications backed up by sound science programmes to provide the evidence base can make the objective case for implementation of adaptation policies	N/A
<b>Practices</b>	UKCIP Adaptation Actions database. Information on adaptation approaches and practices has been assembled by the UK Climate Impacts Programme in its Adaptation Actions database. This database is comprised of more than 300 adaptation strategies and measures implemented and under development by a variety of organisations within the UK. The Adaptation Actions database is searchable by sector, adaptation	Under implementation.	Depends upon resources of organisations accessing the database, and applicability of previous adaptation actions to other settings.	Entries in the database and its currency depend on submissions by those undertaking the adaptation which is partially determined by the value potential contributors see in adding to the database.	Database just launched, so too early to say.	<a href="http://www.ukcip.org.uk/resources/tools/data_base.asp">http://www.ukcip.org.uk/resources/tools/data_base.asp</a>



	<p>activity (i.e. building adaptive capacity, delivering adaptation actions and then further subdivided into the various types of adaptation) and region within the UK. For most of the entries in this database, in addition to a brief description there is a web site address through which more details can be sought. Most of the adaptation approaches listed within the UK submission are contained within the UKCIP Adaptation Actions database.</p>					
	<p>A UKCIP Local Climate Impacts Profile is a resource for Local Authorities and other locally based organisations such as those in a Local Strategic Partnership. It collates information on recent and current severe weather events from local media sources and records their impacts on a locality (flooding, damage to property, disruption to transport</p>	<p>Under implementation (e.g. at Oxfordshire County Council). The profile should be continually updated with information on severe weather events, details of the weather and more qualitative information about the nature of the organisational responses, whether it was felt to be adequate, whether any immediate adaptation measures were taken, whether</p>	<p>Commitment by a local authority to undertake the exercise and communication to officer staff at all levels that such an exercise is happening and that they may be contacted and asked to respond and give information and comment. Important to secure senior Officer support to continue beyond the initial data collection stage.</p>	<p>A Local Climate Impacts Profile helps to start a process of organisational review, concerns might be that it is shelved halfway through or that the information is not followed up and used to inform on-going decision-making.</p>	<p>The process of compiling a Local Climate Impacts Profile is very helpful in creating awareness amongst Council Officers and Politicians of the kind of issues the organisation may face in responding to changes in weather and particularly in response to severe weather events. It also allows staff to reflect on their operational response and weaknesses</p>	<p>A Local Climate Impacts Profile guidance brochures from UKCIP, <a href="http://www.ukcip.org.uk">www.ukcip.org.uk</a>Oxfordshire County Council work <a href="http://www.oxfordshire.gov.uk">www.oxfordshire.gov.uk</a></p>

	<p>etc) and provides a context for analysis of future climate scenarios and the possible consequences for a locality. Understanding vulnerabilities to current extreme weather events, the impacts of those events and the preparedness of the organisation and its ability to respond and cope helps an organisation to understand what kinds of adaptation measures will be necessary.</p>	<p>any immediate adaptation measures are identified and what kinds of preparations are necessary for the future. It is possible for service delivery personnel to use this information to determine the point - the critical threshold - when the service delivery is disrupted, either by temperature or another weather variable. Once the critical threshold is understood and an understanding of the likelihood or probability that the weather conditions that cause thresholds to be reached or exceeded is understood then informed adaptation or preparation can follow.</p>			<p>therein, i.e. lack of consistent monitoring and to consider what strategic or forward planning actions might be necessary.</p>	
	<p>As part of the BRANCH project, modelling the effects of sea-level rise at coastal case study sites in Hampshire, Dorset and Isle of Wight; modelling species movement in Hampshire and Kent.</p>	<p>Under implementation, being discussed with stakeholders.</p>	<p>Need better provision of guidance on 'green' infrastructure in UK regional plans and policies.</p>	<p>Lack of national guidance and leadership on planning space for nature. Planners are concerned about lack of evidence to back up recommendations and decisions e.g. reserving land for the future, especially in public enquiries. Plans do not</p>	<p>We need to empower local level planners to make their plans climate-change-robust by providing them with good evidence and clear guidance, ideally this should come from national level. We have had some success getting climate change adaptation recognised</p>	<p><a href="http://www.branchproject.org">www.branchproject.org</a></p>

				always sit in context with other regions. Climate change doesn't recognise borders, so need to work cross-regionally to find solutions.	in regional spatial plan, but clearer recommendations are still needed.	
	Feeding BRANCH recommendations into South East Regional Spatial Strategy	Completed during South East plan.	Need better provision of guidance on 'green' infrastructure in UK regional plans and policies	Lack of national guidance and leadership on planning space for nature. Planners are concerned about lack of evidence to back up recommendations and decisions e.g. reserving land for the future, especially in public enquiries. Plans do not always sit in context with other regions. Climate change doesn't recognise borders, so need to work cross-regionally to find solutions.	We need to empower local level planners to make their plans climate-change-robust by providing them with good evidence and clear guidance, ideally this should come from national level. We have had some success getting climate change adaptation recognised in regional spatial plan, but clearer recommendations are still needed.	<a href="http://www.southeast-ra.gov.uk/southeastplan/">http://www.southeast-ra.gov.uk/southeastplan/</a>
	Environment Agency River Wear Catchment Adaptation Study	Under consideration.	Lessons from study need to be taken up by key stakeholders.	Danger of it being just another study. Benefit of this work was that it considered specific significant sites/buildings in the catchment which would hopefully make uptake easier for those considered.	This review which considered adaptation needs throughout a river catchment is being taken on throughout the north east region.	<a href="http://www.environment-agency.gov.uk/news/1696408?region=North east&amp;">http://www.environment-agency.gov.uk/news/1696408?region=North east&amp;</a>
	Tyndall Centre Research Theme 3: Adapting to Climate	Under implementation.	Continued financial support for the Tyndall Centre (by NERC and			<a href="http://www.tyndall.ac.uk/research/theme3/theme3_project_list.sht">http://www.tyndall.ac.uk/research/theme3/theme3_project_list.sht</a>

	Change Although international in coverage (and not necessarily applied specifically to the UK context) the research outputs can inform adaptation policy and practice in the UK.		others).			ml
<b>Technologies</b>	Environment Agency: Flood Ranger - computer simulation tool	Under implementation.	Access to CD - training tool to help planners understand the implications of the their planning actions. Virtual world created which then allows you to simulate certain climate change scenarios	Theoretical tool that is not specific to any particular area. New version available which simulates flood impacts on the Thames Estuary	Valuable training tool to get key messages to planning staff	<a href="http://www.espace-project.org/">http://www.espace-project.org/</a>
<b>Sectoral level</b>						
<b>Sector: agriculture</b>						
<b>Approaches / strategies</b>	UK DEFRA Sustainable Agriculture Climate Change Adaptation Research Programme. To initiate preparation of alternative agriculture options and other response measures, including alternative crops, cultivation methods and pest, weed and disease controls.	Under implementation.	Adequate resources to take forward recommendations of research programme and need to ensure research results are communicated effectively, in order to lead to concrete action on adaptation by farmers and land managers.	Knowledge transfer, limited incentives for farmers.	Effective dissemination of research results is essential.	<a href="http://defrafarmingandfoodscience.csl.gov.uk/">http://defrafarmingandfoodscience.csl.gov.uk/</a>  Research pre-2003: Defra Climate Change Impacts & Adaptations Research Programme (CC03) Project Summaries Report 1987 – 2003  <a href="https://intranet.rac.ac.uk/course-ird/sink_swim/CC03_Summaries%20of%20Research_2003.PDF">https://intranet.rac.ac.uk/course-ird/sink_swim/CC03_Summaries%20of%20Research_2003.PDF</a>

						<p>The summary includes research:</p> <p>Identifying And Costing Agricultural Adaptive Under Climate Change Scenarios (ICARUS); Assessing Drought Risks For UK Crops Under Climate Change; Maintaining Wheat Performance Through Improved Resistance To Drought; To Investigate The Likely Impact On Crop Development Of Changes In Temperature And Water Associated With Global Warming; Publication Of The Review Of The Direct Effects Of The Dry Hot Summer Of 1995 On Decision Making Of The Individual Farmer; Review Of The Direct Effects Of The Dry Hot Summer Of 1995 On Decision Making Of The Individual Farmer; On-Farm Water Conservation; The Effect Of Future Climatic Change On</p>
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						<p>Agricultural Potential; To Develop Grasses Likely To Tolerate Climate Change; The timescale of potential farm level responses and adaptations to climate change in England and Wales</p> <p>Current, ongoing research:</p> <p>Vulnerability of UK agriculture to extreme events</p> <p><a href="http://www2.defra.gov.uk/research/Project_Data/More.asp?I=AC0301&amp;M=CFO&amp;V=WHRI">http://www2.defra.gov.uk/research/Project_Data/More.asp?I=AC0301&amp;M=CFO&amp;V=WHRI</a></p> <p>Changes to agricultural management under extreme events – likelihood of effects and opportunities nationally (chameleon)</p> <p><a href="http://www2.defra.gov.uk/research/project_data/More.asp?I=CC0361&amp;M=KWS&amp;V=cc03&amp;SUBMIT1=Search&amp;SCOPE=0">http://www2.defra.gov.uk/research/project_data/More.asp?I=CC0361&amp;M=KWS&amp;V=cc03&amp;SUBMIT1=Search&amp;SCOPE=0</a></p> <p>The Defra Climate Change Research and Innovation Adaptation Network</p>
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						<a href="http://www2.defra.gov.uk/research/project_data/More.asp?I=AC0302&amp;M=KWS&amp;V=AC0302&amp;SCOPE=0">http://www2.defra.gov.uk/research/project_data/More.asp?I=AC0302&amp;M=KWS&amp;V=AC0302&amp;SCOPE=0</a>
	Rural Climate Change Forum - the RCCF is a stakeholder Forum, co-chair by DEFRA minister Ian Pearson and launched in March 2005. It provides advice on climate change and rural land management, including on adaptation and managing the impacts of climate change. The RCCF secretariat is based at DEFRA and the group meets 3-4 times a year.	Under implementation.	Need to ensure that the RCCF has access to robust information about adaptation in order to make sound recommendations. Top level engagement important, as it means that the messages RCCF participants take away are then filtered into their organisations from the top down (and it allows for valuable discussions at the meetings themselves). Continued involvement of minister as a co-chair helps to make sure we continue to get high level engagement. RCCF also adds value by joining up different parts of the agenda (e.g. the important links between action on mitigation and climate change, the need to make sure that policy and research are properly communicated).	Each organisation has their own agenda. That's often helpful and doesn't have to be a barrier, but some organisations approach adaptation with very different perspectives.	Site visits have provided a good backdrop for productive discussions and helped to get the members focused on how best to put things into practice on the ground.	Summary of RCCF, including Terms of Reference: <a href="http://www.defra.gov.uk/environment/climatechange/uk/agriculture/rccf/index.htm">http://www.defra.gov.uk/environment/climatechange/uk/agriculture/rccf/index.htm</a>
	Strategic review of the	Initial review has been	Developed	Cross-sectoral issues	Very difficult to	<a href="http://www.environment-">www.environment-</a>

	impacts of climate change on land management in England & Wales conducted by the Environment Agency.	completed and an Action Plan has been produced to help guide Environment Agency work in this area to aid the incorporation of adaptive action.	understanding through research and partnership working.	are particularly relevant for agriculture. Biodiversity, flood risk management and market changes all affect sectoral impact and ability to adapt to climate change. It is therefore essential that a review of adaptive options is linked into the needs and responses of other sectors.	develop a full understanding of the impacts the sector faces. However it is important to begin engagement at the earliest opportunity and to identify opportunities to build in no-regret adaptive actions which entail no excessive cost and facilitate future adaptation.	agency.gov.uk
	Agri-environment schemes and the Environmental Stewardship scheme (launched March 2005).	Under implementation.	Regular review of management prescriptions and payments render them potentially well-suited to adapt to the changing climatic and socio-economic conditions. However the policy assumes farmers will adopt it voluntarily. Continuation of these policies depends on positive attitudes towards environmental protection and farming and proven success in enhancing biodiversity.	That their role will be undervalued, that their funding will be cut following new initiatives for things like biofuels/bioenergy and their impact will diminish.	Agri-environment schemes in general have the potential to enhance the performance of other policies through components which seek or need to act at landscape scales. After some modification, targeted agri-environment schemes could help develop landscape-level planning and in this way would contribute to maintaining the resilience of all the other policies discussed here.	<a href="http://www.defra.gov.uk/erdp/schemes/default.htm">http://www.defra.gov.uk/erdp/schemes/default.htm</a> Some of this information has been drawn from an Environment Agency/Countryside Council Wales research project looking into Climate Impacts on the Rural Economy. The results of this project will be launched in June 2007. More information will be available from <a href="http://www.environment-agency.gov.uk">www.environment-agency.gov.uk</a> Agri-Environment Schemes review: <a href="http://www.defra.gov.uk/erdp/reviews/agrien">http://www.defra.gov.uk/erdp/reviews/agrien</a>



						v/default.htm Environmental Stewardship: <a href="http://www.defra.gov.uk/erdp/schemes/es/default.htm">http://www.defra.gov.uk/erdp/schemes/es/default.htm</a>
<b>Practices</b>	Agricultural Change and Environment Observatory (funded by DEFRA and others) provides evidence for policy making on the range of environmental issues for agriculture. One of the aims of ACEO is to look at the links between the changes observed in farming practices and observed environmental changes, including adaptation to climate change. Farmers' Voice survey 2006 (part of ACEO research programme) includes a chapter on adaptations as a result of climate change.	Under implementation.		Still fairly young in its creation - it was launched in 2005 to look predominantly at the impact of 2003 CAP reform.	Still fairly young in its creation - it was launched in 2005 to look predominantly at the impact of 2003 CAP reform.	<a href="http://www.defra.gov.uk/farm/policy/observatory/index.htm">http://www.defra.gov.uk/farm/policy/observatory/index.htm</a> ; Agricultural Change and Environment Observatory Programme Annual Review: <a href="http://www.defra.gov.uk/farm/policy/observatory/annualreview.htm">http://www.defra.gov.uk/farm/policy/observatory/annualreview.htm</a> . Climate change adaptation pages of Farmers' Voice 2006 survey: <a href="http://www.defra.gov.uk/farm/policy/observatory/research/pdf/farmersvoice2006.pdf">http://www.defra.gov.uk/farm/policy/observatory/research/pdf/farmersvoice2006.pdf</a> pages vi-vii
	Vale of Evesham Project - specifically examining the impact of an extreme weather event (heatwave of 2003) on farms in the Vale of Evesham and the measures that farmers took in	Under consideration.	Support for farmers to undertake adaptation actions, to ensure they are aware of the potential impacts that will affect their work. Includes the wider land-management community such as	No suitable tools for them to develop their adaptive responses. National tools are academic and generic. Sector-specific, simplified versions required with clear case studies provided	When not in job description or immediate interest of group involved, very hard to engage over the long term. Short-term economic pressures dominate decision making. The need for a	<a href="http://www.sustainabilitywestmidlands.org.uk">http://www.sustainabilitywestmidlands.org.uk</a>

	response.		land-owners and suppliers who also need to be engaged by this process.	at a local level. Cost benefit considerations need to be incorporated throughout.	sector co-ordinator was key to bringing stakeholders together and to facilitate discussion.	
<b>Sector: water resources</b>						
<b>Approaches / strategies</b>	Environment Agency strategy 'Water resources for the future: a water resources strategy for England and Wales' (and planned strategy revision in 2008).	Under implementation.	Widespread take-up of the 25 year strategy groups and individuals.			<a href="http://www.environment-agency.gov.uk/subjects/waterres/137651/?version=1&amp;lang=_e">http://www.environment-agency.gov.uk/subjects/waterres/137651/?version=1&amp;lang=_e</a>
	Environment Agency: Influencing long term water resource planning through 4th Periodic Review (PR04) of water companies.	Under implementation.	Buy-in of water companies.			<a href="http://www.environment-agency.gov.uk/commdata/acrobat/schemeassessmentv7_784388.pdf">http://www.environment-agency.gov.uk/commdata/acrobat/schemeassessmentv7_784388.pdf</a>
	Environment Agency: A coherent framework for water planning under climate change.	Under implementation - due to be completed April 2007.	This project will collate latest scientific evidence of projected climate change impacts on surface and groundwater resources and appraise the methodologies being developed by a raft of national projects. The project will deliver prototype guidance on behalf of the water resources function on how to factor climate change into water company plans ahead	Uncertainty in climate predictions has limited the uptake of climate risk into long-term water resource planning. This guidance aims to overcome that issue and enable greater confidence in building in system resilience. Engagement of the water industry and their involvement in the research will help ensure they are willing to use the final output.	From some of the supporting science it has become evident that the climate change signal will not appear above natural variation for precipitation until the 2030s. Therefore much of the resilience work required to that point should centre around planning for current natural extremes.	Wilby, R.L. 2006. When and where might climate change be detectable in in UK river flows? Geophysical Research Letters. Environment Agency, 2006. Major Droughts in England and Wales from 1800 and evidence of impact. Environment Agency Science Report SR040068 - Part 1, Bristol pp53

			of the statutory water resources plans that will also form part of water companies' submissions for PR09.			
<b>Practices</b>	Thames Estuary 2100. Project to look at potential river and storm surge floods that could affect Thames barrier by 2100.	Under implementation (joint project Met Office and Environment Agency).	Study will inform strategic decisions regarding increasing height of Thames Barrier. Resources, therefore, to make recommended modifications.			<a href="http://www.te2100.dialoguebydesign.net/dbyd.asp">http://www.te2100.dialoguebydesign.net/dbyd.asp</a>
	UK Water Industry Research (UKWIR) project to examine impact of future projections of rainfall on UK sewage systems design and capability of existing system to cope.	Study complete.				<a href="http://www.metoffice.gov.uk/consulting/casestudies/index.html">http://www.metoffice.gov.uk/consulting/casestudies/index.html</a> Reports can be ordered from the UKWIR website <a href="http://www.ukwir.org">www.ukwir.org</a>
	UKWIR project CL/10: Climate Change And The Design of Sewerage Systems	Under consideration.	UK water companies will need permission from regulator to implement recommendations, if extra cost would be incurred.	UKWIR not a statutory body, so no obligation on water companies to implement recommendations.		Reports can be ordered from the UKWIR website <a href="http://www.ukwir.org">www.ukwir.org</a>
	Water company Water Resource Management Plans; impacts of climate change to be factored into estimates of supply & demand.	Under implementation.	Plans produced 5-yearly.	Water company concerns about availability of information for the plans. Need for timely updates to scenarios of impacts of climate change.		<a href="http://www.environment-agency.gov.uk/subjects/waterres/981441/?version=1&amp;lang=_e">http://www.environment-agency.gov.uk/subjects/waterres/981441/?version=1&amp;lang=_e</a>
	EA Catchment Abstraction	Under implementation.	Produced on 6-yearly cycle.	Need for timely updates to scenarios of		<a href="http://www.environment-">http://www.environment-</a>

	Management Strategies - taking account of climate change and influencing future allocation.			impacts of climate change.		<a href="http://agency.gov.uk/subjects/waterres/1341275/564321/309477/?lang=_e">agency.gov.uk/subjects/waterres/1341275/564321/309477/?lang=_e</a>
	Water company Drought Plans.	Under implementation.	Produced on 3-yearly cycle, and will use assumptions in the water resources management plans.	Action not taken early enough in response to threat to the security of water supply.		<a href="http://www.environment-agency.gov.uk/subjects/waterres/1014767/1370506/1401682/?version=1&amp;lang=_e">http://www.environment-agency.gov.uk/subjects/waterres/1014767/1370506/1401682/?version=1&amp;lang=_e</a>
	In Wales: water companies are required to prepare water resources management plans that will take full consideration of the likely impacts of climate change. Work will commence in developing new water resource management plans in 2007, and will be informed by the UK research into climate change impacts that has developed in recent years.	Under development.				
	Welsh Health Estates, through the Welsh Health Environmental Forum, is promoting water conservation and water metering along with grey water recycling in National Health Service premises. To improve the resilience of water	Under implementation				

	supplies in the event of interruption water is stored on site and there are facilities in place to allow water bowsers, operated by the local water company, to be used to re-supply hospital storage tanks.					
<b>Technologies</b>	Environment Agency: Flood Ranger - computer simulation tool.	Under implementation.	Access to CD - training tool to help planners understand the implications of their planning actions. Virtual world created which then allows you to simulate certain climate change scenarios.	Theoretical tool that is not specific to any particular area. New version available which simulates flood impacts on the Thames Estuary.	Valuable training tool to get key messages to planning staff.	<a href="http://www.espace-project.org/">http://www.espace-project.org/</a>
<b>Sector: health</b>						
<b>Approaches / strategies</b>	National Heatwave Plan. Spells out what needs to be done by health and social care services and other bodies to raise awareness of risks relating to severe hot weather and what preparations both individuals and organisations should make to reduce those risks. The plan also details the responsibilities at national and local level for alerting people once	Under implementation.				National Heatwave Plan and all supporting information, including advice for health and social care professionals, care-home managers and staff: <a href="http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4135296">http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4135296</a>

	a heatwave has been forecast, and advising them what to do during a heatwave.					
	The UK Department of Health report Health Effects of Climate Change in the UK, 2001 is currently being reviewed.	Under development.	Stakeholder input. Recent national workshops have been jointly organised by the Department of Health, DEFRA, the Environment Agency, the Health Protection Agency and the Sustainable Development Commission, aimed specifically at addressing Climate Change and Health (including focus on health effects of flooding), on People, Places and Health (with climate change influences recognised including forced migration); Chemicals and Health, (including concerns about raised ozone levels in hot weather), and Food and Health (including sustainability of food stocks which may also be influenced by climate change effects on the supply chain).			<a href="http://www.dh.gov.uk/PolicyAndGuidance/HealthAndSocialCareTopics/AirPollution/AirPollutionGeneralInformation/fs/en">www.dh.gov.uk/PolicyAndGuidance/HealthAndSocialCareTopics/AirPollution/AirPollutionGeneralInformation/fs/en</a>
	The UK Government's Choosing Health white	Under implementation.				<a href="http://www.dh.gov.uk">www.dh.gov.uk</a> <a href="http://www.lho.org.uk/view">www.lho.org.uk/view</a>

	<p>paper requires the National Health Service (NHS) to act as a good corporate citizen. In addition, the 'Building for Health' toolkit allows Primary Care Trusts and NHS Trusts to build sustainability into the process to procure new health care facilities</p>					<p>Resource.aspx?id=10703</p>
	<p>All NHS Trusts in the North West region have been asked to sign up to the North West Climate Change Charter by the Regional Director of Public Health. A wide range of initiatives related to sustainability/climate change are underway across the NW region as part of a collaborative programme of Corporate Social Responsibility - a programme involving the NHS and the North-West Regional Development Agency. One strand in this initiative has been an EU regions project which has defined the Bilbao Agenda.</p>	<p>Under implementation.</p>				<p>www.snw.org.uk www.healthcluster.net.org</p>

	<p>The health sector is working at a regional and local level to mitigate and adapt to the projected impacts of climate change.</p> <p>Key areas:</p> <ul style="list-style-type: none"> <li>• Adapting the healthcare and social care infrastructure (hospitals, nursing homes) to be more resilient to the effects of heat, gales and floods.</li> <li>• Improved systems for forecasting severe gales, floods and heatwaves.</li> <li>• Developing plans for coping with disasters.</li> <li>• Increasing understanding of how people can adapt to changes in climate.</li> <li>• Improving design of urban environments.</li> </ul> <p>Examples:</p> <ul style="list-style-type: none"> <li>• Including text in PFI/PPP building contracts to ensure future changes in climate are taken into account in designing hospitals, for example with better shading and less glass (requires research by heat engineers and NHS</li> </ul>	Under implementation.	This work requires a multi-sectoral approach and bringing people together to work on common themes has proved essential.			<p>The cross sectoral development and use of a sustainability/integrated impact assessment (including climate change issues) has been used in NHS capital developments community plans and other health sector developments. This guidance has been featured in Health Development Agency (HDA) guidance on 'clarifying impact assessment'. HDA (2005) Clarifying Approaches to Health Needs Assessment, Integrated Impact Assessment, Health Equity Audit, Race Equality Impact Assessment (<a href="http://www.hda.nhs.uk">www.hda.nhs.uk</a>, <a href="http://www.nice.org.uk">www.nice.org.uk</a>)</p>
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	<p>Architects).</p> <ul style="list-style-type: none"> <li>• Ensuring building regulations take account of future climate change and are linked to 'weather years' data from the Chartered Institute of Building Services Engineers.</li> <li>• Design of drains to cope with increased intensity of rainfall.</li> <li>• Ensuring hospitals have 'Gale Plans' and 'Flood Plans' as well as 'Heatwave Plans' for the immediate and longer term.</li> </ul>					
<b>Sector: coastal zones (settlements) and marine</b>						
<b>Approaches / strategies</b>	<p>Marine Climate Change Impacts Partnership (MCCIP)  The key objectives for the MCCIP:  To develop and maintain a coordinating framework for marine partners in the UK.  To build the knowledge base and create effective mechanisms for the efficient transfer of marine climate change knowledge from the scientific community to policy advisers and decision</p>	Under implementation.				<a href="http://www.mccip.org.uk">www.mccip.org.uk</a>

	makers. To facilitate uptake of tools and strategies to assist stakeholders in developing and assessing adaptation strategies.					
	Marine Bill (proposed national legislation) will propose a flexible way for the marine environment to be managed, mindful of the increasing pressures on our seas, growing demand for marine space from the expansion of traditional activities, and emergence of new technologies. The approach suggested factors in the need to adapt to the impacts of climate change on our seas and recognises the contribution that the marine area can make to meet this challenge. Overall, the focus of the draft Bill is the management of pressures - human and environmental - on the marine environment.	Under development. White Paper was released for consultation in March 2007.	Sufficient buy-in from stakeholders. Confidence in climate change scenarios from a decision-makers perspective.	Too early to say.	Too early to say.	<a href="http://www.defra.gov.uk/corporate/consult/marinebill-whitepaper07/marinebill-whitepaper.pdf">http://www.defra.gov.uk/corporate/consult/marinebill-whitepaper07/marinebill-whitepaper.pdf</a>
	In Wales, the Welsh Assembly Government and its partners, are developing a Coastal	Under development (consultation just closed)				<a href="http://new.wales.gov.uk/topics/tourism/news/1314056?lang=en">http://new.wales.gov.uk/topics/tourism/news/1314056?lang=en</a>

	Tourism Strategy which will take into account climate change and coastal erosion impacts.					
	Environment Agency Catchment Flood Risk Management Plans (CFMPs)	Under implementation.	Catchment Flood Management Plans will be the cornerstone of our Flood Risk Management Strategy and our new strategic, proactive approach to managing and reducing flood risk. They identify long-term, sustainable policies for flood risk management throughout a river catchment. We have dedicated teams developing the individual CFMPs throughout England and Wales.			Example of CFMP in Anglian region - <a href="http://www.environment-agency.gov.uk/regions/anglian/1109713/?lang=_e">www.environment-agency.gov.uk/regions/anglian/1109713/?lang=_e</a>
	Thames Estuary 2100	Under implementation.	Development of a plan for flood risk management for the tidal Thames	Very large investment required	Adaptation is best started as early as possible to combat the resistance for change engendered in many organisations.	<a href="http://www.environment-agency.gov.uk">www.environment-agency.gov.uk</a>
<b>Practices</b>	Planning Policy Guidance 20: Coastal Planning	Under implementation.	Coastal erosion maps to feed into planning system (under development).	Lack of data.	Conflicting timescales of planning guidance and Local Development Documents. Maintaining vibrancy of coastal communities under threat.	<a href="http://www.communities.gov.uk/index.asp?id=1144093">http://www.communities.gov.uk/index.asp?id=1144093</a>
	Planning Policy	Under implementation.	New Guidance for	Development needs		<a href="http://www.communities.gov.uk">www.communities.gov.uk</a>

	Statement 25		Spatial Planners to consider flood risk both present and future	may overpower future flood risk concerns under climate change		v.uk/index.asp?id=1504639
	Environment Agency Flood and Coastal Defence Appraisal Guidance - Climate change impacts allowances	Under Implementation.	Sufficient funding is required to enable the recommendations in the guidance to be incorporated.	Allowance not site-specific for river flooding (20% increase nationally), which may lead to over-engineering. Recent research conducted to test this has suggested that this figure remains suitable.	The Foresight Report conducted on Future Flood Risk suggested that in order to avoid future increased flood risk, £1bn must be invested annually.	<a href="http://www.defra.gov.uk/enviro/fcd/pubs/pagn/climatechangeupdate.pdf">http://www.defra.gov.uk/enviro/fcd/pubs/pagn/climatechangeupdate.pdf</a> <a href="http://www.foresight.gov.uk/Previous_Projects/Flood_and_Coastal_Defence/">http://www.foresight.gov.uk/Previous_Projects/Flood_and_Coastal_Defence/</a>
<b>Technologies</b>	In Wales, the Welsh Assembly Government has provided guidance to the operating authorities on allowances that should be made to take into account climate change impacts. New coastal defence structures are built with an extra allowance for sea level rise and an increase in wind speeds and wave heights. New river flood defences are built to take account of a 20 per cent increase in peak flows.	Under implementation.				<a href="http://new.wales.gov.uk/topics/environmentcountryside/epq/water_flooding/flooding/?lang=en">http://new.wales.gov.uk/topics/environmentcountryside/epq/water_flooding/flooding/?lang=en</a>
<b>Sector: biodiversity, environment</b>						
<b>Approaches / strategies</b>	England Biodiversity Strategy's Climate Change Adaptation workstream	Under implementation. The new Climate Change workstream of the England Biodiversity Strategy	A robust, accessible, knowledge and evidence base is needed to support adaptation to climate	The obstacles to delivery include: the gaps and high degree of uncertainty in the evidence base; the time		Pages 78-79 of England Biodiversity Strategy: <a href="http://www.defra.gov.uk/wildlife/">www.defra.gov.uk/wildlife-</a>

		<p>was established in March 2005 to:</p> <ul style="list-style-type: none"> <li>• develop higher level guidance about the impact of climate change on biodiversity;</li> <li>• develop guidance literature for biodiversity practitioners; and</li> <li>• identify research need and examine adaptation and resource protection strategies.</li> </ul>	<p>change impacts, including an established network for detecting changes in biodiversity. Initial adaptations must be integrated into all workstreams and processes established to learn from experiences and adjust strategies accordingly. Practical techniques and a strategic overview for adaptive management are needed. Also need to achieve a high level of awareness of impacts of climate change and means of adaptation in all relevant sectors, at national, regional and local levels.</p>	<p>and skills required to obtain, assimilate and communicate new knowledge; and the lack of an existing policy framework for cross-sectoral adaptation.</p>		<p>countryside/biodiversity/biostrat/indicators/pdf/grain/grainvol1v3.pdf</p>
	<p>Adaptation strategy – The Royal Botanic Gardens at Kew. Emergency plans such as using river water or Kew lake water for irrigation are being considered at Kew Gardens.</p>	<p>Under implementation (from April 2006).</p>		<p>Climate change may have positive and negative effects on species present: a warmer climate could increase this number, as well as low summer rainfall patterns could reduce them. In order to overcome this, emergency plans such as using river water or Kew lake water for irrigation are being considered, although</p>		<p><a href="http://www.ukcip.org.uk/resources/publications/downloads.asp?ID=24">http://www.ukcip.org.uk/resources/publications/downloads.asp?ID=24</a></p>

				these measures could have health and environmental implications. Another option under consideration is the utilisation of the satellite garden at Wakehurst Palace, West Sussex, which is currently wetter and cooler than the ones at Kew.		
	Wildlife Trust Interim Core Policy Document on Climate Change	Underway (at April 2006)		The Wildlife Trust has produced an interim policy on climate change. The Wildlife Trust recognise a three track approach to climate change, namely; adaptation, mitigation and communication. Under the scope of adaptation the Trust aims to increase the ability of natural systems, habitats and species to react and adapt to climate change. This will largely be undertaken at the local level. Through communication the Trust aim to encourage others to take action. The Wildlife Trust will aim to raise awareness and where appropriate,		

	Green Space Action Plan (unpublished) - includes action to improve green spaces and develop work on their role in tackling climate change	Under development	Development of the understanding and role of communities in taking action to tackle climate change and helping their local environment to adapt. Better evidence on role of green space in helping the built and natural environment adapt to climate change.	work in partnership. Lack of robust evidence base to support role of green spaces in tackling climate change	Some emerging good practice from New Deal for Communities areas on how communities and local partnerships are responding to climate change	
<b>Practices</b>	Natural England: Assessment of impacts and development of response strategies in four pilot landscape character areas in England.	Under development	Sensitivity analysis and bioclimatic assessment of valued environmental assets (up to 2050s); engagement of local stakeholders in developing response strategies; funding to deliver costed action plans.	Robustness of projections; sectoral conflicts; insufficient funding to deliver actions	None yet.	None yet.
	BRANCH project - Biodiversity Requires Adaptation in North west Europe under a Changing climate, is developing a sound evidence base to enable spatial planners to take action to promote habitat and species' resilience to climate change. Events for stakeholders in all three countries, involved in	Under implementation - completion: September 2007	Embedding of conclusions and recommendations of BRANCH project into planning policy at European, national, regional and local levels. Implementation of policies and mechanisms already available to planners to increase biodiversity's robustness to climate change.	Lack of understanding and mechanisms within planning community to implement policies which will conserve biodiversity in the future. Timescales in planning decisions are not in tune with climate change timescales.	Planners require clear, implementable, prioritised recommendations. The importance of biodiversity can be promoted through its wider benefits to society.	<a href="http://www.branchproject.org.uk">www.branchproject.org.uk</a>

	the planning and biodiversity sectors have been held.					
	As part of BRANCH project, providing climate change adaptation and biodiversity 'training' for planners at regional and national level, in England, France and the Netherlands.					<a href="http://www.branchproject.org.uk">www.branchproject.org.uk</a>
	MONARCH programme has examined the impacts of climate change on a range of species and habitats and considered how the modelling work could be applied to make nature conservation work more effective within the context of a changing climate.	Under implementation.				<a href="http://www.eci.ox.ac.uk/research/biodiversity/monarch.php">http://www.eci.ox.ac.uk/research/biodiversity/monarch.php</a>
	PRINCE project (Climate Sensitivity of Freshwater Ecosystems)	Under implementation.	Research project developing understanding of the impacts of climate change on freshwater ecosystems in England & Wales. Research funded by a number of partner organisations, which has been key to enabling it to take place.			
	The Forestry Commission (in	Under consideration/development; identified	Completion of decision support system (ESC-	Difficulty in providing robust guidance set		<a href="http://www.forestry.gov.uk/forestry/infd-">http://www.forestry.gov.uk/forestry/infd-</a>



	England) is outlining a system for climate-change proofing species choice on the public forest estate and for future inclusion within any English Woodland Grant Scheme revision.	as action in 2007-8 Corporate Plan	CC; climate change variant of Ecological Site Classification) and associated guidance	against the long time frame required for forestry and continuing uncertainty in future climate		6umkar; <a href="http://www.forestry.gov.uk/PDF/fcin069.pdf/SFILE/fcin069.pdf">http://www.forestry.gov.uk/PDF/fcin069.pdf/SFILE/fcin069.pdf</a>
	The Forestry Commission (in England) is outlining how planting might contribute to landscape level climate change adaptation, including in the urban environment, through future changes to the English Woodland Grant Scheme.	Under consideration; identified as action in 2007-8 Corporate Plan	A system to quantify the relative value of different adaptive actions	The complex nature of assessing the full range of environmental benefits and disbenefits		
<b>Technologies</b>	As part of BRANCH project, modelling of: future climate space shifts for 400 species at European scale; habitat networks for 9 species at NW Europe scale; species movement in landscape (case studies in Hampshire, Kent and Limburg); Coastal vulnerability at NW Europe scale; sea-level rise and habitat vulnerability at French (Normandy) and UK (Hampshire), including visualisations of sites	Under implementation - completion: September 2007.				<a href="http://www.branchproject.org.uk">www.branchproject.org.uk</a>

	under changing climate					
<b>Sector: transport, built-environment</b>						
<b>Approaches / strategies</b>	<p>Making Space for Water (MSW). DEFRA-led cross-government strategy on flood and coastal erosion risk management. Key driver for developing a new strategy was climate change and associated risks. Key relevant project is adaptation toolkit which looks at a number of approaches to help those affected, primarily by coastal change, adapt. Includes information, stakeholder engagement, land use planning and local authority powers and possible financial tools. MSW promotes a wide range of responses to adapting to climate change including: working with natural processes where possible; managed realignment; updated climate change allowances for operating authorities; promoting property</p>	<p>Under development - a programme to deliver the strategy, including the adaptation toolkit, is currently taking place.</p>	<p>Good stakeholder engagement and cross government working.</p>		<p>Wide reaching strategy needs to be backed by a good evidence base and ongoing R&amp;D.</p>	<p>Making space for water web pages <a href="http://www.defra.gov.uk/environ/fcd/policy/strategy.htm">http://www.defra.gov.uk/environ/fcd/policy/strategy.htm</a>  Foresight: Future Flooding <a href="http://www.foresight.gov.uk/Previous_Projects/Flood_and_Coastal_Defence/Reports_and_Publications/index.html">http://www.foresight.gov.uk/Previous_Projects/Flood_and_Coastal_Defence/Reports_and_Publications/index.html</a>  Planning Policy Statement 25 - flood risk <a href="http://www.communities.gov.uk/index.asp?id=1504639">http://www.communities.gov.uk/index.asp?id=1504639</a>  Climate change allowances for operating authorities <a href="http://www.defra.gov.uk/environ/fcd/pubs/pagn/climatechangeupdate.pdf">http://www.defra.gov.uk/environ/fcd/pubs/pagn/climatechangeupdate.pdf</a></p>

	level resilience measures; enhanced emergency preparedness measures; and strengthened planning policy guidance, which takes climate change impacts into consideration, to avoid inappropriate development in the floodplain.					
	The Welsh Assembly Government is developing the Transport Strategy for Wales which will take into consideration the impacts of climate change.	Under development.				<a href="http://new.wales.gov.uk/topics/transport/?lang=en">http://new.wales.gov.uk/topics/transport/?lang=en</a>
	Department for Transport report: Climate Change Adaptation - DfT Priorities Scoping Report	Under development.	Sufficient departmental resources; support from senior managers / Ministers	How to build climate change adaptation into strategic / business planning		
	The Changing Climate: Impact on the Department for Transport (Report by DfT)	Under consideration.				<a href="http://www.dft.gov.uk/dft_science/documents/page/dft_science_027568.hcsp">http://www.dft.gov.uk/dft_science/documents/page/dft_science_027568.hcsp</a>
	Railway Safety - implications of weather, climate and climate change (Report by Rail Safety and Standards Board)	Under consideration.				<a href="http://www.rssb.co.uk/pdf/reports/research/Safety%20implications%20of%20weather,%20climate%20and%20climate%20change.pdf">http://www.rssb.co.uk/pdf/reports/research/Safety%20implications%20of%20weather,%20climate%20and%20climate%20change.pdf</a>
	Planning Policy	Under development -	Detailed practice	Capacity of the	Importance of	<a href="http://www.communiti">http://www.communiti</a>

	Statement: Planning and Climate Change (supplement to PPS1)	consultation on draft closed March 2007.	guidance needs to be developed.	planning system at regional and local levels to deliver - hence the importance of practice guidance.	addressing climate change mitigation and adaptation together rather than separately.	es.gov.uk/index.asp?id=1505140
	The Planning Response to Climate Change: Advice on Better Practice	Under implementation.	Produced in the absence of climate change PPS and associated practice guide (see above). May, as a consequence, be superseded by these documents.	N/A	N/A	<a href="http://www.planningportal.gov.uk/england/professionals/en/1112201229106.html">http://www.planningportal.gov.uk/england/professionals/en/1112201229106.html</a>
	Planning Policy Statement 25: Development and Flood Risk	Under implementation.	Practice guidance to be finalised.	Timing: how existing Local Development Documents will take account of PPS25; also conflicting timescales of PPS25 and Local Development Documents.	Keeping pace with rapidly changing climate change agenda - how often to revise the PPS?	<a href="http://www.communities.gov.uk/index.asp?id=1504639">http://www.communities.gov.uk/index.asp?id=1504639</a>
	Review of Existing Buildings	Under development.	Probabilistic scenarios for future climate.	Potential for climate change mitigation measures in buildings to be ill suited to future climate conditions.	N/A	None yet - but prior work under the Review can be found at <a href="http://www.communities.gov.uk/index.asp?id=1504372">http://www.communities.gov.uk/index.asp?id=1504372</a>
	Scottish Planning Policy (SPP) 1: The Planning System	Completed and being implemented	Scottish Planning Policy (SPP) 1 (The Planning System) states that planning should take into account the possible impacts of climate change, for example, greater rainfall and increased risk of flooding, in decisions			<a href="http://www.scotland.gov.uk/library5/planning/nppg1.pdf">http://www.scotland.gov.uk/library5/planning/nppg1.pdf</a>

			regarding the location of new development and other changes in land use.			
	<p>Sustaining Knowledge for a Changing Climate (SKCC) initiative is a collaboration between UKCIP and the Engineering and Physical Sciences Research Council (EPSRC) and builds on the earlier Building Knowledge for a Changing Climate (BKCC), which involved a £3.2 million portfolio of research into the impacts of climate change on the built environment, transport and utilities. SKCC aims are: to sustain the researcher and end user community assembled around the BKCC programme; to synthesise and disseminate results from BKCC in order to maximise impact; and to develop a coherent user-led plan for future research into the impacts of climate change on the built environment and</p>	Under implementation.				<a href="http://www.k4cc.org/">http://www.k4cc.org/</a>

	infrastructure and development of adaptation solutions.					
<b>Practices</b>	Environment Agency flood guidance. Around 5 million people, in 2 million properties, live in flood risk areas in England and Wales. The Environment Agency has an important role in warning people about the risk of flooding in England and Wales, and in reducing the likelihood of flooding from rivers and the sea.	Under implementation.				<a href="http://www.environment-agency.gov.uk/subjects/flood/1217883/?version=1&amp;lang=_e">http://www.environment-agency.gov.uk/subjects/flood/1217883/?version=1&amp;lang=_e</a>
	The 4-year ESPACE (European Spatial Planning: Adapting to Climate Events) project aims to promote awareness of the importance of adapting to climate change and to recommend that it is incorporated within spatial planning mechanisms at local, regional, national and European levels. Funded by INTERREG NW Europe and UK Department for Communities and Local Government.	Under implementation.	Input from 4 European partners to ensure best practice is shared. These then need to be communicated effectively to planners and policy makers throughout the EU	Such a multi national approach could lead to generic guidance which is difficult to apply to each member state involved. This is recognised by the project and through country level projects it hopes to overcome this issue.	Very useful to draw on the expertise of other countries, as it challenges fundamental planning approaches due to the diversity of historical influences on each countries planning systems.	<a href="http://www.espace-project.org/">http://www.espace-project.org/</a> The ESPACE project will be launching the Common Transnational Strategy and Policy Guidance at a conference being held in London on 29th June 2007.
	Highways Agency scoping study of work	Under development - scoping study				

	needed to revise technical standards, specifications and operational procedures because of climate change in 21st century	completed and early stage work on extreme temperatures and precipitation commenced				
	Assessment of impact of storm surge changes on Coastal railway (Dawlish), to enable strategic decision to reinforce protection or move railway.	Report completed.				
	Review of medium to long term coastal risks associated with British Energy sites: Climate Change Effects	Under development / consideration.	No need to implement the adaptation action unless new nuclear power stations are built.			Report available at <a href="http://www.metoffice.gov.uk/research/hadleycentre/pubs/brochures/">http://www.metoffice.gov.uk/research/hadleycentre/pubs/brochures/</a>
	Urban Design Compendium 2	Under development.	Effective dissemination.	N/A	The original Urban Design Compendium, which this will update, does not have sufficient emphasis on environmental sustainability of places.	The original Urban Design Compendium can be found at <a href="http://www.englishpartnerships.co.uk/publications.htm#bestpractice">http://www.englishpartnerships.co.uk/publications.htm#bestpractice</a>
	In Wales: TAN12 on Design sets out what local authorities and developers should be considering in planning for resource efficient development. Recommends measures to achieve resource efficiency through the design process; such as ensuring the siting, layout and design of buildings maximise	Under implementation				<a href="http://new.wales.gov.uk/about/departments/dpec/epecpublications/PlanPubs/TAN/TAN12?lang=en">http://new.wales.gov.uk/about/departments/dpec/epecpublications/PlanPubs/TAN/TAN12?lang=en</a>

	natural heating, cooling and ventilation.					
	Transport Wales is undertaking a programme of inspections and investigations to ensure that slopes above trunk roads are stable and not likely to be mobilised by extreme wet weather.	Under implementation.				<a href="http://new.wales.gov.uk/topics/transport/?lang=en">http://new.wales.gov.uk/topics/transport/?lang=en</a>
	In Wales: TAN 15 on Planning reflects the increased risk of flooding posed by climate change and the need to think seriously about the consequences of that increased risk in making decisions on developments. Local Planning Authorities are currently preparing Local Development Plans and where relevant, will be undertaking broad level or strategic flood consequences assessments to underpin plan preparation and shape growth in their areas.	under implementation				
	Transport Wales are looking at the areas of the network that are currently susceptible to regular flooding and	Under implementation.				<a href="http://new.wales.gov.uk/topics/transport/?lang=en">http://new.wales.gov.uk/topics/transport/?lang=en</a>



	considering how the worst of these can be addressed.					
<b>Technologies</b>	Sustainable Urban Drainage Systems	Under implementation.	Uptake by the construction industry / developers	Long term maintenance of such systems can sometimes be a problem	A system which we have been advocating for many years as it improves resilience to drought and reduces flood risk.	<a href="http://www.environment-agency.gov.uk/business/444304/502508/?version=1&amp;lang=_e">http://www.environment-agency.gov.uk/business/444304/502508/?version=1&amp;lang=_e</a>
	Environment Agency: Flood Ranger - computer simulation tool	Under implementation.	Access to CD - training tool to help planners understand the implications of the their planning actions. Virtual world created which then allows you to simulate certain climate change scenarios	Theoretical tool that is not specific to any particular area. New version available which simulates flood impacts on the Thames Estuary	Valuable training tool to get key messages to planning staff	<a href="http://www.espace-project.org/">http://www.espace-project.org/</a>
<b>Sector: historic environment</b>						
<b>Practices</b>	Rapid coastal zone assessment of historic sites threatened by coastal change and development of guidance	Under implementation.	Completion of national coastal survey and integration within Defra and Environment Agency coastal defence strategies	Limited resources to deliver		<a href="http://www.helm.org.uk/climatechange">www.helm.org.uk/climatechange</a>
	Advice on predicting and managing the effects of Climate Change on World Heritage.	Under implementation.	Ownership of guidance to be taken by World Heritage Committee and states party to the World Heritage Convention	Reliability of current climate change scenarios		Report to the 30th session of the World Heritage Committee (Vilnius, 2006) <a href="http://www.helm.org.uk/climatechange">www.helm.org.uk/climatechange</a>
	Web-based advice on improving energy efficiency in historic buildings	Under development	Completion and dissemination of guidance			<a href="http://www.helm.org.uk/climatechange">www.helm.org.uk/climatechange</a>
	Advice on fitting micro-renewable	Under development	Completion and dissemination of			Web address to be confirmed

	generation		guidance			
<b>Sector: energy</b>						
<b>Practices</b>	Act now: adapting energy infrastructure Northern Ireland Electricity	Ongoing/continuous programme (at April 2006)	Northern Ireland Electricity are currently strengthening their infrastructure, in response to the 1998 floods and storms.			
	GENESIS - A Generic Process for Assessing Climate Change Impacts on the Electricity Supply Industry and Utilities	Completed (at April 2006)	This project will develop a generally applicable methodology for assessing the impact of climate change on the performance of the electricity supply industry. The generic assessment process will provide the currently missing integrated framework that is essential if the many technical and business risks that climate change may impose on the electricity supply industry are to be properly mediated and managed. The study concentrated on two exemplar aspects, namely: the impact on electricity consumption patterns and the impact on wind power generation			<a href="http://esi.eerc.bris.ac.uk/">http://esi.eerc.bris.ac.uk/</a>
	Maintaining a reliable and resilient energy	Under implementation.	Requirement for a dependable system of	The UK will become increasingly reliant on	Following the storms in the UK of October	Energy Review Report, July 2006

	system in the long term		physical distribution networks and access to sufficient and affordable energy.	imports of oil, coal and particularly gas as domestic production of these fuels declines. The UK will also need substantial new investment in electricity generation capacity to replace coal oil and nuclear power stations and to meet expected growth in electricity demand.	2002, the government has been working with the electricity industry to strengthen the resilience of the UK's electricity networks and to better prepare for the future. As a result the industry response to recovery from more recent storm-related events has in general been more successful in restoring supplies as quickly as possible.	( <a href="http://www.dti.gov.uk/energy/review/page31995.html">http://www.dti.gov.uk/energy/review/page31995.html</a> )
	Climate change will change the type and severity of impacts which we should plan to respond to. The normal approach for contingency planning in the UK is to adopt an all-hazards approach and prepare a response which is flexible and can be ramped up, if necessary. However, not all planners would be able to claim that they had an understanding of how climate change may pose problems. All levels of Government (and all Departments)					

	<p>need to factor-in the possible changes which climate change could bring about in respect of contingency planning but that is easy to say and much more of a challenge in practice. The Adaptation Policy Framework will help to address this issue.</p>					

PAPER NO. 7: JAPAN

**Japan's submission on adaptation approaches, strategies, practices and technologies for adaptation**

This submission is made in response to paragraph 56 of the document (FCCC/SBSTA/2006/11). Japan welcomes the opportunity to submit its information and views on adaptation approaches, strategies, practices and technologies for adaptation at the regional, national and local levels in different sectors, as well as on experiences, needs and concerns by following the structure provided from secretariat last January.

This submission of Japan is mainly based on two latest outputs. One is the output of the experts committee on Official Development Assistance (ODA) for climate change adaptation, formed by Japanese Ministry of Foreign Affairs. It has examined the diverse and technical aspects of what measures would be necessary, where the international community should focus its efforts so that developing countries would adapt to climate change, and how Japan would be able to contribute to this process. In March 2007, Japan adopted its recommendations on international cooperation for adaptation to climate change in developing countries. The second output is from Japan International Cooperation Agency (JICA). JICA is now assessing its past technical assistance activities in order to collect good practices for adaptation to climate change. JICA will compile the results and release the paper in a few months, whose outline is attached as the Annex to this submission.

Other outputs under preparation include researches conducted by Japan Bank for International Cooperation (JBIC). JBIC is developing a methodology to assess vulnerability of urban coastal area and also conducting empirical studies regarding adaptation strategies of farm households in Asia and Africa.

Japan has provided significant amount of ODA so far, in the forms of grant assistances, technical cooperation and concessional loans to support thousands of adaptation – related projects/activities in developing countries under Japan's ODA Charter and several initiatives such as Kyoto Initiative, WASABI, disaster reduction, assistance toward PIF member countries, etc.

The Government of Japan and its ODA agencies, JICA and JBIC, have conducted ex-post evaluation of each completed projects. Further details of effectiveness, impact and other lessons learned from past adaptation –related projects/activities can be obtained through the web-site of MOFA (<http://www.mofa.go.jp/policy/oda/note/index.html>), JICA (<http://www.jica.go.jp/english/evaluation/index.html>) and JBIC (<http://www.jbic.go.jp/english/oec/post/index.php>).

Japan considers that it is quite important to collect good practices and lessons learned from the past activities on adaptation, including those related to ODA. Japan looks forward to hearing related information from other parties.

Type of adaptation action <sup>1</sup>	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns/ Barriers	Experiences/ Lesson learned	References i.e. publications, websites etc.
<b>Scope of adaptation action</b> <i>Regional level</i>						
<b>Approaches/ strategies</b>						
<b>Practices</b>						
<b>Technologies</b>						
<i>National level</i>						
<b>Approaches/ strategies</b>	International Cooperation for Adaptation to Climate Change in Developing Countries (Recommendations by Experts Committee) Ministry of Foreign Affairs of Japan	-under implementation  The recommendations, announced April 2007, herein both set forth the key issues on adaptation approach, and describe required policies to promote adaptation measures in developing countries, and appropriate assistance that the international community including Japan should pursue.	- International cooperation in observation, forecasting, impact assessment and other aspects of climate change. - Guidelines for mainstreaming adaptation considerations in development assistance projects. -The urgent sector, such as water resources, food supplies (agriculture), healthcare, disaster prevention, infrastructure and ecosystems, should be selected on a regional basis. etc.		Adaptation measures are unlikely to be a single policy aimed at adapting to the adverse effects of climate change but a comprehensive policy issue to be addressed in the context of development policies on poverty reduction, agricultural development, water resources development and disaster prevention.	Full paper of the recommendation is available at; <a href="http://www.mofa.go.jp/gaiko/oda/bunya/environment/reference.html">http://www.mofa.go.jp/gaiko/oda/bunya/environment/reference.html</a>

<sup>1</sup> Please be aware of the degree of adaptation within activities:

- Some activities are undertaken specifically to adapt to climate change, e.g. increased water storage capacity, development of new crop varieties.
- Some activities include a component of climate change adaptation, e.g. infrastructure replacement incorporating higher flood standards
- Some activities are not carried out for adaptation but have other objectives such as preserving biodiversity, however they can offer adaptation co-benefits, e.g. restored wetlands protect against storm surges.

<b>Practices</b>						
<b>Technologies</b>	Study on vulnerability of mega cities in Asia and adaptation strategies by Japan Bank for International Cooperation	Under implementation  Includes Manila and other cities as case studies	Joint development of assessment methodology with World Bank and Asian Development Bank			
<i>Local (community) level</i>						
<b>Approaches/ strategies</b>						
<b>Practices</b>						
<b>Technologies</b>						

Type of adaptation action	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns/ Barriers	Experiences/ Lesson learned	References i.e. publications, websites etc.
<i>Sectoral level</i>						
<i>Agriculture</i>						
<b>Approaches/ Strategies</b>	a pilot project aiming for the capacity development of the nomads (Mongolia)	04/2004-03/2007	Project for capacity building of the nomads	Adding to adapting to climate impacts, it is necessary to introduce measures to control overgrazing by livestock	(1) Role of aid agencies/companies directly involved in aid activities should be enhanced without discouraging ownership of host countries and groups of residents. (2) Traditional technologies and know-how should be utilized.	
<b>Practices</b>						



<b>Technologies</b>	'The Study on Comprehensive Agricultural Development of Prek Thnot River Basin' (Cambodia)	07/2005-08/2008			(1) Improvement of irrigation system, (2) planning for flood warning system	For more details, please refer to the research paper on 'JICA's Approach on Adaptation to Climate Change', which will be published this year. A summary paper is attached.
<b>Technologies</b>	'Promotion, Development and Dissemination of NERICA Rice Varieties' (Uganda)	06/2004-06/2006			Transfer of rice cultivation technology	
<b>Technologies</b>	a pilot study in north-east Asia for developing desertification assessment and constructing an early warning system (EWS)	04/2004-03/2007	The CST of the 6 <sup>th</sup> COP, UNCCD was urging to establish an early warning system against desertification.	There is a gap between data obtained from satellite and those from in situ observation.  Integration between EWS and appropriate countermeasures are necessary.	(1)The risks of soil degradation varied regionally (2)The options for the desertification countermeasures (3)The cost-effectiveness evaluation.	
<b>Technologies</b>	a study and research project for transferring the methods of technologies for desertification countermeasures (Burkina Faso)	04/2004-03/2008	Traditional technologies and know-how are necessary.		(1) Role of aid agencies/companies directly involved in aid activities should be enhanced without discouraging ownership of host	

					countries and groups of residents. (2) Traditional technologies and know-how should be utilized.	
<i>Water resources</i>						
<b>Approaches/ Strategies</b>	'The Study for the Water Resources Management and Rural Water Supply Improvement' (Yemen)	12/2005-07/2007			(1) Institutional development for water resource management, (2) participatory approach, (3) development of rural water supplies	Ditto
<b>Practices</b>						

<b>Technologies</b>	Asian Water Cycle Initiative (AWCI) Bangladesh, Bhutan, Cambodia, China, India, Indonesia, Japan, Korea, Laos, Mongolia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Uzbekistan, Vietnam	-under development  Baseline ideas for implementation were agreed at the 2 <sup>nd</sup> Asian Water Cycle Symposium, 9-10 January 2007. See "Annex AWCI". An implementation plan will be approved at the 3 <sup>rd</sup> Asian Water Cycle Symposium, 3-5 December 2007.  Preliminary case studies started in Vietnam, Bangladesh, Thailand, Pakistan and Japan.  Implementation period: 2008-2010			Improvement of flood control and water use management	Annex AWCI
<b>Technologies</b>	Study on Advanced Prediction System and Counter Measures of Regional- and Meso- scale Water Cycle	Under implementation	Joint development of the JICA project, such as water resource survey and management in arid land countries		Technology transfer is an important factor to apply the adaptation technologies for water management, desert greening and oasis-network establishment into practical needs in arid land countries	<a href="http://kvousei.aesto.or.jp/~k051open/">http://kvousei.aesto.or.jp/~k051open/</a>

<b>Technologies</b>	A Sub-surface dam for the effective use of underground water in the arid area (Burkina Faso)	1995-2002	a Sub-surface dam for the effective use of underground water in the arid area and to have a research on the effect and effective use of its storage of water and suffered influences to natural environment		This sub-surface dam brought villagers about 2,700 m <sup>3</sup> of water supply a year.	
<i>Health</i>						
<b>Approaches/ Strategies</b>	'Enhancement of Early Diagnosis for Malaria' (Tanzania)	11/2004-11/2007			Community-based approach for disease control	ditto
<b>Practices</b>						
<b>Technologies</b>						
<i>Coastal zones (settlements)</i>						
<b>Approaches/ Strategies</b>						ditto
<b>Practices</b>	'The Study on Comprehensive Flood Mitigation for Cavite Low' (The Philippines)	03/2007-01/2009			Community-based approach for disaster management	

<b>Technologies</b>	'The Project for the Construction of Multipurpose Cyclone Shelter' (Bangladesh)	Completed 11/2005.			Construction of cyclone shelter	
<b>Technologies</b>	'The Project for the Seawall Construction in Male Island' (Maldives)	Completed 11/2002.			Construction of protective structures for vulnerable coastal zones	
<i>Forest / Nature Conservation</i>						
<b>Approaches/ Strategies</b>						ditto
<b>Practices</b>	'Coastal Wetland Conservation in Yucatan Peninsula' (Mexico)	03/2003-02/2008			(1) Restoration of mangroves, (2) environmental education	
<b>Technologies</b>	'Palau International Coral Reef Center Strengthening Project' (Palau)	10/2002-09/2006			Strengthening of monitoring abilities	
<i>Others (please provide information about other relevant sectors)</i>						
<b>Approaches/ Strategies</b>						ditto
<b>Practices</b>	Group Training Course 'Development of Strategies on Climate Change'	Under implementation			Provision of technical training (Acceptance of trainees from developing countries to Japan)	
<b>Technologies</b>						

## **JICA's Approach on Adaptation to Climate Change**

### **1 JICA's Approach on Adaptation**

#### **1-1 Basic Concepts for JICA's Cooperation related to Adaptation**

As effects of climate change have been increasingly observed, the needs for assistance on adaptation in developing countries are also growing. In response to their needs, JICA is expected to assist developing countries in designing and implementing the adaptation measures. It should be noted that there are two basic concepts underlying JICA's cooperation in this area; one is a concept of 'human security', and the other is 'capacity development' (CD) as a key approach. In addition, adequacy and possibility to internalize adaptation considerations into a range of conventional projects should also be examined.

#### **1-2 Approach to Adaptation Measures in JICA's Cooperation**

The adaptive capacity consists of various interacting elements such as human resources, knowledge, information and technology. Assistance for adaptation in developing countries is to help strengthening of these elements at individual and organizational levels. It is also important to support to create enabling environment, such as overall policies and rules, for facilitating interactions among those individuals and organizations. In other words, assistance for adaptation is to support recipient countries in developing their own adaptive capacity as a whole on multiple levels of individuals, organizations, and societies.

There are three entry points of assistance for adaptation. First is the empowerment of communities by promoting CD at specific communities and sharing lessons with others. The second is strengthening of key organizations by promoting human resources development, technology dissemination or research development. The third is the policy formulation and institutionalization where assistance is provided for key ministries to develop their capacity to formulate and implement related policies.

### **2 Adaptation Measures in Each Sector**

## 2-1 Water Resources

Adaptation measures in this sector may include appropriate water resource management, development, and effective utilization, as well as water quality and sanitation improvement. Institutional development for water resource management and development of rural water supplies are among the examples of the measures taken by JICA projects.

Project examples:

**【Morocco: The Study on the Integrated Water Resources Management Plan in the Haouz Plain in the Kingdom of Morocco】**

(September 2005 – March 2008)

**【Yemen: The Study for the Water Resources Management and Rural Water Supply Improvement】**

(December 2005 – July 2007)

**【Ethiopia: The Project for Water Supply Development in the Afar National Regional State】**

(Basic Design Study: January – July 2006, Exchange of Notes: November 2006, This project is in operation)

## 2-2 Agriculture / Food

Adaptation in this sector may include irrigation facility development, crop plant breed improvement, rural development with participation of local residents, and countermeasures against extreme climate events. JICA projects with adaptive effects include water management with participatory approach, transfer of rice cultivation technology, integrated rural development approach.

Project examples:

**【Cambodia: The Study on Comprehensive Agricultural Development of Prek Thnot River Basin】**

(July 2005 – August 2008)

**【Uganda: Promotion, Development and Dissemination of NERICA Rice Varieties in Uganda】**

(June 2004 – June 2006)

**【Mali: The Study on the Capacity Building Programs for the Community-based Prevention of Desertification in the South Region of Segou in the Republic of Mali】**

(July 2004 – January 2008)

### 2-3 Forest / Nature Conservation

Development of infectious disease/vectors-resistant tree species, mangrove conservation, forest disaster prevention, and forestation in arid areas are considered as adaptation measures in this sector. The examples of the measures taken at JICA projects include research and development of adaptation technologies, transfer and dissemination of appropriate technologies, and strengthening of monitoring abilities.

Project examples:

**【Mexico: Coastal Wetland Conservation in Yucatan Peninsula】**

(March 2003 – February 2008)

**【Palau: Palau International Coral Reef Center Strengthening Project】**

(October 2002 – September 2006)

**【China: The Japan-China Cooperation Science and Technology Center for Forest Tree Improvement Project】**

(October 2001 – October 2006)

**【Nicaragua: The Project on Participatory Forest Management】**

(December 2000 – July 2004)

### 2-4 Disaster Prevention (including coastal defense)

Adaptation in this sector may include coastal disaster prevention, river disaster prevention, landslide disaster prevention, and disaster prevention planning. Among the measures taken at JICA projects are implementation of countermeasures against current disaster risks, awareness raising and capacity strengthening on disaster management in communities, establishment of early-warning systems, and capacity improvement of governmental section in charge of disaster prevention.



Project examples:

**【Philippines: The Study on Comprehensive Flood Mitigation for Cavite Low in the Republic of the Philippines】**

(March 2007 – January 2009)

**【Maldives: The Project for the Seawall Construction in Male Island (Phase 4)】**

(Basic Design Study: February – June 2000, Exchange of Notes: August 2000, Completed in November 2002)

**【Bangladesh: The Project for the Construction of Multipurpose Cyclone Shelter (Phase V)】**

(Basic Design Study: March – July 2003, Exchange of Notes: November 2003, Completed in November 2005)

## 2-5 Urban / regional development and transportation

Adaptation measures in this sector may include development plan formulation and infrastructure maintenance. There are few JICA projects that take account of future climate change risks. However, projects that address current climate risks are also expected to help recipient countries in enhancing their capacity to respond to future risks.

Project examples:

**【Cambodia: the Project for Improvement of National Road No.1 (Phnom Penh-Neak Loueng Section)】**

(Basic Design Study: March 2004 – March 2005, Exchange of Notes: June 2005, This project is in operation.)

**【Bangladesh: The Project for the Construction of Portable Steel Bridges for Rural Roads】**

(Basic Design Study: December 2004 – August 2005, Exchange of Notes: November 2005, Completed in January 2007)

**【Sri Lanka: The Detailed Design Study on the Outer Circular Highway to City of Colombo in the Democratic Socialist Republic of Sri Lanka】**

(2001-2002, 2004-2005)

## 2-6 Health

Adaptation in this sector may include measures against malaria, waterborne infectious diseases, as well as actions tailored for high risk areas. Among the measures taken at JICA projects are strengthening of adaptive capacity through maintenance of health information system and establishing of an administration system to control diseases.

Project examples:

**【Tanzania: Enhancement of early diagnosis for Malaria】**

(November 2004 – November 2007)

**【Zambia: Lusaka District Primary Healthcare Project (Phase 2)】**

(July 2002 – July 2007)

#### 2-7 Others (acceptance of trainees)

Among various technical training courses conducted by JICA, there are many courses that are related to adaptation to climate change. The examples include anti-tropical diseases, water management technology in dry regions, measures against extreme climate events, agricultural crops cultivation, and ecosystem protection. Specifically, the Group Training Course on “Development of Strategies on Climate Change” has been successfully conducted for many years, contributing to helping the participants in enhancing their capacities on adaptation.

#### 2-8 Overview

JICA has implemented a number of technical cooperation projects which include adaptive effects in one way or another. Particularly, there are many cases where the measures taken to counter current climate risks also contribute to enhancement of capacity to adapt to future climate risks. There are also many examples where a participatory approach is found to be effective. More profound effects will be expected, if climate change impacts and vulnerabilities are taken into consideration from an early stage of project design in many cases.

PAPER NO. 8: MEXICO

**Submission from Mexico  
on adaptation approaches, strategies, practices and technologies for adaptation**

**15 May 2007**

Mexico thanks the Secretariat of the UNFCCC and SBSTA, and welcomes the opportunity to express views on relevant examples of adaptation approaches, strategies, practices and technologies for adaptation at the regional, national and local levels in different sectors, as well as on experiences, needs and concerns.

**(continued in next page)**

Type of adaptation action	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns/ Barriers	Experiences/ Lesson learned	References i.e. publications, websites etc.
<b>Scope of adaptation action</b> <i>Regional level</i>						
<b>Approaches/ strategies</b>	Stage II Capacity Building Project for Adaptation to Climate Change in Central America, Mexico and Cuba.	Ongoing	Need to replicate the Project at the local level, and to incorporate its results into public policies.	The differences in capacity and coordination approaches among participating countries. Lack of coordination among the academia and governmental sectors.	Taking key stakeholders on board since the early stages of the Project, improved its chances of success, and made the vulnerability assessment and the identification of possible adaptation measures process much easier.	México: Tercera Comunicación Nacional ante la Convención Marco de las Naciones Unidas sobre Cambio Climático, 2006. <a href="http://www.ine.gob.mx">http://www.ine.gob.mx</a> , <a href="http://www.cathalac.org/">http://www.cathalac.org/</a>
<i>National level</i>						
<b>Approaches/ strategies</b>	National Adaptation Strategy within the Intergovernmental Commission for Climate Change	Under development	Coordination among different areas of the federal government needs to be	Budget constraints and institutional barriers that make policy integration difficult.	The inclusion of all relevant areas is necessary, as well as consultations	<a href="http://www.ine.gob.mx">http://www.ine.gob.mx</a> , <a href="http://www.semarnat.gob.mx/queessemarnat/cambioclimatico/Pages/cicc.aspx">http://www.semarnat.gob.mx/queessemarnat/cambioclimatico/Pages/cicc.aspx</a>

			improved. Analysis of costs and co-benefits would be useful.		with non governmental organizations. International experiences are useful.	
<b>Approaches/ strategies</b>	Assessment of current and future vulnerability at the national level for water, agriculture and forest sectors, with a view to improve their adaptive capacity.	Under development	A major challenge will be to incorporate measures identified into sector policies.	Budget constraints and institutional barriers that make policy integration difficult.	Stakeholders contributed to identify adaptation measures. The coordination among the academic and governmental sectors was very useful.	<a href="http://pembu.atmosfcu.unam.mx/~cambio/">http://pembu.atmosfcu.unam.mx/~cambio/</a> <a href="http://www.ine.gob.mx/cclimatico/comnal3.html">http://www.ine.gob.mx/cclimatico/comnal3.html</a>
<b>Approaches/ strategies</b>	Sector Plan of the Ministry of Social Development	Under development	Look for synergies with other Ministries of the Federal Government in order to explore and develop integral adaptation actions.	Limited capacity and monetary resources necessary to assess the vulnerability of the sector under different climate change scenarios.	A territorial model, currently under construction, is being considered as the basis of the Plan. For this model, the physical environment is the main pillar that supports the development of human activities, and as such it should be preserved.	
<b>Approaches/ Strategies</b>	National Forest Program and	Under implementation	It is necessary to consider	Capacity constraints.		<a href="http://www.conafor.gob.mx/portal/index.php?s1=2">http://www.conafor.gob.mx/portal/index.php?s1=2</a>

	Strategic Forest Program for Mexico for year 2025 – ProArbol Program: 250 million trees to be planted in 2007		climate change scenarios, in order to identify the species that could be planted in different climate conditions.			
<i>Local (community) level</i>						
<b>Approaches/ strategies</b>	Identification of adaptation measures to be implemented in coastal wetlands in the Gulf of Mexico.	Under implementation	Conveying the idea about the need to include climate change considerations in local policies	Lack of research capacity at the local level and in the topics to be addressed.	It is seen as crucial to look at socioeconomic aspects related to this issue, and at measures that could be implemented in the short-term	<a href="http://www.gefonline.org/projectDetails.cfm?projID=3159">http://www.gefonline.org/projectDetails.cfm?projID=3159</a> <a href="http://www.ine.gob.mx/cclimatico/comnal3.html">http://www.ine.gob.mx/cclimatico/comnal3.html</a>
<b>Approaches/ Strategies</b>	Development of the first state-level climate action plan in Mexico (for the State of Veracruz), which includes an adaptation component.	Under development	Capacity and resources need to exist at the state and local level. Collaboration from national and international	It has been important to identify the advantages at the state and local level that the development and implementation of global climate change policies might bring.	Actions at the local and state level are deemed as crucial, and so is the development of capacity and legal and institutional frameworks. The participation of key stakeholders and the coordination among federal and state and	México: Tercera Comunicación Nacional ante la Convención Marco de las Naciones Unidas sobre Cambio Climático, 2006. <a href="http://www.ine.gob.mx">http://www.ine.gob.mx</a>

					local governments are very important for this kind of activity.	
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<i>Sectoral level</i>						
<i>Water resources</i>						
<b>Approaches/ Strategies</b>	National Hydrological Plan	Under development	Look for synergies among different ministries of the Federal Government in order to explore and develop integral adaptation actions for the water sector.	Limited capacity and monetary resources necessary to assess the vulnerability of the sector under different climate change scenarios.	Inclusion of key stakeholders expected. Coordination among academia and government will be sought after.	Not available.
<i>Others (please provide information about other relevant sectors)</i>						
<b>Approaches/ Strategies</b>	National Civil Protection System	Ongoing	Climate change scenarios have not been considered yet in the design of this System.		The system is moving from a reactive to a more proactive approach.	<a href="http://www.proteccioncivil.gob.mx">http://www.proteccioncivil.gob.mx</a>
<b>Practices</b>	Payment for environmental services in the forest sector	Under implementation	The evaluation of the real impact of the payment for environmental services in the conservation of forest areas.	Definition of a methodology to define priority areas and to establish the amount of payment to be made. Maximum surface limit of 200 hectares.	It has been important to link forest conservation to all services provided by forests, not only carbon sequestration, but also their role on the hydrological cycle, soil preservation, etc.	<a href="http://www.conafor.gob.mx/portal/index.php?s1=2&amp;s2=1&amp;s3=11">http://www.conafor.gob.mx/portal/index.php?s1=2&amp;s2=1&amp;s3=11</a>
<b>Technologies</b>	Risk atlases	Under	Limited	It is necessary	This technology has	<a href="http://www.cenapred.unam.mx/">http://www.cenapred.unam.mx/</a>



	and early warning systems (for hurricanes and floods)	implementation	capacity to develop risk maps at local and regional level.	to increase capacity to assess vulnerability at regional and local level.	had positive impacts in preparedness in case of extreme hydro-meteorological events. Prevention has received larger attention and resources.	
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**Nairobi work programme on impacts, vulnerability and adaptation to climate change  
New Zealand submission May 2007**

This submission responds to the invitation from SBSTA to provide information on adaptation approaches, strategies, practices and technologies for adaptation at the regional, national and local levels in different sectors, as well as on experiences, needs and concerns.

New Zealand provided a submission to SBSTA in February 2007 responding to the invitation to provide information on relevant programmes activities and views on the issues relating to climate related risks and extreme events. Some of the material in the February submission (FCCC/SBSTA/2007/MISC.4 refers) provides more detail on some of the information in the table below.

In the table below examples of adaptation approaches at the regional, national and local level are provided in different sectors.

Type of adaptation action <sup>1</sup>	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns/ Barriers	Experiences/ Lesson learned	References i.e. publications, websites etc.
<b>Scope of adaptation action</b> <i>Regional level</i>						
<b>Approaches/ strategies</b>	Pacific outreach programme on IPCC 4 <sup>th</sup> assessment report	Under implementation. This activity will be ongoing during 2007 with around six individual			Important to respond to needs identified in the region; tailoring the outreach activities to fit with events/other	

<sup>1</sup> Please be aware of the degree of adaptation within activities:

- Some activities are undertaken specifically to adapt to climate change, e.g. increased water storage capacity, development of new crop varieties.
- Some activities include a component of climate change adaptation, e.g. infrastructure replacement incorporating higher flood standards
- Some activities are not carried out for adaptation but have other objectives such as preserving biodiversity; however they can offer adaptation co-benefits, e.g. restored wetlands protect against storm surges.

		workshops/meetings in different locations in the South Pacific.			meetings already scheduled in the region is a practical way to implement the strategy.	
<b>Practices</b>						
<b>Technologies</b>						
<i>National level</i>						
<b>Approaches/ strategies</b>	New Zealand Climate Change Adaptation Programme: Focus on partnerships with key sectors (local government, engineers, insurance industry, and agriculture sector). One component is a national information programme using case-studies to illustrate practical adaptation actions. In addition climate change risk management is being factored into all existing work programmes where climate	ongoing			<b>Experiences/Lesson learned</b>  Important to have adaptation needs identified by the sector rather than top-down. Important to identify the co-benefits of existing work programmes e.g. the Sustainable Water Programme of Action	<a href="http://www.climatechange.govt.nz">www.climatechange.govt.nz</a>

	change and variability will have an effect e.g. Sustainable Water Programme of Action, Review of Flood Risk Management, Review of the New Zealand Coastal Policy Statement.					
<b>Practices</b>						
<b>Technologies</b>						
<b>Local (community) level</b>						
<b>Approaches/ strategies</b>	<i>Community based dune management</i> for the mitigation of coastal hazards and climate change effects. Dune replanting is the technology employed.	ongoing			<b>Experiences/Lesson learned</b> Community based dune restoration partnership programmes may be the most effective and affordable method of managing climate change impacts on the coast in at least the short to medium term. Community involvement, empowerment, understanding and respect are essential.	<a href="http://www.ebop.govt.nz/Coast/Care/Coast-Care-Bay-of-Plenty.asp">www.ebop.govt.nz/Coast/Care/Coast-Care-Bay-of-Plenty.asp</a> <a href="http://www.climatechange.govt.nz/resources/adaptation/index.html">www.climatechange.govt.nz/resources/adaptation/index.html</a>
	<i>Adapting to climate change in eastern New Zealand – The Hawkes Bay Climate Change Adaptation Group</i> , funded through the Sustainable Farming Fund.				<b>Experiences/Lesson learned</b> This community level project is aimed at identifying and implementing practical measures for the long-term sustainability (ecological, social and economic) of land and water resources in eastern New Zealand, in the face of uncertain climate change projections. The project is being implemented through development of a “best practice” adaptation resource kit for	<a href="http://www.mfe.govt.nz/publications/climate/view-from-the-ground-iul03/view-from-the-ground-iul03.pdf">http://www.mfe.govt.nz/publications/climate/view-from-the-ground-iul03/view-from-the-ground-iul03.pdf</a>

				<p>the management of climate change impacts in eastern New Zealand, and education and awareness raising of farmers and rural communities on climate change and adaptation measures that can be adopted over time.</p> <p>Part of this project resulted in publication by Earthwise Consulting of <i>The View from the Ground</i> – a farmer perspective on climate change and adaptation. The approach taken, used six workshops for farmers in different parts of New Zealand to develop a grassroots perspective on adapting to climate change, and to draw relevant information together in order to share it more widely. The “view from the ground” is a very positive and proactive view – farmers collectively have a lot of capacity to adapt to climate change. However, this adaptive capacity is qualified by a need for a more cooperative environment in which a strong sense of community is needed along with greater communication between farming and non-farming communities</p>	
	<p><i>Changing attitudes and practice for farming dry land in Marlborough – Starborough - Flaxbourne Soil Conservation Group, funded through the Sustainable</i></p>			<p><b>Experiences/Lesson learned</b>  This project aims to change farmer attitudes and land management practices for farming fragile dry land in Southern Marlborough. It is led by a farmer management group based in the Starborough - Flaxbourne area of Marlborough</p>	<p><a href="http://www.maf.govt.nz/sff/about-projects/search/05-132/index.htm">http://www.maf.govt.nz/sff/about-projects/search/05-132/index.htm</a></p>

	Farming Fund					
	<i>Sustainable production in Marlborough's variable climate - Marlborough Sustainable Primary Production Group, funded through the Sustainable Farming Fund</i>				<b>Experiences/Lesson learned</b> The implementation and demonstration of systems of sustainable pastoral and arable farming within Marlborough's dryland climate by using predictive pasture modelling based on soil moisture analysis as a management tool to identify sustainable farming systems	<a href="http://www.maf.govt.nz/sff/about-projects/search/00-337/index.htm">http://www.maf.govt.nz/sff/about-projects/search/00-337/index.htm</a>
<b>Practices</b>						
<b>Technologies</b>						

Sectoral level <sup>2</sup>					
Agriculture					
<b>Approaches/ Strategies</b>	The Sustainable Farming Fund administered by the Ministry of Agriculture and Forestry supports environmentally sustainable community projects. A large proportion of the funded projects have benefits for adaptation of current farming systems to increase economic and environmental resilience e.g. drought tolerant species, dry land management, irrigation efficiency, water feasibility studies and new forestry species. Examples of these community projects are provided under the <i>Local</i>			<b>Experiences/Lesson learned</b> Community based programmes are an excellent way of building capacity and understanding at the on-farm level.	<a href="http://www.maf.govt.nz/sff/index.htm">http://www.maf.govt.nz/sff/index.htm</a>

<sup>2</sup> The sectors below are given as examples. Please provide information on any other sectors which you consider important and have examples to share.

	<i>(community level heading above)</i>					
<b>Practices</b>						
<b>Technologies</b>						
<i>Water resources</i>						
<b>Approaches/ Strategies</b>	Building climate change into Sustainable Water Programme of Action	Under development			<b>Experiences/Lesson learned</b> Important to identify the co-benefits of existing work programmes. This programme addresses water quality, water allocation and availability, including consideration of the impacts of climate variability and change. The work on more efficient water allocation will assist land and water users across a range of sectors (including agriculture, forestry, electricity generators and communities) to adapt to the impacts of climate change and increase resilience to climate variability. Linkages between other government programmes are being made to ensure climate change actions are consistent	<a href="http://www.mfe.govt.nz/issues/water/rog-action/index.html">http://www.mfe.govt.nz/issues/water/rog-action/index.html</a>
<b>Practices</b>						
<b>Technologies</b>						
<i>Health</i>						
<b>Approaches/ Strategies</b>						
<b>Practices</b>						
<b>Technologies</b>						
<i>Coastal zones (settlements)</i>						
<b>Approaches/ Strategies</b>	Provision of guidance material through the Coastal Hazards and Climate	To be updated using information from IPCC AR4			<b>Experiences/Lesson learned</b> The type of approach including a decision-making framework to assess risks is very successful with the target audiences	<a href="http://www.climatechange.govt.nz">www.climatechange.govt.nz</a> <a href="http://www.climatechange.govt.nz/resources/adaptation/index.html">www.climatechange.govt.nz/resources/adaptation/index.html</a>



	Change Guidance manual					
<b>Practices</b>	Set-backs from waterways and raised floor levels in flood prone areas have been incorporated into the Christchurch City Plan and Urban Development Strategy.				<p><b>Experiences/Lesson learned</b>          These changes to the Christchurch City Plan and Urban Development Strategy seek to reduce the risks to the community from climate change (sea level rise and flooding). While these practices are geographically specific in their scope, it is expected that many of the issues, challenges, and methodologies relating to coastal hazard planning within a climate change framework presented in the report that was commissioned by the Christchurch City Council and on which the changes to the City Plan were based, will also be applicable in other regions and catchments.</p>	<a href="http://www.ecan.govt.nz/climate">www.ecan.govt.nz/climate</a> <a href="http://www.climatechange.govt.nz/resources/adaptation/index.html">www.climatechange.govt.nz/resources/adaptation/index.html</a>
<b>Technologies</b>	See community based dune management example under the <b>Local (community) level</b> heading above					
<i>Infrastructure</i>						
<b>Approaches/ Strategies</b>	Development of CLINZI (Climate's Long-term Impact on New Zealand's Infrastructure) an integrated assessment				<p><b>Experiences/Lesson learned</b>          Wellington City Council (WCC) has undertaken a risk analysis using CLINZI. Seven risks were identified as requiring further attention including: change in water demand, possible reduced water quality,</p>	<a href="http://www.wellington.govt.nz/services/environment/climate.html">www.wellington.govt.nz/services/environment/climate.html</a> <a href="http://www.climatechange.govt.nz/resources/adaptation/index.html">www.climatechange.govt.nz/resources/adaptation/index.html</a>

	<p>process for assessing the long-term impact of climate on infrastructure investments. Its purpose is to assist local councils with their functions using a decision-tool. CLINZI was developed by the New Zealand Centre for Ecological Economics (NZCEE, a joint venture between Landcare Research NZ Ltd and Massey University) in conjunction with NIWA and the International Global Change Institute (IGCI). It involves generation of local climate scenarios, regression modelling and qualitative analysis, all within a risk management framework.</p>				<p>impacts on storm water discharge rates to the sea from sea level rise, changes in electricity demands, impacts on transmission assets, increased maintenance of roads, and changes in traffic demand.</p> <p>The modelling analysis concluded that it would be prudent for WCC to build a state of readiness for climate change. The analysis of policies and strategies concluded that while WCC acknowledged potential climate change risk in a range of official documents, further work was recommended. The study recommended that WCC place a greater focus on communicating the climate change aspects of its policies to the public.</p>	
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<b>Practices</b>	Building projected climate change into design criteria for stormwater infrastructure	On-going			Being pro-active with stormwater infrastructure upgrades will reduce the impact of high rainfall events that are projected to increase in frequency and intensity.	<a href="http://www.climatechange.govt.nz">www.climatechange.govt.nz</a> <a href="http://www.kapiticoast.govt.nz/Sustainability/ClimateChange.html">www.kapiticoast.govt.nz/Sustainability/ClimateChange.html</a>
	Building projected climate change into design criteria for bridges and culverts that are part of New Zealand's state highway system	On-going			Transit New Zealand (the Crown Entity responsible for state highways in New Zealand) has demonstrated its ability to incorporate a changing physical environment into its planning processes.	<a href="http://www.transit.govt.nz/planning/climate.jsp">www.transit.govt.nz/planning/climate.jsp</a> <a href="http://www.climatechange.govt.nz">www.climatechange.govt.nz</a>
<b>Technologies</b>						

PAPER NO. 10: SOUTH AFRICA

**Response to request for submissions from Parties and organisations  
on adaptation approaches, strategies, practices and technologies for adaptation**

**A. Mandate**

1. The SBSTA invited Parties and relevant organizations to provide structured submissions, by 15 May 2007, on adaptation approaches, strategies, practices and technologies for adaptation at the regional, national and local levels in different sectors, as well as on experiences, needs and concerns. It requested the secretariat to develop the structure for these submissions and to disseminate it to Parties by 20 January 2007 (FCCC/SBSTA/2006/11, paragraph 56).

**B. Preamble**

South Africa welcomes the opportunity to provide inputs to this important information gathering process, and looks forward to pursuing a global integration of this information that will allow a clear identification of the extent of individual country commitment to adapting to climate change.

We note that our submission outlines both real investment in accordance with the requirements of Articles 10 d), 10 e), 13.4 c) of the Kyoto Protocol, and Articles 3.4, 4 f), 4 g), 4 h), 4 i), 5, 6, 12.1 c), and identifies key areas which are under consideration.

Accordingly, we note that these submissions are very likely, as ours does here, to identify many opportunities for enhanced actions identified as “under consideration” that may benefit from additional funding sources in accordance with the South African view on the “360° approach” to adaptation.

We strongly agree that “many adaptation actions by their nature are very cross-cutting as they seek to enhance adaptive capacities and reduce vulnerabilities in a number of related sectors and communities” but note that this should not distract from the very real need for funding such actions in a way that is consistent with the spirit and intent of the UNFCCC.

We also note that several large scale initiatives are currently being put in place by various South African agencies to deal with current climate variability and environmental monitoring – these include high cost, high technology approaches such as Doppler radar techniques to quantify and monitor extreme rainfall events, and remote sensing approaches from space, such as locally developed high resolution camera techniques, currently due for launch.

**South Africa: Submissions from Parties and organisations  
on adaptation approaches, strategies, practices and technologies for adaptation**

**14.05.2007**

Type of adaptation action <sup>1</sup>	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns/ Barriers	Experiences/ Lesson learned	References i.e. publications, websites etc.
<b>Scope of adaptation action</b> <i>Regional level</i>						
<b>Approaches/ strategies</b>	Landcare South Africa: Optimising productivity and sustainability of natural resources so as to result in greater productivity, food security, job creation and better quality of life for all	Under implementation	Political buy-in at national and local level Sufficient funding and good governance structures Stakeholder involvement	Funding availability and sustainability	Sustainable development principles provide support co-benefits for climate change adaptation objectives	<a href="http://www.nda.agric.za/docs/Landcarepage/landcare.htm">http://www.nda.agric.za/docs/Landcarepage/landcare.htm</a>
<b>Approaches/</b>	Working for water:	Under	Political buy-in at	Funding	Sustainable	<a href="http://www.dwaf.gov.za/wfw/">http://www.dwaf.gov.za/wfw/</a>

<sup>1</sup> Please be aware of the degree of adaptation within activities:

- Some activities are undertaken specifically to adapt to climate change, e.g. increased water storage capacity, development of new crop varieties.
- Some activities include a component of climate change adaptation, e.g. infrastructure replacement incorporating higher flood standards
- Some activities are not carried out for adaptation but have other objectives such as preserving biodiversity, however they can offer adaptation co-benefits, e.g. restored wetlands protect against storm surges.

<b>strategies</b>	Alien plant removal program to enhance water yield from natural catchments and landscapes	implementation	national and local level Sufficient funding and good governance structures Stakeholder involvement	availability and sustainability	development principles provide support and co-benefits for climate change adaptation objectives	
<b>Approaches/strategies</b>	Working for wetlands: Producing sustainable environmental outcomes, using implementation models that simultaneously contribute to the employment creation and skills transfer objectives of government's Expanded Public Works Programme	Under implementation	Political buy-in at national and local level Sufficient funding and good governance structures Stakeholder involvement	Funding availability and sustainability	Sustainable development principles provide support and co-benefits for climate change adaptation objectives	<a href="http://www.sanbi.org/research/wetlandprog.htm">http://www.sanbi.org/research/wetlandprog.htm</a>
<b>Approaches/strategies</b>	Working on fire: Managing wildfire for sustainable development outcomes	Under implementation	Political buy-in at national and local level Sufficient funding and good governance structures Stakeholder involvement	Funding availability and sustainability	Sustainable development principles provide support and co-benefits for climate change adaptation objectives	Val Charlton, Advocacy and Awareness Co-ordinator, Working on Fire Programme – + 27 (0) 82 378 9056 <a href="mailto:val@wofire.co.za">val@wofire.co.za</a>

<b>Approaches/ strategies</b>	Climate Change R and D strategy <i>(initiative of the Department of Science and Technology)</i>	Under consideration	Political buy-in at national and local level Sufficient funding and good governance structures Stakeholder involvement	Funding availability and sustainability		
<b>Approaches/ strategies</b>	SAEON: South African Ecological Observatory Network	Under implementation	Political buy-in, sufficient funding and good governance structures, regional co-ordination and scientific capacity	Funding availability and sustainability		Dr Johan Pauw 211 Skinner Street PO Box 1758 0001 Pretoria  www.saeon.ac.za

<i>National level</i>						
<b>Approaches/ strategies</b>	Weather Research and Information Programme	Network of stations needs to be expanded and all stations need cohesive and consistent monitoring and reporting – the expansion is under consideration	Budget (estimated at 500k per annum over 3 years) Capacity Established channels for communicating weather information	No extra barriers identified		<p><a href="http://www.wc-climatechange-response.org.za">www.wc-climatechange-response.org.za</a> : A Climate Change Strategy and Action Plan for the Western Cape version 6</p> <p>Midgley, G.F., Chapman, R.A., Hewitson, B., Johnston, P., De Wit, M., Ziervogel, G., Mukheibir, P., van Niekerk, L., Tadross, M., van Wilgen, B.W., Kgope, B., Morant, P.D., Theron, A., Scholes, R.J., Forsyth, G.G. (2005) A Status Quo, Vulnerability and Adaptation Assessment of the Physical and Socio-economic Effects of Climate Change in the Western Cape. CSIR Report No. ENV-S-C 2005-073.</p>
<b>Practices</b>	Improved land use management and related agricultural practices	Current research in segments – e.g. sustainable agriculture practices; programme under consideration	Capacity (human) – e.g. through strengthening of extension services in agriculture Training, education and awareness – particularly of land owners and farmers	Farmers are cash strapped and argue that the costs of improved land use (and resource) management are prohibitive – for example improved irrigation to improve efficiency is an expensive technology switch for many farmers who do not have the capital. Mulching is considered labour intensive and therefore costly		<p><a href="http://www.wc-climatechange-response.org.za">www.wc-climatechange-response.org.za</a> : A Climate Change Strategy and Action Plan for the Western Cape version 6</p> <p>Midgley, G.F., Chapman, R.A., Hewitson, B., Johnston, P., De Wit, M., Ziervogel, G., Mukheibir, P., van Niekerk, L., Tadross, M., van Wilgen, B.W., Kgope, B., Morant, P.D., Theron, A., Scholes, R.J., Forsyth, G.G. (2005) A Status Quo, Vulnerability and Adaptation Assessment of the Physical and Socio-economic Effects of Climate Change in the Western Cape. CSIR Report No. ENV-S-C 2005-073.</p>



<b>Approaches/ strategies</b>	Integrate climate risks into development planning and approval processes	Being considered	Political 'buy-in' Guidelines developed for evaluating climate risks when considering development plans and approvals	Development planners and officials in development planning approvals are resistant to changes in their procedures  Incorporating this approach into existing legislation is time consuming and costly – ideally effected without	n/a	<a href="http://www.wc-climatechange-response.org.za">www.wc-climatechange-response.org.za</a> : A Climate Change Strategy and Action Plan for the Western Cape version 6  Midgley, G.F., Chapman, R.A., Hewitson, B., Johnston, P., De Wit, M., Ziervogel, G., Mukheibir, P., van Niekerk, L., Tadross, M., van Wilgen, B.W., Kgope, B., Morant, P.D., Theron, A., Scholes, R.J., Forsyth, G.G. (2005) A Status Quo, Vulnerability and Adaptation Assessment of the Physical and Socio-economic Effects of Climate Change in the Western Cape. CSIR Report No. ENV-S-C 2005-073.
<b>Approaches/ strategies</b>	Map the 1 in 50 year floodline and use and disseminate information for development planning and related decisions	Being considered	Budget and capacity			<a href="http://www.wc-climatechange-response.org.za">www.wc-climatechange-response.org.za</a> : A Climate Change Strategy and Action Plan for the Western Cape version 6
<b>Approaches/ strategies</b>	Strengthen and focus socio-economic data about vulnerable communities; develop scenarios	Being considered – community level data is to be available in the short term that can feed into scenarios	Quality community level data			<a href="http://www.wc-climatechange-response.org.za">www.wc-climatechange-response.org.za</a> : A Climate Change Strategy and Action Plan for the Western Cape version 6
<b>Local (community) level</b>						
<b>Approaches/ strategies</b>	EThekweni Municipality: Climatic Future for Durban: <i>Amendment of Spatial Development</i>	Under consideration	Cost/benefit studies required to increase motivation power of the activity	Benefits of doing so not explicitly visible enough.	Improved economic arguments required	Hounsoume, R. and Iyer, K. 2006. EThekweni Municipality: Climatic Future for Durban: Phase II Headline Climate Change Adaptation Strategy. CSIR, Durban.

	<i>Plans (SDPs) to accommodate CC impacts</i>					
<b>Approaches/ strategies</b>	Adapting to multiple stressors of climate, water and health in Sekhukhune district, Limpopo Province, South Africa	Under development	Understanding of the role of climate variability impacts on water resources on water availability for agriculture, industry and domestic use	Sector-specific approaches reduce the ability to see how climate impacts on multiple stressors, requiring a holistic response.	Climate change cannot be emphasized as a primary topic with stakeholders on the ground, but rather the primary stressors experienced by stakeholders should be linked to climate variability and change.	Adapting to climate, water and health stresses: insights from Sekhukhune, South Africa / Gina Ziervogel, Anna Taylor, Frank Thomalla, Takeshi Takama and Claire Quinn. – SEI, 2006. – 61 pp. – ISBN 978 91 976022 1 1 <a href="http://www.sei.se/editable/pages/sections/policy/SEI_Ziervogel%20et%20al_SAfrica_2006.pdf">http://www.sei.se/editable/pages/sections/policy/SEI_Ziervogel%20et%20al_SAfrica_2006.pdf</a>

<i>Sectoral level<sup>2</sup></i>						
<i>Agriculture</i>						
<b>Type of adaptation action<sup>3</sup></b>	<b>Title of adaptation action, including projects</b>	<b>Status of adaptation action</b> - ongoing - under implementation - under development - under consideration	<b>Needs in order to successfully implement the adaptation action</b>	<b>Concerns/Barriers</b>	<b>Experiences/Lesson learned</b>	<b>References</b> i.e. publications, websites etc.
<b>Approaches/Strategies</b>	Desert Margins Program: Halt the degradation of South Africa's drylands, particularly its biodiversity, soils and carbon stocks, by sharing sustainable practices and strengthening human capacities.	Under implementation				Prof Klaus Kellner DMP-National Coordinator School of Environmental Sciences and Development North-West University (Potchefstroomcampus) Potchefstroom, 2520 E-mail: plbkk@puk.ac.za or Mrs Hestelle Stoppel DMP NCU Tel/Fax: (018) 299 2509

<sup>2</sup> The sectors below are given as examples. Please provide information on any other sectors which you consider important and have examples to share.

<sup>3</sup> Please be aware of the degree of adaptation within activities:

- Some activities are undertaken specifically to adapt to climate change, e.g. increased water storage capacity, development of new crop varieties.
- Some activities include a component of climate change adaptation, e.g. infrastructure replacement incorporating higher flood standards
- Some activities are not carried out for adaptation but have other objectives such as preserving biodiversity, however they can offer adaptation co-benefits, e.g. restored wetlands protect against storm surges.

<b>Approaches/ Strategies</b>	Mitigation and adaptation options for agricultural production <i>University of Kwazulu-Natal, funded by Department of Agriculture: South African Atlas of climate change impacts on the agricultural sector</i>	Under development	State of the art regional climate models, downscaled, especially representing extreme events State of the art hydrological and mechanistic crop yield models Fine scale climate and soils data surfaces	High end skills needed to maintain capacity in this field, a lack of sufficient recruitment of young scientists to replace an ageing scientific skills base	Work of this nature requires long term commitment, job security and continuity. High level of competition for competent staff from other job markets.	
<b>Technologies</b>	Environmental Stress Tolerance Program, University of Cape Town Genetic modification program to increase drought tolerance in crops	Under development	High end skills in genetic research, associated high level of funding for equipment.	Long lead time to implementation		<a href="http://web.uct.ac.za/depts/plantstress/people.htm">http://web.uct.ac.za/depts/plantstress/people.htm</a> publications: <a href="http://web.uct.ac.za/depts/plantstress/papers.htm">http://web.uct.ac.za/depts/plantstress/papers.htm</a>
<b>Technologies</b>	Drought mapping: <i>Department of Agriculture: Drought mapping and identification of drought prone areas using coarse resolution satellite imagery</i>	Under consideration	Skilled staff in satellite image analysis and spatial data analysis, Funding	Continuity of skilled staff	High level of competition for competent staff from other job markets.	
<i>Water resources</i>						

<p><b>Approaches/ Strategies</b></p>	<p>EThekweni Municipality: Climatic Future for Durban <i>Implement water recycling and demand management practises</i></p>	<p>Under consideration</p>	<p>Cost/benefit studies required.  Further research on resilience of water supply systems, including possible increasing drought duration and intensity possible with CC, combined with rapid rural-urban migration (often made worse during times of extreme environmental stress such as could happen with very severe drought.</p>	<p>Full cost of water capture, storage and delivery is not explicit. This activity then competes against a partially subsidised public good.  Climate change has not been explicitly catered for in water supply and sanitation services.</p>	<p>Adaptation co-benefits to supply-side management</p>	<p>Hounscome, R. and Iyer, K. 2006. EThekweni Municipality: Climatic Future for Durban: Phase II Headline Climate Change Adaptation Strategy. CSIR, Durban.</p>
<p><b>Approaches/ strategies</b></p>	<p>Integrated Water Supply and Infrastructure Management Programme for the Western Cape, that incorporates: <i>Use less water approach</i> Conserve water Design farms, industrial activities, buildings and</p>	<p>Under consideration</p>	<p>Appropriate institutional arrangements at a national, provincial and local authority level Budget allocation An adopted water management policy and plan for the Western Cape with an associated implementation</p>	<p>Existing institutional arrangements are not conducive; water is managed by the Department of Water Affairs and Forestry at a national level and does not have a provincial line function. The Western Cape has water supply</p>	<p>Institutional arrangements are key, as is a cross sectoral approach to an integrated water management programme. Sectors should include agriculture, water, industry, local government and housing</p>	

	<p>community developments to use less water Use more efficient irrigation systems and appliances</p> <p><i>Recycle</i> Industrial process recycling Wastewater treatment plants and use of recycled water Drive rainwater capture at a domestic level</p> <p><i>Improve system and reserve productivity</i> Repair leaks and minimise UAW- <i>reduce water losses by 15% by 2014</i> Use appropriate water quality for relevant purpose Strengthen against incidence of 1:100 year drought</p> <p><i>Develop back up supply</i> Manage</p>		<p>mandate Public awareness and education Political buy-in</p>	<p>issues that pertain to the province and not the entire country. The revised regulatory framework has been designed but is not fully implemented (with authority for allocations and catchment management devolving to the Catchment Management Agencies (CMA), some of which have not yet been implemented.</p> <p>Water tariffs do not reflect the scarcity of the resource and SA water is amongst the cheapest in the world – little incentive to conserve</p> <p>Conflict over the resource between sectors and communities</p>		
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	<p>catchment areas carefully and sustainably <i>so as to increase yields of existing resources</i></p> <p>Build small or large scale treatment plants including desalination – particularly as back up supply</p>					
<b>Approaches/ Strategies</b>	<p>Managing climate change risk for agriculture and water resources</p> <p><i>DFID/IDRC project on adapting to climate change in the Berg River Catchment, western Cape</i></p>	Approved – not yet begun	Understanding of relative importance and value of water within various sectors	Access to relevant information		
<b>Practices</b>	<p>Integrating climate scenarios into hydrological and economic models for application by Water resource managers</p> <p><i>DFID/IDRC project on adapting to</i></p>	Approved – not yet begun	Post doc researcher and training opportunities	Computational skill		

	<i>climate change in the Berg River Catchment, western Cape</i>					
<b>Technologies</b>	Further development of BERGSIM model <i>DFID/IDRC project on adapting to climate change in the Berg River Catchment, western Cape</i>	Approved – not yet begun	Downscaled scenarios and understanding of model integration	Computational resources		
<b>Approaches/ Strategies</b>	Climate information for water resource management <i>Water research Commission of South Africa</i>	Ongoing	Support for information dissemination of seasonal forecast information	Limited understanding in how climate information can be applied in water management strategies	People are more likely to use climate information when they have engaged with providers who explain potential information uses	<a href="http://www.c4w.org.za">www.c4w.org.za</a>
<b>Technologies</b>	Climate information for water resource management <i>Water research Commission of South Africa</i>	Ongoing	Seasonal forecast information platform	Format and nature of forecasts needs to be more clearly explained	Some diagrammatic representations are easier to understand than others	<a href="http://www.c4w.org.za">www.c4w.org.za</a>



<i>Health</i>						
<b>Approaches/ Strategies</b>	EThekweni Municipality: Climatic Future for Durban <i>Research underway into modelling climate change and impacts on disease vectors, esp. malaria</i>	Ongoing	Education programmes directed at public response.  Security of electricity supply needs to be strengthened against extreme climate conditions – maintenance of cold chain, refrigeration and air conditioning necessary during heat waves.  Research into effectiveness of management interventions in malaria risks, spraying programmes and environmental impacts of these.	Current research programmes are not deep enough and need to be strengthened. Funding is an issue.  Capacity constraints are evident in the public health service regarding development of preparedness regarding expanding populations (rural-urban migration) and heat stress, for example.		Hounscome, R. and Iyer, K. 2006. EThekweni Municipality: Climatic Future for Durban: Phase II Headline Climate Change Adaptation Strategy. CSIR, Durban.
<i>Coastal zones (settlements)</i>						
<b>Approaches/ Strategies</b>	Revision of Spatial Development Framework (SDF) to outline hazardous areas and re-zone accordingly for disaster avoidance	Under consideration	Political will and capacity to implement. Probably needs further motivation using cost benefit analysis	Direct effects not evident, resulting in lower priority ranking (somewhat speculative assessment)		Hounscome, R. and Iyer, K. 2006. EThekweni Municipality: Climatic Future for Durban: Phase II Headline Climate Change Adaptation Strategy. CSIR, Durban.

<b>Practices</b>	Set-back lines restrict coastal development. Caters for a 0.3-0.5m sea-level rise over the next 50 years and 1:50 year storm	Implemented	Significant concern in that a research programme conducted by local research institutions, using radar for real-time monitoring of rainfall over city catchments, has now come to an end. This does not seem to be a priority of the municipality. Political will to fund this is required.	Continued pressure to ease development restrictions.	A large storm in March 2007, a rare combination of equinox high tides and cyclone-induced heavy seas caused much damage to coastal infrastructure and property served as a timely lesson.	Theron, A K (2003). Setback line for the coastal zone: Cave Rock to Msimbazi River Mouth. CSIR Report ENV-S-C 2003-112. Environmentek, Stellenbosch. pp 44.
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*Others (please provide information about other relevant sectors)*  
*Biodiversity*

Type of adaptation action <sup>4</sup>	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns/Barriers	Experiences/ Lesson learned	References i.e. publications, websites etc.
<b>Approaches/ Strategies</b>	Adapting conservation responses to climate change imperatives <i>NSBA: A national spatial biodiversity assessment for South Africa</i>	Under implementation, and ongoing	High quality land use, population and land cover/natural resource data	Data quality, high cost, long term commitment and skills requirement of obtaining sufficiently high quality data, capacity and skills to model and visualize data	Continuity of skills in biodiversity quantification, data management and collection essential over years to ensure availability of good data	<a href="http://www.sanbi.org/frames/biodiversityfram.htm">http://www.sanbi.org/frames/biodiversityfram.htm</a>
<b>Practices</b>	Adapting conservation responses to	Under implementation	Local, regional and national	Competition with other land use	Extensive stakeholder involvement	e.g. <a href="http://bgis.sanbi.org/downloads/Baviaanskloof_Megareserve_Background.pdf">http://bgis.sanbi.org/downloads/Baviaanskloof_Megareserve_Background.pdf</a> <a href="http://www.sanparks.org/parks/addo/">www.sanparks.org/parks/addo/</a>

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- Some activities include a component of climate change adaptation, e.g. infrastructure replacement incorporating higher flood standards
- Some activities are not carried out for adaptation but have other objectives such as preserving biodiversity, however they can offer adaptation co-benefits, e.g. restored wetlands protect against storm surges.

	climate change imperatives <i>Cape Action for people and Environment, Succulent Karoo Ecosystem Project, Addo Elephant Park expansion project</i>		stakeholder involvement Available land of sufficient conservation value in appropriate geographical location	pressures Land-use allocation regulations Benefits for local stakeholders	necessary to obtain local buy-in High quality land use and resource maps are necessary for regional planning	<a href="#">library/2006/newsletters/AugSep06.doc</a>
<b>Technologies</b>	Developing and applying tools for conservation responses for biodiversity conservation under climate change <i>South African National Biodiversity Global Change and Biodiversity Program: Biovulnerability and Bioadaptation themes</i>	Under development, and ongoing	High quality spatial biodiversity data, advanced spatial statistical modelling skills, skilled scientific staff, advanced computing, data-basing and coding skills	High end skilled staff, data quality, high cost, long term commitment and skills requirement of obtaining sufficiently high quality data, capacity and skills to model and visualize data	Long term commitment to collecting and databasing spatially explicit data underpins this type of activity. Retention of high skilled staff in competition with other job markets.	<a href="http://www.sanbi.org/clinrep">www.sanbi.org/clinrep</a> <a href="http://www.sanbi.org/sacountrystudy">www.sanbi.org/sacountrystudy</a> <a href="http://www.sanbi.org">www.sanbi.org</a> <a href="http://www.aseanbiodiversity.info/Abstract/51004826.pdf">http://www.aseanbiodiversity.info/Abstract/51004826.pdf</a> f Bomhard, B., Midgley, G.F. (2006) Securing protected areas in the face of climate change: Lessons learned from the South African Cape Floristic Region. Initial report for IUCN PALNET (Protected Areas Learning Network) <a href="http://www.parksnet.org/documents/1/6500_documents_document_file_116_original.pdf">http://www.parksnet.org/documents/1/6500_documents_document_file_116_original.pdf</a>

PAPER NO. 11: TAJIKISTAN

<i>National level</i>						
<b>Approaches/ strategies</b>	Strategy on adaptation to climate change and minimization its adverse impacts	under implementation	Raising public awareness	Lack of sound knowledge	No	<a href="http://www.meteo.tj">www.meteo.tj</a> <a href="http://www.unfccc.int">www.unfccc.int</a>
<b>Practices</b>	Identification of the preliminary adaptation activity	under implementation	Trainings	Poor awareness	No	<a href="http://www.meteo.tj">www.meteo.tj</a> <a href="http://www.unfccc.int">www.unfccc.int</a>
<b>Technologies</b>	Introduction of new effective technologies into adaptation planning	under implementation	Research projects and trainings	Poor awareness	No	<a href="http://www.meteo.tj">www.meteo.tj</a> <a href="http://www.unfccc.int">www.unfccc.int</a>
<i>Local (community) level</i>						
<b>Approaches/ strategies</b>						
<b>Practices</b>						
<b>Technologies</b>						

<i>Sectoral level<sup>1</sup></i>						
<i>Agriculture</i>						
<b>Approaches/ Strategies</b>	Reduction of vulnerability of agriculture to climate change adverse impacts; adaptation capacity building	under development	Raising awareness	Lack of sound knowledge	No	<a href="http://www.meteo.tj">www.meteo.tj</a> <a href="http://www.unfccc.int">www.unfccc.int</a>
<b>Practices</b>	Identification of the preliminary adaptation activities for agriculture	under development	Trainings	Poor awareness	No	<a href="http://www.meteo.tj">www.meteo.tj</a> <a href="http://www.unfccc.int">www.unfccc.int</a>
<b>Technologies</b>	Technologies for agricultural forecast modeling; development of drip and soil irrigation methods; growth of heat stable crops.	under development	Research projects and trainings	Poor awareness	No	<a href="http://www.meteo.tj">www.meteo.tj</a> <a href="http://www.unfccc.int">www.unfccc.int</a>
<i>Water resources</i>						
<b>Approaches/ Strategies</b>	Rational use of water resources; planning adaptation of water resources to climate change	under development	Raising awareness	Lack of sound knowledge	No	<a href="http://www.meteo.tj">www.meteo.tj</a> <a href="http://www.unfccc.int">www.unfccc.int</a>
<b>Practices</b>	Identification of preliminary adaptation activities	under development	Trainings	Poor awareness	No	<a href="http://www.meteo.tj">www.meteo.tj</a> <a href="http://www.unfccc.int">www.unfccc.int</a>

<sup>1</sup> The sectors below are given as examples. Please provide information on any other sectors which you consider important and have examples to share.

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	for water resources					
<b>Technologies</b>	Development of drip and soil irrigation methods	under development	Research projects and trainings	Poor awareness	No	<a href="http://www.meteo.tj">www.meteo.tj</a> <a href="http://www.unfccc.int">www.unfccc.int</a>
<i>Health</i>						
<b>Approaches/ Strategies</b>	Development of adaptation activities aiming at human health protection in conditions of climate warming	under development	Raising awareness	Lack of sound knowledge	No	<a href="http://www.meteo.tj">www.meteo.tj</a> <a href="http://www.unfccc.int">www.unfccc.int</a>
<b>Practices</b>	- reduction of the malaria disease risk; - improvement of reproductive health; - reduction of human mortality (esp. among climate-impacted people)	under development	Trainings	Poor awareness	No	<a href="http://www.meteo.tj">www.meteo.tj</a> <a href="http://www.unfccc.int">www.unfccc.int</a>
<b>Technologies</b>	Improvement of collector and drain array and prophylactics	under development	Research projects and trainings	Poor awareness	No	<a href="http://www.meteo.tj">www.meteo.tj</a> <a href="http://www.unfccc.int">www.unfccc.int</a>
<i>Coastal zones (settlements)</i>						
<b>Approaches/ Strategies</b>						<a href="http://www.meteo.tj">www.meteo.tj</a> <a href="http://www.unfccc.int">www.unfccc.int</a>

<b>Practices</b>						<a href="http://www.meteo.tj">www.meteo.tj</a> <a href="http://www.unfccc.int">www.unfccc.int</a>
<b>Technologies</b>						<a href="http://www.meteo.tj">www.meteo.tj</a> <a href="http://www.unfccc.int">www.unfccc.int</a>
<i>Others (please provide information about other relevant sectors)</i>						
<b>Approaches/ Strategies</b>	Planning adaptation activities in terms of extreme weather events	under development	Raising awareness	Lack of sound knowledge	No	<a href="http://www.meteo.tj">www.meteo.tj</a> <a href="http://www.unfccc.int">www.unfccc.int</a>
<b>Practices</b>	Assessment of potentially hazardous areas	under development	Trainings	Poor awareness	No	<a href="http://www.meteo.tj">www.meteo.tj</a> <a href="http://www.unfccc.int">www.unfccc.int</a>
<b>Technologies</b>	Development and introduction of constructions effectively preventing floods rise risks	under development	Research projects and trainings	Poor awareness	No	<a href="http://www.meteo.tj">www.meteo.tj</a> <a href="http://www.unfccc.int">www.unfccc.int</a>



**Submission by the United States of America providing information on adaptation approaches, strategies, practices and technologies for adaptation at the regional, national and local levels in different sectors, as well as on experiences, needs and concerns.**

<b>Type of adaptation action<sup>1</sup></b>	<b>Title of adaptation action, including projects</b>	<b>Status of adaptation action</b> - ongoing - under implementation - under development - under consideration	<b>Needs in order to successfully implement the adaptation action</b>	<b>Concerns/Barriers</b>	<b>Experiences/Lesson learned</b>	<b>References</b> i.e. publications, websites etc.
<b>Scope of adaptation action</b> <i>Regional level</i>						
<b>Approaches/strategies</b>	Institute for Social and Environmental Transition (ISET) Project on Adaptation to Climatic Variability and Change				NOAA and other partners support ISET's efforts to test mechanisms for incorporating climate information in relief and reconstruction programs and to increase understanding of the role climate information could	<a href="http://www.i-s-e-t.org/">http://www.i-s-e-t.org/</a>

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- Some activities include a component of climate change adaptation, e.g. infrastructure replacement incorporating higher flood standards
- Some activities are not carried out for adaptation but have other objectives such as preserving biodiversity, however they can offer adaptation co-benefits, e.g. restored wetlands protect against storm surges.

					<p>play as a guiding element in such situations. The program builds off earlier field and policy research conducted by ISET and other partners in the region (see <i>Adaptive Capacity &amp; Livelihood Resilience</i> at <a href="http://www.i-s-e-t.org">www.i-s-e-t.org</a>). It is being undertaken in conjunction with a multi-donor financed program of implementation, analysis and research on adaptation to climate change and disaster risk reduction coordinated by ISET that is on going in coastal regions and areas vulnerable to floods and droughts in South Asia.</p>	
<b>Practices</b>						
	<p>Training Institute on Climate and Extreme Events</p>				<p><u>The East-West Center in Honolulu, Hawaii</u> plays a vital role in addressing the areas of climate change and climate variability by supporting efforts such as the <i>Training Institute on Climate and Extreme Events</i>, a joint project with the University of the</p>	

					South Pacific and the New Zealand National Institute of Water and Atmospheric Research (NIWA). This three-year project (2004-2006) contributes to developing local capacity to understand, anticipate and prepare for climate-related extreme events, and explore opportunities to mainstream information about climate variability and change into sustainable development planning.	
	Pacific Regional Integrated Sciences and Assessment (Pacific RISA Program)				The Pacific RISA program covers the American Flag Pacific Islands as well as <b>Micronesia, the Marshall Islands and Palau</b> and emphasizes reducing Pacific Island vulnerability to climate-related extreme events such as drought, floods and tropical cyclones. Led by researchers at the East-West Center in Hawaii, Pacific RISA works in close collaboration with scientific and educational institutions, regional organizations,	

					governments, and local businesses and communities.	
	Alaska Center for Climate Assessment and Policy (ACCAP)				A new Alaska RISA center, the Alaska Center for Climate Assessment and Policy (ACCAP) is being led by investigators at the University of Alaska. The primary functions of ACCAP will be (1) the synthesis of available data and information in order to quantify actual and potential impacts of changes in the seasonality of weather and climate on Alaskan people and ecosystems, and to determine corresponding needs for enhanced product delivery by agencies such as the National Weather Service; (2) research that will facilitate the product enhancement identified in (1); and (3) assessment of the vulnerability and adaptive capacity of various Alaskan sectors, together with a determination of the	

					management and policy decisions that can reduce vulnerability and facilitate adaptation. The transportation sector will provide the initial prototype for this activity.	
	California Applications Program (CAP)				The California Applications Program (CAP), led by researchers at Scripps Institution for Oceanography, studies the impacts of climate variability and change in California and the surrounding area. CAP evaluates weather and short-term climate forecasts and climate change projections, with particular attention to climate influences from the Pacific Ocean and western North America. An associated emphasis is to develop a better capacity for observing the climate over the complex landscape of the California region. CAP is working to improve climate information for decision makers in key sectors, including water, human health, and	

					wildfire.	
	Carolinas Integrated Sciences and Assessments (CISA)				The Carolinas Integrated Sciences and Assessments (CISA) project aims to improve the range, quality, relevance, and accessibility of climate information for water resource management in North and South Carolina. CISA examines water resource issues at interannual, decadal, and longer scales to determine how decision makers use climate information to manage water and how current operational practices can benefit from new climate and water resource products. CISA investigates how best to present climate sciences that are relevant to water resource policy, and to foster understanding of climate variability, issues of forecast uncertainty, and risks associated with forecast failure.	
	Climate Impacts Group (CIG)				The Climate Impacts Group (CIG), located at the University of Washington-Seattle, examines the impacts of	

					<p>natural climate variability and global climate change in the U.S. Pacific Northwest. CIG's goal is to increase the resilience of the region to climate fluctuations through research and interaction with stakeholders. CIG research emphasizes four key sectors of the Pacific Northwest environment: water resources, aquatic ecosystems, forests, and coastal systems. Focusing on the intersection of climate sciences and public policy, CIG works with planners and policymakers to apply climate information to regional decision-making processes.</p>	
	<p>Climate Assessment for the Southwest (CLIMAS)</p>				<p>The Climate Assessment for the Southwest (CLIMAS) project fosters collaboration between university researchers, agency scientists, resource managers, educators, and decision makers throughout the region to understand climate and its impacts on human and natural systems in the</p>	

					U.S. Southwest and adjacent U.S.-Mexico border area. CLIMAS investigates vulnerability to climate variability in both rural and urban areas, how to improve climate inputs for drought planning, and climate impacts on water resources, water policy, and wildland fire. CLIMAS studies how climate information is used by decision makers and works to evaluate and improve forecasts.	
	Southeast Climate Consortium (SECC)				The Southeast Climate Consortium (SECC) is a multi-institutional, multidisciplinary team focusing on the vulnerability of agriculture, forestry, and water resources management to climate variability. SECC scientists are developing methods to translate regional climate forecasts into local forecasts, linking them with crop and hydrology simulation models in order to enhance understanding of	



					<p>decision makers so they can reduce risks associated with climate variability. The Consortium is developing partnerships needed to build equitable outreach programs for farmers, forest managers, water resource managers, homeowners, and policymakers to enhance user familiarity with seasonal climate forecasts.</p>	
	<p>Western Water Assessment (WWA)</p>				<p>The Western Water Assessment (WWA) provides information about climate variability and climate change to water resource decision makers with the goal of improving management of the Intermountain West's most critical resource, water. Through partnerships with key decision makers, WWA provides vulnerability assessments, climate forecasts, and paleoclimate studies designed to enhance short-term and long-term management decisions. WWA experts focus on</p>	

					the Colorado and Platte River Basins, researching policy options, streamflow forecasting, snowpack monitoring, drought planning, and reservoir management.	
	Regional Climate Outlook Forums,				Regional Climate Outlook Forums have become a principal vehicle for providing advance information about seasonal climate fluctuations in <b>Africa, the Americas and Asia</b> . The Forums bring together climate forecasters and forecast users to develop a consensus forecast and to discuss how to disseminate and apply information.	
	Mainstreaming Adaptation to Climate Change Project (MACC)				<i>The MACC</i> project responds to a need to build an adequate knowledge base and capacity in the Caribbean region to identify the climate change impacts, assess vulnerability and risk for key sectors of SIDS' economies. It provides for capacity building to mainstream adaptation strategies into	

					planning and development projects. NOAA collaborates with the <u>Secretariat of the Caribbean Community (CARICOM)</u> through a Memorandum of Agreement.	
<b>Technologies</b>	SERVIR extension	Under implementation			The National Aeronautics and Space Administration (NASA) and the U.S. Agency for International Development (USAID) are developing tools to apply remotely sensed information to development assistance. Based on the successful web-based SERVIR model in Central America, this activity will develop a platform that integrates satellite and other geospatial data for improved scientific knowledge and decision making by managers, researchers, students, and the general public. The activity is expanding to serve other parts of the world. SERVIR addresses the nine societal benefit areas of the Global	

					Earth Observation System of Systems. For example, SERVIR can be used to monitor and forecast ecological changes, as well as to respond to severe events such as forest fires, red tides, and tropical storms.	
<i>National level</i>						
<b>Approaches/strategies</b>	National Integrated Drought Information System (NIDIS): Develop and Implement an integrated national drought early warning system	Under development	<p><b>CREATE SUBSYSTEMS</b></p> <ul style="list-style-type: none"> <li>• Monitoring and forecasting subsystem:</li> <li>• Risk assessment sub-system</li> <li>• Preparedness sub-system</li> <li>• Communication sub-system</li> <li>• Key Clearinghouse Functions</li> <li>• Evaluation and feedback sub-system</li> </ul> <p><b>RESEARCH GAPS</b></p> <ul style="list-style-type: none"> <li>• Selected “research</li> </ul>	Coordination across Federal, Regional, State, and Local levels; Federal agency interaction and accountability	<p><b>SHORT AND LONGTERM NIDIS IMPLEMENTATION GAPS</b></p> <p>Short-Term Drought Considerations:</p> <ul style="list-style-type: none"> <li>○ Develop coordinated effort in drought monitoring, prediction and early warning, in support of NIDIS-type activities</li> <li>○ Establish long (multi-decade) climate records adequate for retrospective studies, and as required for initialization, calibration and</li> </ul>	<a href="http://www.westgov.org/wga/initiatives/drought/">http://www.westgov.org/wga/initiatives/drought/</a>

			<p>needs” in NIDIS:  --“Developing methodologies to integrate data on climate, hydrology, water: short-term vs. long term drought  --Identifying regional differences in drought impacts and related information needs and delivery systems  --Develop regionally specific drought monitoring and forecasts</p>		<p>validation:</p> <ul style="list-style-type: none"> <li>○ Improve (real-time) observation/assimilation of key surface variables needed for monitoring, model initialization and/or validation (with uncertainty estimates):</li> <li>○ Improve coupled (atmosphere-ocean-land) model prediction system</li> <li>○ Improve understanding of roles of local and remote processes on drought variability and predictability, as a function of timescale</li> </ul> <p>Long-Term Drought Considerations:</p> <ul style="list-style-type: none"> <li>○ Foster research into the mechanisms that control the land surface branch</li> </ul>	
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					<p>of the hydrological cycle at multi-year (decadal) timescales:</p> <ul style="list-style-type: none"> <li>○ A research effort focusing on the causes of historical droughts (attribution studies):</li> <li>○ Improve simulations of hydrological variability on decadal time scales.</li> <li>○ Foster research focusing on the predictability of multiyear-to-decadal drought</li> </ul>	
<b>Practices</b>	National Integrated Drought Information System (NIDIS): Regional Pilot Projects	Under development	<p>CREATE SUBSYSTEMS IN REGIONS</p> <ul style="list-style-type: none"> <li>• Monitoring and forecasting subsystem:</li> <li>• Risk assessment sub-system:</li> </ul>	How to scale up to a unified national approach from select regional pilot activities		<a href="http://www.westgov.org/wga/initiatives/drought/">http://www.westgov.org/wga/initiatives/drought/</a>

			<ul style="list-style-type: none"> <li>• Preparedness sub-system:</li> <li>• Communication sub-system:</li> <li>• Key Clearinghouse Functions</li> <li>• Evaluation and feedback sub-system</li> </ul> <ul style="list-style-type: none"> <li>• Identify potential illustrative cases/approaches</li> <li>• Create governance and management mechanisms</li> <li>• Criteria for Pilot selection: choice, design and implementation</li> <li>• Priorities for the near-term: What's needed at different scales?</li> </ul> <p>Linkages between the data and modelling communities focused on pilots</p>			
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<b>Technologies</b>	National Integrated Drought Information System (NIDIS): Drought Portal	Under development	The USDP will provide county, regional and national drought-related products (analysis, forecasts, and research) to a variety of users, ranging from individuals whose livelihood is impacted by drought to large corporations, water managers and the research community through a dynamic, Internet-based drought portal.	Data collection, quality control, and integration; systems integration	<p>What is a Portal? Sites on the World Wide Web that typically provide personalized capabilities for their visitors.</p> <p>Key Clearinghouse Functions: Credibility, Legitimacy, Accessibility, Reliability (timeliness etc.) to answer Where are drought conditions now? Does this event look like other events? How is the drought affecting me? Will the drought continue? Where can I go for help?</p>	
<i>Local (community) level</i>						
<b>Approaches/ strategies</b>	USAID Climate Change Adaptation Guidance Manual	Ongoing/under development	Provides guidance to project designers; requires cooperation from designers, stakeholders		The USAID Guidance manual is meant to facilitate incorporation of climate change information into the design process of development projects. Working closely with development partners is critical.	
<b>Practices</b>						



<b>Technologies</b>	RANET rural communications network	ongoing			RANET is a rural communication network of FM radio stations and/or cell phones. It is used to communicate information about weather, markets, disasters, etc. to remote areas.	
	Use and Usefulness: a Comparative Study of Seasonal Climate Forecasting Systems in Drought-affected Regions of Latin America	ongoing			Using a combination of ethnographic and physical data in a participatory data gathering effort, vulnerability maps for drought in Ceara, Brazil were developed. They have since been used as a basis to design short and long-term drought planning. These GIS maps are effective tools for planning at the local level and provide more effective drought response by incorporating climate forecasts.	<a href="http://bara.arizona.edu/imp_maplan.htm">http://bara.arizona.edu/imp_maplan.htm</a>

Type of adaptation action <sup>2</sup>	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns/Barriers	Experiences/Lesson learned	References i.e. publications, websites etc.
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<i>Sectoral level<sup>3</sup></i>						
<i>Agriculture</i>						
Approaches/Strategies						
Practices	Farmer Managed Natural Regeneration	ongoing	Appropriate legal structure, patience on part of farmers		3 million ha of tree cover have been added in Niger due to farmers taking advantage of changes in national forestry code. Results: better soil condition, water infiltration, reduced wind damage, more resilient livelihoods.	<a href="http://usinfo.state.gov/products/pubs/desertific/land.htm">http://usinfo.state.gov/products/pubs/desertific/land.htm</a>
	Sustainable Adaptations to Drought and Climate Variability in Agricultural Production Systems	ongoing			In both mail-back surveys and during ethnographic interviews, farmers and ranchers reported on a range of responses to drought effects, including: cattle culling	<a href="http://drought.unl.edu/index.htm">http://drought.unl.edu/index.htm</a>

<sup>2</sup> Please be aware of the degree of adaptation within activities:

- Some activities are undertaken specifically to adapt to climate change, e.g. increased water storage capacity, development of new crop varieties.
- Some activities include a component of climate change adaptation, e.g. infrastructure replacement incorporating higher flood standards
- Some activities are not carried out for adaptation but have other objectives such as preserving biodiversity, however they can offer adaptation co-benefits, e.g. restored wetlands protect against storm surges.

<sup>3</sup> The sectors below are given as examples. Please provide information on any other sectors which you consider important and have examples to share.

	Across Nebraska			<p>and reduced stocking rates, reduced grass and hay production, crop losses, surface water/ground water quantity and quality problems, increased supplemental feed costs, emotional stress, increased pests such as grasshoppers, wind erosion, increased irrigation, reduced cattle pregnancy rates, increased weed pressures, tree losses, hindered pasture burns, and increased disease problems. To reduce these effects, many producers reported implementing a range of drought mitigation and response actions. Some of these are best management practices implemented as part of their normal operating procedures while others were implemented specifically to deal with impending drought conditions. The most cited practice among livestock producers was reducing the number of cattle on their land by selling them earlier, selling off more or buying fewer calves and yearlings, and keeping fewer replacements. Developing an appropriate grazing management system, including pasture rotation and cross fencing was also mentioned. While many livestock producers also suggested</p>	
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					<p>changing haying and grazing practices, they stressed different types of changes. Several mentioned reducing their need for hay by allowing cattle to forage on stubble fields and the range during the winter. On the other hand, others stressed the use of additional hay and supplement feed to survive the winter and allow pastures to rest. Some livestock producers also mentioned converting marginal cropland to pasture provide more grazing land for the cattle. Finally, many livestock producers stressed the need for pipelines, windmills, and wells in order maintain herds and implement desired grazing plans.</p>	
<b>Technologies</b>						
<i>Water resources</i>						
<b>Approaches/ Strategies</b>						
<b>Practices</b>						
<b>Technologies</b>						
<i>Health</i>						
<b>Approaches/ Strategies</b>						
<b>Practices</b>						
<b>Technologies</b>						
<i>Coastal zones (settlements)</i>						
<b>Approaches/ Strategies</b>	Coral Reef Manager's Guide				Synthesizes best scientific knowledge and management	<a href="http://www.coris.noaa.gov">http://www.coris.noaa.gov</a>

					experience. Represents collaboration between managers and researchers.	/activities/reef_managers_guide/
<b>Approaches/ Strategies</b>	Workshop on Climate Science and Services: Coastal Applications for Decision Making through Sea Grant Extension and Outreach (April 2007)	Implementation initiated; follow up activities ongoing			NOAA's Sectoral Applications Research Program (SARP) supports sector-specific research and partnership building activities. Within this framework, it recently convened a workshop to develop a community of practice for climate extension in coastal regions, and, specifically, to foster the use of the Sea Grant extension, communications, and education networks as a facilitator of climate adaptation in coastal regions.	<a href="http://www.csc.noaa.gov/sgcw/index.html">http://www.csc.noaa.gov/sgcw/index.html</a>
<b>Approaches/ Strategies</b>	NOAA, World Wildlife Fund, and the Florida Reef Resilience Project support for Climate Change LEADS: Linking Environmental Analysis to Decision Support	Ongoing			This project implemented by WWF with support from NOAA's Sectoral Applications Research Program, seeks to 1) Establish a process for information flow among scientists research climate change, coral bleaching, and water quality in south Florida's reefs, the stakeholders who depend on reef ecosystems for livelihoods, and managers responsible for ensuring the long-term health of the environment; 2) Synthesize existing scientific data to identify and reduce vulnerability of south Florida's reefs to climate by	<a href="http://www.worldwildlife.org/climate/LEADS.cfm">http://www.worldwildlife.org/climate/LEADS.cfm</a>

					creating a tool that can be utilized effectively by reef managers and stakeholders to enhance adaptive management options; and 3) Improve sustainable management of coastal resources and develop methodology for conservation projects related to adaptation.	
<b>Practices</b>						
<b>Technologies</b>						
<i>Others (please provide information about other relevant sectors)</i>						
<b>Approaches/ Strategies</b>						
<b>Practices</b>						
<b>Technologies</b>	Famine Early Warning System Network (FEWS-NET)	ongoing			The FEWS-NET combines data from satellite observations with local meteorological, crop, and livelihood information to provide decision makers with early warnings of food security risks. FEWS operates in 21 countries and has been providing early warnings for 20 years. Similar programs are being developed to warn of risks of malaria, meningitis, and pests.  FEWS is a useful tool for identifying food security risks. To cope with those risks, governments and relief agencies must take the warnings seriously.	<a href="http://www.fews.net/">http://www.fews.net/</a>
<b>Urban</b>	Climate Variability and Change and New York City				A website has been developed that is an easy-to-use information resource that is expected to foster	<a href="http://ccir.ciesin.columbia.edu/nvc">http://ccir.ciesin.columbia.edu/nvc</a>

	Planning for the Future				<p>better decisions related to the health, safety and livelihoods of the citizens in the region. The site is designed to be useful to all levels of readers, from climate experts to grade school students. In addition to providing basic information about climate in the NYC area, the website provides users an opportunity to become part of a network that will share expertise and information related to climate change and variability in the NY metropolitan area, join an email list where interested individuals may discuss items related to climate change and variability impacts on urban environments, and browse a resource list that includes web links and a bibliography of publications related to the topics discussed on the website.</p>	
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