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Item 3 of the provisional agenda
Nairobi work programme on impacts, vulnerability and adaptation to climate change

Approaches to and experiences in integrating and expanding adaptation planning and action at national, subnational, community and local levels, and lessons learned, good practices, gaps, needs, and barriers and constraints to adaptation

Submissions from Parties and relevant organizations

1. The Subsidiary Body for Scientific and Technological Advice (SBSTA), at its twenty-eighth session, invited Parties and relevant organizations to submit to the secretariat, by 20 March 2009, the following (FCCC/SBSTA/2008/6, para. 59):

(a) Views and information on approaches to and experiences in integrating and expanding adaptation planning and action at national, subnational, community and local levels, including scaling up of local and community-based adaptation;

(b) Views on lessons learned, good practices, gaps, needs, barriers and constraints to adaptation, including implementation of adaptation projects.

2. The SBSTA requested the secretariat to compile these submissions into a miscellaneous document to be made available by SBSTA 30.

3. The secretariat has received 11 such submissions. In accordance with the procedure for miscellaneous documents, these submissions are attached and reproduced[*] in the language in which they were received and without formal editing.

[*] These submissions have been electronically imported in order to make them available on electronic systems, including the World Wide Web. The secretariat has made every effort to ensure the correct reproduction of the texts as submitted.

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PAPER NO. 1: BELIZE

Submission by Belize on the Nairobi Work Programme on Impacts, Vulnerability and Adaptation to Climate Change, and in particular: Information and Experiences in Integrating Adaptation Planning and Action at the National Level

Introduction

The Subsidiary Body for Scientific and Technological Advice (SBSTA) invited Parties to summit their (a) Views and information on approaches to and experiences in integrating and expanding adaptation planning and action at national, subnational, community and local levels, including scaling up of local and community-based adaptation;

(b) Views on lessons learned, good practices, gaps, needs, barriers and constraints to adaptation, including implementation of adaptation projects. (FCCC/SBSTA/2008/L.13/Rev.1 paragraph 50)

Background

Belize has participated and continues to participate in several regional adaptation projects developed by the Caribbean Community. Besides integrating adaptation planning and action, these projects have components which have strengthened the national systematic sea-level and meteorological observing networks, prepared vulnerability assessments, and built national capacity to undertake adaptation measures.

Information and Experiences in Integrating Adaptation Planning and Action at the National Level

The first regional project, which commenced in 1997, was the Caribbean: Planning for Adaptation to Global Climate Change (CPACC) project which was funded by the Global Environmental Facility (GEF), implemented by the World Bank and executed by the Organization of American States (OAS). A Project Implementation Unit (PIU) located within the Centre for Sustainable Development of the University of the West Indies (UWICED) was responsible for local project management. The project had four regional components and five pilot components. Belize participated in the pilot component on coral reef monitoring which proved very valuable as the country subsequently experienced two severe coral bleaching episodes in 1998 and 2005 and mechanical damage to the reef caused by the passage of several hurricanes and tropical storms. One regional component developed an adaptation policy framework which was used as the basis to convene national consultations to develop a comprehensive national adaptation policy. Unfortunately, changes in Cabinet portfolios, decision makers and the political directorate have hindered the adoption of the draft adaptation policy. Renewed efforts are underway to update the policy and present it to Cabinet for its adoption.

CPACC was a Stage I adaptation project in the three-stage adaptation project cycle recommended by the Intergovernmental Panel on Climate Change (IPCC) and the GEF. As this four-year project drew to a close, the region recognized that the project execution process had to be institutionalized to ensure the sustainability of its outputs and maintain regional capacity.

The next regional project was the Canadian funded Adaptation to Climate Change in the Caribbean (ACCC). Among several outputs, this project developed risk management guidelines for climate change adaptation decision making, developed a guide to assist practitioners to integrate climate change in the

environmental impact assessment (EIA) process, developed a Master of Science Degree programme at the University of the West Indies (UWI), and developed the business plan for the Caribbean Community Climate change Centre (CCCCC). Three Belizeans have successfully completed the Master of Science Degree programme in Climate Change. One is now involved in the national climate change programme while the other two utilize their expertise in incorporating climate change in the national planning process and in the management of a non-government organization involved in implementing a carbon sequestration project. Belize is the host of the Climate Change Centre and provides it with annual financial and logistical support. The risk management guidelines are being used as a reference document by the national climate change focal point and the EIA climate change guide has been presented to the Department of the Environment to be used to update the EIA process.

Belize is now participating in the Stage II adaption project: Mainstreaming Adaptation to Climate Change (MACC). This project is also funded by the GEF and implemented by the World Bank, but executed by the CCCCC. This project also has several components. Belize undertook a pilot vulnerability study on the North Stann Creek River, a major river that runs through the citrus producing and processing valley, and is a source of water for several small communities and a major coastal town. Citrus processing is one of the major sources of foreign exchange for the country. The outputs of this vulnerability study are being used to develop a comprehensive national water resource policy and adaptation strategy. A regional component has drafted a regional climate change strategy to address all aspects of climate change in all important socio-economic sectors. The strategy was reviewed at a national consultation workshop and recommendations for amendments and improvement have been submitted to the project management team. The amended strategy will be presented to the CARICOM Heads of Government for their endorsement. Belize will then use this as the basis for the development of a national climate change implementation strategy.

Views on lessons learned, good practices, gaps, needs, barriers and constraints to adaption, including implementation of adaptation projects

Belize has over ten years of experience in the implementation of adaptation projects. Most of the interventions have focused on developing local capacity. This has been highly successful as the country has been able to retain and build its local capacity and manage its adaptation projects. The integration of climate change adaptation into national policies is ongoing. The MACC project will convene its final regional workshop which will be followed by a high-level seminar where the results and recommendations will be presented to the highest regional and national political leaders. Belize will be represented by technical experts and decision makers. Their attendance is expected to stimulate the adoption of the national adaptation climate change and water resources policies and strategies.

The adoption of sector specific and national adaptation policies and strategies have been delayed because of changes of decision makers, changes in political portfolios and changes in the political directorate. A new round of awareness building, identification of new champions and amendments of the policies and strategies are required. However, these renewed interventions have exceeded the project funding and execution cycle. Consequently, efforts are now underway on developing a strategy to undertake a sustained effort to adopt and implement national adaptation policies and strategies. This will require further capacity building and financial resources.

PAPER NO. 2: COLOMBIA

ADAPTATION

The Conference of the Parties (COP), at its 14th session, according to the work program for 2009, and document FCCC/SBSTA/2008/6, requested the Subsidiary Body for Scientific and Technological Advice (SBSTA) to invite parties to submit their views and information on the Nairobi work program on impacts, vulnerability and adaptation to climate change.

Colombia welcomes the opportunity to present its views on adaptation planning and practices, especially on the following issues:

- Views and information on approaches to and experiences in integrating and expanding adaptation planning and action at national, sub-national, community and local levels, including scaling up of local and community-based adaptation.

- Views on lessons learned, good practices, gaps, needs, barriers and constraints to adaptation, including implementation of adaptation projects.

In this context, Colombia would like to submit the following views:

Based on the Colombian experience through implementation of adaptation projects (e.g. INAP project),[1] we strongly believe that a crucial need in adaptation issues is to promote community involvement in the entire process. Additionally, there are also basic activities that must be included in an adaptation project, such as: the improvement and downscaling of global climate models and local climate change scenarios; enhancing early warnings, vulnerability and risk assessments in order to identify short, medium and long term priorities on adaptation; development of recovery measures and capacity building at the local level. Vulnerability and risk assessments should include socio-economic aspects.

A fundamental criteria of choice for adaptation measures should be: building on what already works and is successful today, taking into account the role of local communities.

Education, training and public awareness are very important in order to downscale national adaptation plans into sub-national, community and local adaptation strategies. The implementation of article 6 of the Convention must be considered as a strategic input to the implementation of the Nairobi work program by Parties.

[1] Colombia has developed the first adaptation project in a continental country, the Integrated National Adaptation Program: High Mountain Ecosystems, Colombia´s Caribbean Islands, and Human Health (INAP). INAP is framed within the GEF pilot adaptation window.

PAPER NO. 3: COSTA RICA

Submission on adaptation planning and practices - Nairobi Work Programme
Costa Rica

1. The Mandate

In the document FCCC/SBSTA/2008/6, par. 59, the Subsidiary Body for Scientific and Technological Advice (SBSTA) invites Parties to submit by 20th of March 2009, their views on the Nairobi Work Programme and also requested the Secretariat to compile these views for consideration at the SBSTA at its Thirtieth Session.

2. Preamble

Central America is a very vulnerable region to both extreme and gradual changes in climate and it is of utmost relevance for our governments (see Annex 1 Regional Climate Guidelines of Presidents of the Region). In this sense, adaptation is crucial for our country and this is reflected at a policy framework within our national development plan 2006-2010, the National Climate Change Strategy and in the development of Costa Rica's National Program for Adaptation to Climate Change. Costa Rica is highly vulnerable to the effects of climate change. Extreme hydrometeorological events have increased in frequency and impacted our country with greater significance over the past 3 years. Eighty percent of national emergencies in our country have been caused by extreme hydrometeorological phenomena, bringing significant environmental, human, and economic losses.

In the year 2008, tropical storm Alma formed in an unprecedented manner in the Pacific Ocean. In Costa Rica, Alma caused significant economic losses and damaged 600 communities, washed away vast cropland areas, and affected 75 thousand people living in the slopes, mountains, and valleys of our Pacific coast, according to reports by the National Meteorological Institute (IMN). In order to face impacts like that of Alma and those which are more gradual, the national development plans of Costa Rica integrate adaptation in different scales and sectors. In this submission, we will highlight how adaptation has been integrated in development efforts within key sectors. In the last segment, we will highlight key barriers and needs required for the adequate integration of adaptation in the planning processes.

3. Views and information on approaches to and experiences in integrating and expanding adaptation planning and action at national, subnational, community, and local levels, including scaling up of local and community-based adaption

- ***Energy sector***: Within this sector, adaptation has been integrated gradually to our work. The Costa Rican Institute of Electricity (ICE) has integrated adaptation to the Energy Expansion Plans and has focused on diversifying the sources of energy. Based on our countries supply and demand of energy, the ICE works on ensuring the expansion of **renewable energy** sources.

- ***Freshwater*:** has been a priority to Costa Rica and was defined as such since the country's First National Communication. Considering that the country, for the past 50 years, has developed its energy sources based mainly on hydroelectricity. Currently 85% of our energy comes from these sources. In this sense, Costa Rica has advanced a number of adaptation efforts for freshwater at subnational and national levels:
  - A pilot project to assess vulnerability of freshwater in the northwest region of Costa Rica. This project also defined adaptation measures for this resource. The lessons learned drawn from this pilot project are currently being replicated at a national level.
  - The strengthening of national capacities to assess the vulnerability and the design of adaptation measures for freshwater systems. This project is a means to reduce the vulnerability of this essential resource and increase our country's human development index. As a part of this national effort, a model has been developed to define the degree of vulnerability of each basin in the country. With this information, adaptation measures will be assigned for each region in the country. These regional adaptation measures will assign responsibilities to the different institutions within the region and allocate the required resources. Based on our countries supply and demand of energy, the National Institute of Electricity (ICE) works on ensuring the availability of freshwater for human and agricultural use.

- ***Biodiversity*:** In terms of adaptation to climate change, the freshwater and biodiversity sectors are a priority for our country. Biodiversity is a priority because it and coastal marine areas are critical sectors for our communities and national economy. Hence, the Ministry of Environment of our country has begun to develop the National Adaptation Program for Biodiversity and Costal Marine Areas. In this sense, we are designing both climate risk assessments and management reduction strategies for these sectors and expect to integrate these into current and new national policy frameworks. Furthermore, the country is also assessing the financial and investment needs of freshwater and biodiversity sectors for adaptation to climate change. In this sense, Costa Rica has advanced in designing and implementing many ecosystem based adaptation strategies, these include:
  - The Payment for Environmental Services national program
  - The National Biological Corridors Program (based on results of the ecological gap analysis of the Program of Work of Protected Areas of the Convention of Biological Diversity);
  - National Ecological Monitoring Program (PROMEC) which includes the monitoring of changes in habitat, forest coverage, effective management, amongst other indicators;
  - The Forever Costa Rica project which will contribute in reducing vulnerability in coastal marine areas by consolidating protected areas (with significant areas of mangroves), increasing resiliency of marine habitat and strengthen institutional capacities to promote enhanced action on adaptation (the project seeks to support the government in attaining the POWPA goals).

- ***Agriculture*:** Costa Rica´s experience indicates that necessary adaptation efforts and costs could be reduced if more agricultural producers take actions to adapt by taking advantage of economies of scale (i.e. joint learning, improved communication and coordination issues for risk management). It is important to understand the decision making process within a context of uncertainty, this should be the first step in the development of adaptation strategies that are sustainable throughout time. The Environment for Development program of the Tropical Agricultural Research and Higher Education Center (CATIE) carried out research in Costa Rica to understand behavior patterns of coffee producers in face of threats to climate change and, their willingness to invest in measures which reduce their vulnerability. It may be inferred from the results that farmers react in appropriate ways to the changes perceived within their own levels of risk, without being influenced by the risk perceived in others. However, lack of information regarding the magnitude of the risk, may lead to overreactions and unnecessary expenses. This research found that communication at group levels, impacts decision making only when this may lead to a reduction in adaptation costs. The probability of a farmer choosing to adapt increased up to 84 percent when increasing communication related to cost reduction. Furthermore, the results pointed out the importance of agricultural producer organizations as a platform to launch coordinated actions to seek out reduced adaptation costs and therefore promote adaptation strategies at a local and sectoral level.

4. Views on lessons learned, good practices, gaps, needs, barriers and constraints to adaptation including implementation of adaptation projects

This segment of the submission will focus on the barriers and constraints our country has identified as key elements to the integration of adaptation to development processes.

- Integrating adaptation into land use at local government level
- More assessments of critical areas that must be considered
- Economic valuation assessments must be carried out in order to define the best strategy available i.e. infrastructure versus ecosystem based adaptation

Barriers

In the water resources sector, seven main barriers have been identified that limit the implementation of adaptation measures to climate change. Specifically, these barriers are: 1) Little political interest and prioritization; 2) Insufficient knowledge on the climate change problem; 3) Little diffusion and internalization of the information on policies, plans, and programs; 4) Confusing conceptual judicial framework; 5) Inter and intra-institutional lack of coordination; 6) Inadequate resource allocation policies; 7) High cost of adaptation measures and lack of resources.

1. Limited political interest and prioritization

Lack of knowledge on the side of decision makers on the topic of adaptation to climate change has so far been detected, very well due to the lack of information on the subject and on the existence of projects or project proposals to improve the current situation.

However, with the tragic implications on water availability and negative effects on human health brought about by the El Niño phenomenon in the year 2007, with the increase of extreme hydrometeorological events occurring worldwide, and Al Gore's recent movie and other documentaries on the negative effects of climate change, one would expect an important cultural awareness raising effect on decision makers at the highest levels, in order to decidedly support the implementation of policies and measures towards the adaptation of the water resources sector to climate change.

2. Insufficient knowledge on climate change

The country lacks awareness-raising knowledge on the phenomena related with climate change. For example, it is necessary to document, at the local level, the happening of extreme events, to know their effects on water reservoirs and on how their impacts are distributed over the area in study. These issues have not been analyzed due to lack of resources.

An opportunity envisioned in relation to this aspect is the interest that has arisen on the topic and which has begun to flourish, by scientific and investigation entities such as IMN, universities and other organisms as well as by international cooperation, specially the UNDP. In this sense, it is hoped that scientific research on the topic will increase in the future, thus allowing to know and better direct the adaptation measures and, with that, insert the necessary adjustments based on a follow-up and evaluation process.

3. Limited dissemination and internalization of policies, plans, and programs at all levels

According to OECD (2006), one of the main barriers to put in practice adaptation to climate change measures is the fact that knowledge of the implications of climate change is found typically within the Government and cooperation agencies which, generally, are overloaded with other topics like equity and management. According to IMN (2006), although important scientific knowledge has been generated on the subject, it has remained within the technical level, with little success to transfer the information to the political and ONG levels which ultimately have the responsibility of organizing society so that it may respond and push adaptation to climate change forward.

Costa Rica is not the exception and Azofeifa (2006) found through research that after two and a half years of having started the adaptation of the water resources sector to climate change in the northwestern region of the Greater Metropolitan Area study, and even though an adequate knowledge diffusion had taken place at the technical and institutional levels, the information had failed to effectively reach the public. As a result, it was determined that the following stage of the adaptation to the water resources sector program would be to enhance knowledge diffusion and public awareness.

4. Confusing legal framework

Despite the fact that our country has a basic legal framework which encourages adaptation of our water resources to climate change, a multiplicity of decrees and laws have provoked duplicity in the jurisdictions and overlap of institutional functions. Furthermore, there is confusion and lack of clarity within social sectors and within the institutions themselves. This situation must be addressed in order to advance in an efficient and effective manner with the implementation of the necessary adaptation actions.

The laws, decrees, regulations, and mandates dictated by our government, and which, as a whole, make up the legal framework that tries to regulate and organize our water resources, coexist anarchically in a way where institutional duties are overlapped and shared within a great diversity of judicial norms. The result is a mesh of about 155 laws and executive decrees that direct in some manner or other the management of our water resources.

The new Water Resources Law proposal will likely be approved by Congress, and would organize, clear out, and consolidate the hierarchy and functions of each institution related to water resources management and protection.

The Law proposal counts with increased legitimacy given the ample social participation by different sectors, institutions, and organisms involved in the process.

5. Lack of coordination both Inter and intra-institutional

Lack of institutional coordination is evidenced through an inadequate fund distribution for institutional plans, programs and projects. Espinoza (2004) has studied the plans of action of the main institutions related with water resources management, such as the Costa Rican Waterworks Institute (AyA), Costa Rica´s Energy Company (ICE), the Public Health Ministry (MSP), and the Ministry of Environment, Energy, and Telecommunications (MINAET), and has found that all references studied state the lack of institutional coordination as the greatest problem faced by the water resources management I Costa Rica, and that cases abound where excessive bureaucracy and project cancellation bring do more harm than good. The problem lies in the traditional institutional planning methodology, with reduced national and sectoral vision. Additionally, there are no clear institutional strategies to adequately comply with the mandate to protect, coordinate and control our water resources.

6. Inadequate policies to address allocation of resources

OECD (2006) points out that obtaining resources is a problem as they are easier to get once the disaster has occurred rather than in anticipation, even though the latter may cost much less. The basin that supplies seventy percent of the water to the metropolitan area is currently at risk due to lack of resources, especially to regulate urban expansion and polluting activities in the vicinity. Eighty percent of regional governments have no resources to carry out adaptation to climate change measures.

Additionally, planning has been rehearsed with a short-term vision, leaning towards mitigation and not towards prevention or adaptation. This is manifested through a conflict of interests between the environmental and fiscal sides, with often predominance of fiscal issues in resource allocation policies.

7. High cost of adaptation measures and lack of resources

Even though adaptation of our water resources to climate change should be a priority within national planning, its actual implementation is subject to resource availability in order to provide the necessary adjustment costs. This situation, linked to the aforementioned situation about fiscal interests wining over environmental interests, added to the current economic crisis, plus planning and investment short-sightedness certainly amount to a grim scenario. However, the climate change issue has gained international importance recently, and multilateral organizations and cooperation agencies are dedicating more resources to invest in adaptation practices. Good examples are the GEF funds and UNDP's Small Donation Program.

PAPER NO. 4: CZECH REPUBLIC ON BEHALF OF THE EUROPEAN COMMUNITY AND ITS MEMBER STATES

SUBMISSION BY THE CZECH REPUBLIC ON BEHALF OF THE EUROPEAN COMMUNITY AND ITS MEMBER STATES

Prague, 5 March 2009

Subject: **Nairobi Work Programme on impacts, vulnerability, and adaptation to climate change**
Submission on views and information on approaches to and experiences in integrating and expanding adaptation planning and action at national, sub national, community and local levels, including scaling up of local and community-based adaptation

Introduction

The SBSTA invited Parties and relevant organizations to submit to the secretariat, by 20 March 2009:

(a) Views and information on approaches to and experiences in integrating and expanding adaptation planning and action at national, sub-national, community and local levels, including scaling up of local and community-based adaptation; and

(b) Views on lessons learned, good practices, gaps, needs, barriers and constraints to adaptation, including implementation of adaptation projects.

The Czech presidency on behalf of the EU welcomes this opportunity to respond to this request. Relevant additional information can also be found in our earlier submission of May 2007 contained in document FCCC/SBSTA/2007/MISC.10.

General remarks

The EU is heavily affected by climate change. Europe has warmed by almost 1°C in the last century, faster than the global average. Rainfall and snowfall has significantly increased in northern Europe, whereas droughts are more frequently observed in Southern Europe. In recent years, an increased intensity of extreme weather events has caused damage to the economies, disruption to society and individual distress. The EU is of the view that integration of adaptation actions into national and sectoral planning processes is key to strengthen resilience and reduce vulnerabilities to the negative impacts of climate change at national, sub-national, community and local levels.

The EU and its Member States have been proactive in mainstreaming adaptation into their policies, both at the national and at the regional level. Several EU members have already adopted their own national adaptation strategies (see examples below). The EU is preparing a climate change adaptation strategy, which started from the European Commission's 2007 Green Paper "Adapting to climate change in Europe – options for EU action" and which was supported by an extensive participatory process, intended to integrate climate change into all the relevant policies implemented at the EU level and thus complement the Member States' efforts in dealing with inevitable climate change. Climate change concerns are being integrated in key sectoral policies such as agricultural and water policies, regional policies supporting local economies, flood risk management and also within the EU's development policies. Involvement of relevant actors at all levels from civil society to private sector or local governments has been a priority in defining and implementing adaptation strategies in the EU.

The EU cohesion policy is contributing to climate proofing of activities in the EU, with a major focus on adaptation & risk prevention (6.3 billion Euros are planned to be invested in 2007-2013) as well as networking, sharing good practice on adaptation strategies/measures among regions and key operators/stakeholders.

Member States Experience and Approaches

In our previous submission, many EU Member States described examples of practices in integrating and expanding adaptation planning and action at national, sub-national, community and local levels, including scaling up of local and community-based adaptation. In the past two years there has been further progress in the EU and the following examples illustrate how some member states are addressing:

- Conducting integral and sectoral evaluations of impacts, vulnerabilities and adaptation options, with the involvement of key stakeholders.
- Raising awareness among decision makers and the public to improve the short-term nature of decision-making and planning horizons, which tend to make planning and implementing adaptation unattractive.
- Empowering local government through capacity building and training that facilitate the planning for, and implementation of, community-based adaptation.
- Informing communities on how and why the climate is changing to enable them to assess whether their way of coping with current climate variability will be sufficient to deal with the impacts of future climate change.

United Kingdom

The environment ministry, Department of Environment, Food and Rural Affairs (Defra) launched an Adaptation Policy Framework through its website, http://www.defra.gov.uk/adaptation in 2008. The Adapting to Climate Change Programme (ACC) has been set up to drive forward the development of work on adaptation in the UK on a national basis. In November 2008 the Climate Change Act came into force, requiring the government to undertake a national climate change risk assessment every 5 years (the first due in 2011) and established an Adaptation Sub-committee to provide advice and scrutiny to the ACC programme. Defra has funded development of new UK Climate Projections in collaboration with the UK Meteorological Office (Hadley Centre) and academic community to provide future climate scenarios, ensuring that these are relevant to users and policy makers through stakeholder engagement. These scenarios are due to be published in Spring 2009. Other nationally inspired but community-led initiatives to assist in the integration of adaptation planning and action include local authority targets and other community based initiatives such as local authority partnerships involving private and public bodies working at the community level to identify best practices and address adaptation needs. On a sectoral level, adaptation planning has been embedded into a number of projects, such as the Future Farming project on agriculture, Making Space for Water and the TE2100 project on water resources and coastal flooding. A part of the UK adaptation architecture to provide a linkage between the top down approach and bottom up or community based approach, is the UK Climate Impacts Programme (UKCIP), which works with stakeholders to assist them in planning and taking action in their communities through a range of tools provided on their interactive website (www.ukcip.org.uk). UKCIP also works closely with the research community to help co-ordinate scientific research on impacts and adaptation. Experience has shown that key to successfully delivering this research is the engagement of stakeholders as partners throughout the research process (e.g., Building Knowledge for a Changing Climate).

The Netherlands

Central government, regions, municipalities and water boards have joined forces in the Netherlands to adapt to climate change. They are working together on the National Programme on Climate adaptation and Spatial Planning (http://www.maakruimtevoorklimaat.nl/english-Summary.html) and drew up the National Adaptation Strategy in 2007. The strategy addresses matters such as safety, nature and the

quality of the living environment. The central consideration is that adapting to climate change requires an integral approach to spatial matters.

In a new research programme Knowledge for Climate[1] cooperation between the public sector, private sector and scientific institutions is aimed at developing knowledge to respond to climate change. The research is focused on areas susceptible to the consequences of climate change ('hotspots'), such as main national airport, the harbour of Rotterdam, the major rivers and the South-western Delta. The Hotspots/regional knowledge lines are chosen based on, their economic importance and the importance of the investment agenda, the possible impact of climate change, the ambitions relating to innovation and adaptation and national and international transferability of experiences and lessons learned. This hotspot approach combines the development of demand-driven knowledge, by bringing together the local authorities and business and science communities, in a hotspot team with a cross sectoral approach focus on key sectors such as water management, water security, flooding and water availability, transport, agriculture, nature and recreation, urban development, energy supply, financial services, and health.

Spain

Spain's framework instrument for mainstreaming adaptation into national policies, the National Climate Change Adaptation Plan (PNACC), identifies 15 priority key sectors and systems for undertaking specific impacts and vulnerability assessments, and identification of adaptation options (see http://www.mma.es/portal/secciones/cambio_climatico/documentacion_cc/divulgacion/pdf/pnacc_ing.pdf). Despite diverse approaches are needed to tailor the sectoral analyses to the specific factors driving the likely adaptation options (i.e. who holds the powers, institutional issues, available technology, cultural and social factors, etc.), a common approach and knowledge base (e.g. common regional climate change scenarios) plus a regular feedback of data and results between sectors will guarantee a coherent overall approach. Three sectors (coastal areas, water resources, biodiversity) plus developing regionalised climate scenarios have been prioritised for action.

Spain has envisaged ways to ensure effective mainstreaming into both Spain's complex administrative division (national, regional and local powers) and the key actors through the PNACC: when drafted, it was subject to wide coordination and participation, channelled through three existing bodies comprising the relevant administrations, research institutions, NGOs and socio-economic actors. Before the actual implementation of adaptation action, sectoral key stakeholders will be invited to help defining adaptation options. Besides, communication, public awareness, capacity building and training within each sector/system are key PNACC pillars.

The PNACC's governance relies on the coordination role of the Spanish Climate Change Office (OECC), of the Ministry of Environment, and Rural and Marine Affairs (MARM); in 2008, a Climate Change Secretary of State was created, to enhance the climate change policies' coordination powers within the MARM. (Further information: http://www.mma.es/portal/secciones/cambio_climatico/areas_tematicas/impactos_cc/pnacc.htm).

Other national mainstreaming and coordination mechanisms exist, such as an interadministrative 'Working Group on Impacts and Adaptation' that, as a first result, designed a Coordinated R+D+ Innovation Programme on Impacts and Adaptation to Climate Change aiming at filling knowledge gaps in backbone national sectors (health, tourism, forestry, agriculture). Also, the Spanish Network of Cities for Climate (http://www.redciudadesclima.es/index.php) is an initiative, supported by the MARM, to provide technical support to local entities for climate-proof sustainable policies. In its framework, the OECC contributed to define strategic guidelines for mainstreaming and adapting local policies to climate change. Several agreements concluded with key social and economic actors, in sectors such as Health (a national

[1] http://www.knowledgeforclimate.org

observatory on climate change and health to be set up), Agriculture (agreements with wine or green-farming producers), or Insurance, are also worth of mention.

Specific integration into sectoral regulatory and planning documents has started to be effective at different levels, such as the National Action Programme to combat Desertification under the UNCCD or the Water Management Planning Regulation. In the meantime before other regulations are adopted or modified, specific planning documents have been revised for climate change impacts and adaptation options to be considered in the fields of EIA & SEA, and protected areas' planning.

Ireland

Ireland's Climate Change Research Programme (CCRP) was established in 2007 through the Interdepartmental Committee for the Strategy for Science Technology and Innovation (IDC SSTI) to develop national research on climate change and support national policy. The CCRP constitutes a broad co-ordinated research programme across a range of sectors. The objective of the programme is to provide integrated analyses of climate change issues, challenges, and related solutions and opportunities.

The Environmental Protection Agency (EPA) has lead on development of the CCRP structure with the cooperation of key state agencies and government departments. The programme is structured according to four linked thematic areas, including climate change impacts and adaptation.

Work under the thematic of impacts and adaptation supports actions identified in the National Climate Change Strategy (2007) to develop a national climate change adaptation strategy. To this end a national climate change impacts and adaptation database is being developed, with a view to informing the national climate change adaptation strategy and planning. This process is stakeholder led and has been informed by national expertise, sectoral analysis and international best practice. A key future element will be to develop processes by which scientific data and adaptation measures can be successfully integrated into planning and development practices.

The EPA is currently funding primary climate science in collaboration with a number of bodies including Met Eireann (Ireland's meteorological services), and work on impacts and adaptation within the academic research community. The aim is to provide knowledge, which will support the integration of adaptation to climate change into all levels of planning in Ireland.
Relevant web links:
www.epa.ie
http://www.epa.ie/downloads/pubs/other/events/oclr/adaptationworkshop/

France

More than 100 research projects on impacts and adaptation have been or are nearly to be funded in France, principally by the Ministry in charge of ecology (program GICC), by CNRS, by the National Research Agency, by the GIS-Climat, by the MAAIF insurance company and by local or decentralized government authorities. The French researchers have also been deeply involved in European and international programs. New downscaled climate scenarios from Météo-France, IPSL and CERFACS are already available, which are derived from the modelling experiments run for the IPCC 4th assessment report. The resolution is 8x8 km and the fit with past-observed data is insured at local scale.

The heat wave, which took place over Europe in 2003, increased the awareness of the population and of the policymakers on climate change. A heat wave plan has been developed and is activated every summer under the responsibility of the Ministry of health (Direction générale de la santé) following the heat wave of August 2003. The system is perennial and covers the whole country, involves many ministries including Interior and when necessary Defence, and is relayed by local plans, especially in large cites (e.g. Mairie de Paris). It makes use of meteorological information under clear specifications, in a partnership with Meteo-France, and includes different levels of alert. Data on activity, health, deaths,

quantitative and qualitative, are collected both from the hospitals and upstream of the hospital system, with a daily transmission to the Ministry of health. Information has been increased at all levels to the professionals and to the population, in order to react adequately. This plan has been proved efficient during another heat wave, which took place in 2006.

The French government has adopted a national strategy on adaptation to climate change in November 2006. This strategy has made 43 recommendations, which include better information and motivation of stakeholders, promoting an approach adapted to local communities, encouraging voluntary approaches and dialogue with private stakeholders, better taking into account the specific aspects of overseas territories, integration in public policies, and launching an inter ministerial work in order to evaluate the costs of impacts and adaptation. All these strands are being implemented. The national observatory on the effects of climate warming (ONERC) and other organisations bring information from the results of research projects to the users and assists in the development of tools for adaptation. For instance, many industries and local governments interested in infrastructures do meet within a club founded by the Caisse des depots, Météo-France and ONERC in order to evaluate impacts and adaptation options; the water and electricity production sectors for instance are very deeply involved in this process.

The new law called “Grenelle de l’environnement” which is under the consideration of the Parliament requests the Government to present a national climate adaptation plan by 2011. The MEEDDAT (Ministère de l’écologie, de l’énergie, du développement durable et de l’aménagement du territoire) has started in 2007 with ONERC an inter ministerial work to assess the main impacts, adaptation options and their costs in France, which is a necessary first step to define a detailed national adaptation plan. The results will be available during the summer of 2009, and may serve as a background for the definition of priorities for the plan itself. Adaptation will also be included in the new Territorial Climate Plans and in the Regional Schemes for Air, Energy and Climate, which will shortly be made mandatory by the Grenelle laws.
Relevant web links:
http://www.ecologie.gouv.fr/-English-.html
http://www.sante-jeunesse-sports.gouv.fr/dossiers/sante/canicule-chaleurs-extremes/plan-canicule-2008.html
http://www.gip-ecofor.org/gicc/

Germany

In December 2008 the Federal Cabinet adopted the "German Strategy for Adaptation to Climate Change" (http://www.bmu.de/english/climate/downloads/doc/42841.php). It creates a framework for adapting on the national level, primarily describes the contribution of the Federation and provides guidance for other actors. It is based on the principles of openness and cooperation; knowledge, flexibility and precaution; subsidiarity and proportionality; integrated approach; international responsibility; sustainability. It lays the foundation for a medium-term, step-by-step process undertaken in cooperation with the federal Länder and other civil groups and aimed at assessing the risks of climate change. On this basis, appropriate goals will be defined and adaptation measures will be developed and implemented.

The Strategy sums up the current status of knowledge on the anticipated climate changes and the impacts these could entail. Possible climate impacts and options for action are outlined for 15 areas of activity and selected regions. In addition, the Strategy describes the international context and the German contribution to adaptation in other parts of the world, and explains the next steps for further developing the German Adaptation Strategy. As a next step, the Federal Government will draw up an Adaptation Action Plan by spring 2011 together with the federal Länder and other actors. A broad based communication process and initiatives for improving the knowledge base and foundations for decision-making are supporting this.

In order to support the actors and the process of implementing and improving the Adaptation Strategy the German Government decided to further expand the offerings and services of the Competence Centre on

Global Warming and Adaptation (KomPass, http://www.anpassung.net) at the Federal Environment Agency (UBA); KomPass will collate and evaluate information and results from the various subject areas and ministries and communicate them via an Internet portal. Furthermore the establishment of a Climate Service Centre at the Helmholz-Gesellschaft Deutscher Forschungszentren (seed funding by the Federal Ministry of Education and Research, http://www.bmbf.de/pub/bmbf_hts_lang_eng.pdf) is planned, at the interface between climate system research and users of the data obtained from scenario and model calculations. The aim is user-oriented acceleration of knowledge dissemination and research processes in the field of climate modeling and scenario development.

In Germany practical studies on adaptation options have started. The German National Meteorological Service (Deutscher Wetterdienst, DWD) e.g. started co-operations with several major cities to investigate impacts of future climate change on cities and to identifying mitigation and adaptation options.

Latvia

Although several examples of sectoral adaptation policies are enforced and implemented in Latvia (flood risk assessment and management, risk management and insurance in agriculture, rural development, coastal zone management, etc.) as well as research on climate change impacts, coordinated process on elaboration of adaptation policy system started in 2008 with acceptance by Latvian Government of Report on Adaptation to Climate Change (2008). The Report deals with climate change impacts and vulnerabilities in different sectors, gives an overview of relevant research at international and national level as well as on the most important policy initiatives, globally and in EU level, related to adaptation. It also describes the current situation in Latvia, presenting what has already been done concerning adaptation and outlines recommendations for future adaptation policies and measures to be taken. The Report prescribes to elaborate national conception with development scenarios within one year after delivery of White Paper on adaptation by European Commission. The elaboration work of adaptation conception is already started in two working groups: one is inter-governmental expert group, but the second one consists of scientists and specialists from different agencies as well as representatives of enterprises and insurance sector. The co-coordinator of this process is the Ministry of the Environment (Climate and Renewable Energy Department)[2].

Very important aspect for Latvia, regarding adaptation policy and measures, is fact that climate change risks are included in the highest national security level - into National Security Conception (2008). This Conception is elaborated on the basis of analysis of danger to the State, in its turn that determines the basic strategic principles, priorities and measures for the prevention of danger (including climate change risks) to the State. The Conception besides other threats (e.g. military) predicts strong response to prevent and to react to climate change (environmental) risks and disasters, and asks for elaboration of appropriate policy and tools` system. The same task is for National Civil Protection System, which is subject to national security system. The goal of the last one is to identify and classify risks (floods, storms, etc.) and it levels, indicated appropriate measures and responsible institutions.

New financial mechanism has developed in Latvia regarding flexible mechanisms under Article 17 of Kyoto protocol. As Latvia has decided to participate in flexible mechanisms (e.g. International emission trading or IET), it gave possibility for earmarking 40 million of Assigned Amount Units (AAUs) (emissions in Latvia are 59% under estimated level) to be potentially available for Latvia during first (2008-2012) commitment period. Law on Latvia's Participation in the Kyoto Protocol Flexible Mechanisms (2007) is predicted development of Climate Change Financial Instrument what means that every AAU sold will be used for *greening* purposes, including adaptation policy and measures.

[2] http://www.vidm.gov.lv/eng

The main important outcome from researchers is expected from National Research Programme KALME (Climate Change Impact on the Waters of Latvia) (2006-2009)[3], carried out by University of Latvia and several other scientific institutions. Scientists in Latvia have joined forces to investigate how climate change will potentially influence Latvian lakes, rivers and the Baltic Sea coast and coastal waters, and to elaborate scientifically justified proposals to adapt to and mitigate adverse impacts. The task of the State Forest Monitoring Programme[4] is to explore the impact of climate changes to forest ecosystems, forest biodiversity status and changes as well as to forest soils. Data on climate change direct impacts are gathering by Latvian Environmental, Geological and Meteorological Agency[5]; regulatory monitoring on Baltic Sea coast geological processes also is going on.

Speaking on communicative aspect of climate change impacts and adaptation, Latvia has published several books and brochures for different groups of audience: Climate Change in Latvia (University of Latvia, 2007, in English) - collection of scientific papers about the character and impacts of climate change as well as climate policy and technologies; Climate Change and Global Warming (University of Latvia, 2008, in Latvian) - popular scientific collection of articles written by experts mainly for students and other interesents; two brochures on climate change and adaptation, and appropriate political processes (University of Latvia, 2008, in Latvian) – for very broad audience; Meeting the Climate Change: challenge for Latvia in International Environment (Strategic Analysis Commission under the Auspices of the President of the Republic of Latvia, 2008). Although there is no separate or single communication plan for adaptation, every project or programme, for example, National Research Programme KALME (Climate Change Impact on the Waters of Latvia) has its own working package on communication. Therefore we can say that this communication aspect has been (and will be) involved through different ways (projects, programmes, books, mass media, etc.).

Sweden

A Commission on Climate and Vulnerability, initiated by the Government has, in consultation with all major stakeholders in the country, studied the impact of extreme weather events and long-term climate change and assessed the sensitivity, vulnerability and proposed adaptation measures to build a more robust Swedish society. A regional climate model and downscaling of global climate scenarios have been used to specify climate indices as a foundation for the vulnerability assessment. The Commission submitted its report in October 2007. The report gives a good overview of threats and opportunities in all important sectors[6]. The Commission stressed the responsibility of local and regional administrations to implement adaptation measures. On the national level, central agencies will have important roles for making regional climate scenarios and high resolution maps available as a basis for the activities on local and regional level.

During spring 2009, the Swedish Government will present a new climate bill including a national adaptation policy with priorities and responsibilities.

In its development cooperation the Swedish Government prioritizes environment and climate change, with a special focus on adaptation, as one of three thematic priorities. The Swedish Government launched a Commission on Climate Change and Development[7] in December 2007 to address issues of risk reduction, adaptation and development. The purpose is to address the adverse effects on development caused by climate change and major natural disasters. The Commission will further explore and promote effective ways to integrate risk reduction and adaptation to climate change into development and poverty reduction plans in developing countries and to ensure that future investments in Official Development

[3] http://kalme.daba.lv/en
[4] 54% of Latvia territory is covered by forest
[5] http://www.meteo.lv/public/26902.html
[6] http://www.sweden.gov.se/sb/d/574/a/96002
[7] http://www.ccdcommission.org/

Assistance take full account of climate stresses and increased disaster risks. The final report of the Commission will be presented in May 2009.

The Government of Sweden also provides a new funding package for climate change and development. The Government is allocating 4055 million SEK in additional support to climate-related development assistance over the period 2009-2011. The main objective of the package is to contribute to and support adaptation to climate change in the poorest countries, with special focus on African.

Some additional initiatives under way:

- In the National Budget Bill for 2009, 55 million Euro was allocated for a three year period to strengthen ongoing initiatives in order to enhance the knowledge on risks for floods and landslides and support measures to forestall climate impacts.
- A strategy for forest tree breeding has been developed. Some local municipalities have changed their regulations for physical planning and the built environment to take into account the risk of rise in water levels and expected future maximum flows in lakes and watercourses.
- The ability of hydropower dams to cope with flooding has been reviewed and the safety margin is increased when reconstruction is carried out.
- To support local municipalities a network of five central agencies has been formed. The network has put together information on climate change impacts, risk handling, and how to develop an adaptation strategy.
- Examples of how adaptation measures have been integrated into existing regional and municipality work has been compiled. The information is available on a web based adaptation portal[8].
- Currently two major research programmes are active. CLIMATOOLS[9], with the aim to develop tools to help decision-makers to adapt the society primarily in areas as health, built-up areas and tourism and SWECIA[10] with the aim to improve the capacity for advanced analysis and assessment of climate impacts.

Italy

Key vulnerabilities to climate change

The key vulnerabilities identified for Italy in relation to the projected climate changes are the following:

1) Water supply:

- anthropogenic pressure on water resources and water management will become more critical;
- flood risk is likely to increase;
- the risk of water resources loss will probably increase, particularly in Southern Italy, exacerbating the existing difference between the North and the South of the Country.

2) Soil degradation and desertification:

- run-off erosion due to the increase of intense precipitations and floods in Northern Italy;
- erosion determined by dryness, salinization, and nutrients loss due to a decrease in precipitations and an increase in droughts in Southern Italy;
- highest sensitivity to desertification risk in Southern and insular regions.

[8] http://www.smhi.se/cmp/jsp/polopoly.jsp?d=9315&l=sv
[9] http://www.foi.se/FOI/templates/Page____6631.aspx
[10] http://www.mistra-swecia.se/

3) Agriculture:

- a particularly negative effect is anticipated at local scale in Southern Italy, where both vegetation and land are already experiencing a marginal water supply regime;
- reduced crops yields, especially in summer; soil quality deterioration.

4) Coastal zones:

- risk of sea flooding from sea level rise;
- loss of wetlands;
- salt water intrusion into coastal fresh-water beds, with adverse impacts on agriculture and fresh-water supply; coastal erosion.

5) Alpine region:

- changes in the hydrological cycle resulting in geomorphologic processes.

6) Biodiversity and ecosystems:

- loss of ecosystems and biodiversity, with a possible range of reduction in the number of stable plant species in 2100, between 20÷40% compared to 1990 in Northern Italy and Apennines, and 40÷60% in Southern Italy;
- higher risk of forest fires and other disturbance regimes in Central and Southern Italian forests.

According to the first comprehensive economic assessment of the impacts of climate change in Italy[11], aggregate GDP[12] losses induced by climate change in Italy are likely to be small.

However, some economic sectors (e.g. tourism) and the alpine regions will suffer significant economic damages.

Adaptation measures

Some Italian measures already implemented in the context of environment protection, natural hazards prevention, sustainable management of natural resources and health protection, can be also beneficial for adapting to climate change.

They range from legal frameworks and monitoring, to surveillance of early impacts and early warning, and some practical measures in the sectors:

- environment and water resources protection,
- fight against desertification,
- agriculture,
- coastal zone protection,
- heat health warning systems.

[11] Carlo Carraro, Alessandra Sgobbi, 2008: "Climate Change Impacts and Adaptation Strategies in Italy. An Economic Assessment", Fondazione Eni Enrico Mattei – FEEM, http://www.feem.it/NR/rdonlyres/7ACCA8B4-5B26-47E2-B718-76729FF67C0F/2498/608.pdf.

[12] GDP = Gross Domestic Product.

These Italian measures, however, are generally aimed more at reducing vulnerability to current climate variability and extreme weather conditions, rather than at preventing the potential adverse effects of the projected climate changes.

Adaptation to Climate Change: Italian priorities[13]

Italian priorities for adaptation to climate change can be derived from the existing (and above mentioned) key vulnerabilities indicated by the IPCC and the EEA. That means that priority actions need to be defined, starting from policies concerning especially the sectors:

- water resources management,
- agriculture and rural development,
- Italian and Mediterranean ecosystems and biodiversity protection,
- coastal and soil protection,
- health protection,
- industry,
- energy and tourism.

The recommended actions for adaptation include[14]:

1) improving research on climate change impacts;
2) adjusting water resources management to climate change (e.g. promoting water savings, water conservation and an efficient water distribution, and a sustainable management of marine resources);
3) responding to the impacts of climate change in agriculture (e.g. promoting traditional cultivations resistant to the minor availability of water, and supporting the cultivation of forests for land maintenance);
4) setting in security Italian coasts (e.g. adjusting urban plans and rethinking infrastructures localisation in relation to the modification of the coastline, and restoring the coastal dunes and wetlands);
5) being prepared to the expected increase in the frequency and intensity of extreme events (e.g. setting in security the major hydro-geological risk areas, and setting up more efficient early warning systems in the higher risk areas for floods and landslides);
6) promoting the mountain natural heritage and of a tourism less linked to skiing needs;
7) considering climate risks in the development of health strategies (e.g. increasing frequency of summer heat waves);
8) improving public involvement and awareness on policies for mitigation and adaptation to climate change;

[13] Source: Italian Ministry of Environment, Land and Sea – IMELS, 12/06/08: "Italian Fourth National Communication to the *United Nations Framework Convention on Climate Change* – UNFCCC", http://unfccc.int/resource/docs/natc/itanc4.pdf.

[14] "A MANIFESTO FOR CLIMATE A New Deal for Sustainable adaptation and environmental security - Conclusions of the Italian National Conference on Climate Change (Roma, Fao Headquarters, 12-13 September 2007), http://www.conferenzacambiamenticlimatici2007.it/site/_Files/13settembre/ManifestoperilclimaCNCC2007-IT-EN-FR.pdf.

9) promoting new sustainable forms of consumption (starting from water labelling of goods and products) and environmental incentives for labour and enterprises also in relation to the new regulation on environmental accountability;

10) providing incentives system for energy savings in the residential sector.

Finland

Finland's National Adaptation Strategy presents in great detail the anticipated impacts of climate change in different sectors and measures to be taken until 2080. The objective of the Strategy is to improve the capacity of society to adapt to the changes ahead. Through mainstreaming, both the Government and other stakeholders will take further action to promote adaptation. The Strategy is part of the National Energy and Climate Strategy adopted in 2006.

The preparation of the Adaptation Strategy was coordinated by the Ministry of Agriculture and Forestry. The work was carried out in broad cooperation between representatives of the relevant Ministries and scientific institutions in 2003-2004. The complete strategy is available in English in http://www.mmm.fi/en/index/frontpage/environment/ilmastopolitiikka/ilmastomuutos.html

Priorities identified for increasing adaptation capacities include: (i) mainstreaming climate change impacts and adaptation into sectoral policies, (ii) addressing long-term investments, (iii) coping with extreme weather events, (iv) improving observation systems, (v) strengthening the research and development base, and (vi) international cooperation.

The Strategy covers the following sectors: agriculture and food production, fisheries, reindeer husbandry, game management, water resources, biological diversity, industry, energy, transport and communications, land use, communities, buildings and construction, health, tourism and recreational use of nature.

The Strategy is implemented in 2005-2012 primarily through sector-specific strategies and programmes. It will be evaluated in 6 to 8 years. A five-year research programme for 2006-2010 has been launched to address the need to strengthen policy-relevant research and development questions.

The implementation of the Adaptation Strategy is making good progress. In the past two years various administrative sectors, municipalities and industries have launched their own review processes. Examples can be found in http://www.mmm.fi/en/index/frontpage/environment/ilmastopolitiikka/ilmastomuutos/strategiaetenee_engl.html

During its term of office, the Government of Finland will draw up a foresight report on climate and energy policy. The report is to be submitted to Parliament during spring 2009. The aim of the report is to serve decision making in various sectors.
(http://www.vnk.fi/hankkeet/tulevaisuusselonteko/en.jsp)

Denmark

In March 2008 the Danish government introduced its 52 page *'Danish strategy for adaptation to a changing climate'*[15]. The strategy focuses on those adaptation measures, which could be appropriately implemented within the next ten years.

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15 http://www.kemin.dk/enUS/climateandenergypolicy/dkpolicy/climateadaptationstrategy/Sider/climateadaptationstrategy.aspx)

With this strategy, the government stresses the importance of timely adaptation to climatic changes. Adaptation should be autonomous, in the sense that the authorities, enterprises and individuals at their own initiative react to the impacts of climate change in due time, within the given legislative, financial and technological framework. Furthermore it underlines that where autonomous adaptation is not the most optimal approach for society, it may be necessary to launch adaptation measures that have been agreed centrally at a higher political level.

In this respect, the Danish government calls for implementation of information initiatives and organisation of the area in order to ensure that future climate change is included in the planning and development stages, so that all stakeholders have the best possible foundation for considering adaptation or not. The strategy includes the following key initiatives:

- Set up a cross-ministerial Coordination Forum on Adaptation to 1) evaluate the progress in implementation of the strategy and report to the government; 2) monitor and share knowledge about climate adaptation as well as share experiences with climate adaptation between sectors, and authorities at all levels.
- Establish an Information Centre on Adaptation under the Ministry of Climate and Energy to communicate the strategy, current knowledge and data of relevance for adaptation to society primarily through a climate adaptation web portal hosted by the Information Centre.
- Establish a Coordination unit for Research on Climate Change Adaptation to 1) promote cooperation and knowledge sharing among national and international research centres; 2) provide climate data and state of art climate research results of significance to the climate adaptation web portal

The strategy identifies vulnerable sectors and lists ongoing adaptation initiatives. It also outlines what can be done to encourage this process in the future. A sectoral responsibility for autonomous adaptation is the key principle in the strategy although municipalities also have a key role witin their own jurisdiction. The sectors included are:

- Coastal management
- Buildings and infrastructure
- Water supply
- Energy supply
- Agriculture and forestry
- Fisheries
- Nature management
- Land use planning
- Health
- Rescue preparedness
- Insurance

Needs for socio-economic modeling and evaluation of measures is thematically emphasized across all sectors.

The development of the national adaptation strategy is lead by the government - currently the Ministry of Climate and Energy. The strategy has been developed by an inter-ministerial working group, which prepared a catalogue assessing the impacts, vulnerabilities and adaptation options as basis for the subsequent development of a draft strategy for public consultation. As a common basis for the strategy, and to show the uncertainty range of expected future climate changes, three scenarios have been selected: The IPCC A2 scenario (as a medium-high emission scenario) and the IPCC B2 scenario (as a medium-low

emission scenario). In addition, a third scenario is described based on the EU's goal of limiting anthropogenic induced climate change to less than 2 degree Celsius compared to pre-industrial levels.

Main concerns highlighted by the strategy with regard to changing climatic conditions include increased precipitation (esp. in winter), milder winters, warmer summers, sea-level rise, stronger winds and increased occurrences of extreme weather events. These changes may have potentially disrupting effects on those sectors listed above. Potential opportunities include increased production in agriculture and forestry, new crops, reduced need for heating and increased potential for wind power generation.

Links to European Union adaptation policies are only through reference to directives that are thought relevant for adaptation (e.g. the Water Framework Directive and the Directive on Assessment and Management of Flood Risks). .

The strategy has been in a public hearing before it was adopted by the Parliament on 1 April 2008.

Belgium

The knowledge of climate change in Belgium is increasing thanks to several studies on European and regional scale. The results of these studies teach us a lot about climate change impacts in Belgium. One of the most important ones, in terms of potentially affected people, is sea level rise. Other aspects, that can lead to severe impacts are: changes in rainfall (heavy showers, drought in summer …), heat waves that will be much stronger and can last longer, unknown fauna and flora and new diseases that can locally affect nature, humans and their socio-economic activities.
The results of the studies are being implemented into policies and legislations.
In what follows a brief overview of the Belgian efforts will be given.

Studies about adaptation in Belgium.
In Belgium several studies on impacts of climate change and concrete actions are already started or even carried out. Most action has been undertaken in the field of water management, landscape management and coastal management.
CCI-hydr, Adapt, Climar, SCALDWIN are some of the projects that reveal the Belgian awareness for climate change and possible adaptation actions which focus on water related changes, more particular precipitation and rivers, the sea, and groundwater. Observations realised during the period 1937-2003 in Oostende reveal an increase of the sea level estimated to 16 cm/century. Higher frequency of marine storms will have to be taken into account in planning and organising maritime traffic, offshore energy production and aquaculture production. Fisheries will suffer from shifts in fish populations and spawning grounds.

A Flemish study on adaptation to climate change in the agricultural sector concludes that the financial losses will be moderate (between 0.1 % and 4.1 % of the end production value of plant and animal production for the year 2020), depending on the evolution of the climate in the future. If the agriculture adapts itself to climate change, the losses will decrease from 0 % (no losses) to 0.4 %. Especially the summer drought will have a negative influence on crops with superficial rooting, f.e. beetroot.
Changes in biodiversity are studied via a detailed research of the climatic conditions. Also in spatial planning better understanding is realised via the CcASPAR research project and adaptation to Climate change is set up via a "working package 8".
A Walloon study will inter alias allow for the increase of fundamental knowledge of the forest ecosystem (relation soil-tree-environment) and the development of decision help tools. Other studies in Walloon Forests are linked to adaptation to climate change (e.g. monitoring of nutrient and water cycles in water catchments, long term monitoring of intensive and permanent plots in the European forest monitoring framework, cartography tool to identify the level of hydrological risk).
Another project (AGORA-CMD) tries to identify climate-environmental and health indicators in order to start up an integrated monitoring tool.

Adaptation policy and legislation.

There is special attention for adaptation in policy and legislation in Belgium.
The sea level rise and risk of floods are incorporated in the Flemish Sigma-plan. The protection level for 2100 will be reached in 2020 (based on IPCC AR4). Beside the Sigma plan, the Flemish authorities have decided to protect the coastal zone for storms with a return period of 1/1000 year. The research is going on for this protection level.

Belgium is equipped with warning systems for flooding, with flood management plans and will lead actions to reduce vulnerability (for inland water and sea). Furthermore the building of houses in inundation zones is restricted.
In agriculture, several instruments stimulate farmers to take into account environmental concerns in their farm management. These include measures to mitigate the impact of agriculture on climate change as adaptation measures. Financial aids are given for investments in relation to adaptation of building, pest monitoring in integrated crop protection, revaluation of used water and water management systems, etc.
The agro-environmental program includes voluntary measures effective in addressing the consequences of extreme weather phenomena. Measures such as to prevent the erosion of agricultural land are already accessible for farmers: hedges, grassy headlands, winter soil cover, etc. The program also proposes measures to promote the maintenance and development of biodiversity. As such, the implementation of Natura 2000 to conserve endangered species and their habitats is a major biodiversity conservation tool. Recent changes of the common agricultural policy offer new opportunities for a further integration of climate change concerns.
In Wallonia an expert group is working on the impact of climate change on forest ecosystems, on recommendations for policy makers and on guidance for forest owners/managers in their field practices. Moreover, some measures of the new Forest Law in Wallonia work in the same direction, f.e. limitation of drainage and clear-cutting, promoting continuous forest cover, promoting diversity of species, etc.

Supervision on studies and legislation.

All of these studies and policies are supervised on different levels.
A Belgian Adaptation Consultation gathers the information from the different regions and translates this in national or international notes. It organises events and takes care of the Belgian adaptation plan.
On regional level a Flemish and a Walloon steering group tries to put adaptation on the agenda of the different departments and administrations.
Also different sectors are working on adaptation regarding the initiatives taken in the field.
Relevant web links:
http://www.arcadisbelgium.be/climar/
http://www.kuleuven.be/hydr/CCI-HYDR.htm
http://www.ulb.ac.be/ceese//ADAPT/Home.html
http://lv.vlaanderen.be/nlapps/docs/default.asp?id=841
http://www.virtuelecampus.be/main.aspx?c=.ONDERZKDBE&n=40312&id=UA054&tid=21029&pid=23397

Czech Republic

Main adaptation measures and policies are included in the National Program to Abate the Climate Change Impacts in the Czech Republic (http://www.env.cz/AIS/web-en.nsf/pages/Climate_Change), which was released by Ministry of the Environment in 2004. This document deals with adaptation strategy in cooperation with mitigation measures. The National Program was focused primarily on water management, agriculture, forestry, health and education in terms of defining adaptation measures.

In 2007, National Program has been evaluated and it was decided by the government to replace it and prepare new Climate Protection Policy in the Czech Republic, which should be finished in the first half of 2009. Document will contain mitigation as well as adaptation measures in order to solve the problem of the climate change simultaneously. Some policies and measures will continue, others were replaced and some are under preparation.

Regards the research and development of climate scenarios and thus formulating further adaptation measures, there are two projects that are running from 2007. Both are monitoring river basins and its environment with focus on hydrological aspects of water retention in monitored areas. Main difference is that one is observing small river basins and in GEOMON network and the other one is monitoring the main Czech river basins. The aim of research is to observe and collect data relevant for climate modeling, specify and update climate change scenarios and impacts for Czech Republic. On the basis of these scenarios, concrete adaptation measures will be defined. As these projects are planned for 5 years, final results are being expected in 2011.

Austria

In Austria the development of a national adaptation strategy has been announced officially in the current government programme, which defines goals up to 2013. The Ministry of Agriculture, Forestry, Environment and Water Management (BMLFUW) has initiated preparatory projects for developing a national adaptation strategy in 2007. Since 2007 the BMLFUW organised three national workshops on climate change adaptation to inform and discuss with stakeholders about the necessity to take action and the steps to be taken towards an adaptation strategy. Scope and meaning of "adaptation to climate change" was explained, discussions were held.

First a study on the current status of adaptation activities in Austria was conducted. Based on a survey of existing research projects and adaptation actions, it summarizes the current status quo of adaptation to climate change in Austria. Activities that reduce negative impacts are covered as well as those capitalizing on positive impacts of climate change on human society. In this regard, the survey also encompasses activities that may serve this purpose even if the respective actors may have taken the measure without explicitly aiming at adaptation to climate change. The majority of activities take place in the following areas: Water management, protection against natural hazards, agriculture and forestry. Overall 13 areas of activity were screened. A public database containing these results is in preparation and will be available soon. The following conclusions can be drawn from the survey: Austria is already active with respect to climate adaptation, although most activities are taken individually and reactively. An adaptation strategy could help to capitalize on possible synergies from co-operation and would support proactive measures that also reflect future climate impacts and help to avoid increases in GHG emissions resulting from adaptation activities.

This initial study has been serving as a starting point for the development of a comprehensive paper, containing climate projections, vulnerability assessments and a portfolio of first recommendations for additional adaptation actions. This paper covers the sectors agriculture, forestry, water management and tourism and electricity industry. Further vulnerable sectors will be considered in 2009.

In spring 2009 a participatory process will start to discuss adaptation measures, responsibilities for implementation, research needs etc. with the relevant stakeholders. A home page with relevant information on climate change adaptation in Austria is under preparation (planned to be launched in June 2009).

Romania

Taking into account that Romania's climate will experience major changes during this century following the regional and global trends, the Ministry of Environment initiated a process for approving a National Guide on Adaptation to Climate Change Effects. The necessity to elaborate the guide has been identified in the Romanian Strategy on Climate Change and its Action Plan approved in 2005. In this respect, an interdisciplinary and inter-sectorial Working Group was organized at the beginning of 2007 based on an Order of the Environment Minister. Presently, this Working Group consists of 25 experts representing the authorities and institutions responsible with environmental protection, economy, development and finance, agriculture, forests and rural development, transports, public works and housing, education, health, tourism, meteorology and hydrology, research institutes and NGOs.

The main task of this Working Group was to prepare the national guide on adaptation to climate change effects. The first draft of the document has been presented in January 2008 followed by a process of public consultation and debates. The document contains information on impact and vulnerability to climate change and identifies adaptation measures in the most vulnerable sectors (biodiversity, agriculture, water resources, forests, infrastructure, constructions, transports, tourism, energy, industry, health, sport, insurances). In the same time, new studies and research activities were identified in order to substantiate the future adaptation actions. The final version of the National Guide on Adaptation to Climate Change Effects was approved by an Order of the Minister of Environment in September 2008.

The guide's main objective is represented by the increase of the adaptive capacity of Romania in response to the negative effects of climate change. The guide provides detailed information on the:

- Identification of impacts induced by climate change, as well as the vulnerability degree of different sectors;
- Integration of the adaptation concept in the sectoral development strategies and decision-making process;
- Identification of the most important and cost-effective adaptation measures in the most vulnerable sectors.

The guide's goal was to identify the necessary adaptation measures considering the latest climate scenarios developed in Romania, and taking into account the available resources. The guide gives particular emphasis to identification and communication of adaptation measures that can be implemented at local level taking in consideration the limited resources.

The guide is also expected to resolve some internal issues related to climate change adaptation activities such as: intra- and inter-institutional communication; limited awareness in the field of adaptation; development of the scientific basis; importance of the local authorities in respect of the adaptation measures.

PAPER NO. 5: JAPAN

Japan's submission on views and information on adaptation planning and practices

This submission is in response to paragraph 59 of FCCC/SBSTA/2008/6. Japan welcomes the opportunity to submit its views and information on approaches to and experiences in integrating and expanding adaptation planning and action at national, subnational, community and local levels, including scaling up of local and community-based adaptation. Japan also would like to provide its views on lessons learned, good practices, gaps, needs, barriers and constraints to adaptation, including implementation of adaptation projects.

1. Japan's views and information on approaches to and experiences in integrating and expanding adaptation planning and action at national, subnational, community and local levels

In order to enhance integrating and expanding adaptation planning and action at national, subnational, community and local levels, Japan believes that the following elements are needed:

- Establishing a knowledge network for adaptation, and strengthening the support for capacity building for vulnerability and impact assessment as well as planning and implementation of adaptation measures

In order to provide useful information for planning and implementation of adaptation measures to policy makers and practitioners, it is essential to improve access to knowledge of adaptation and to enhance synergy among organizations, regional centers and networks conducting work relevant to climate change. In this regard, it is necessary to establish a knowledge network for adaptation, and this should be done by utilizing existing regional centers. The network can be established by cooperation among the UNFCCC, Parties and relevant organizations. Information obtained through the network should be provided to the UNFCCC.

Regional scientific networks, such as the Asia-Pacific Network for Global Change Research (APN), can contribute effectively to conducting capacity building for vulnerability and impact assessment.

- Cooperating with current and future approaches which are taken in other international frameworks outside the UNFCCC (including the relevant UN institutions and international financial institutions for development), as well as by bilateral support (especially national development strategies and international support for development)

In the field of adaptation to climate change, it is necessary for approaches under the UNFCCC to utilize information acquired through many relevant ongoing multilateral and bilateral supports, including assistance in the field of development policy. Therefore, it is essential to cooperate with current and future approaches which are taken in other international frameworks outside the UNFCCC and by bilateral support.

- Improving the accumulation and sharing of information regarding support for adaptation measures (e.g. donors' reporting regularly to the UNFCCC the information on adaptation measures, which is to be broadly provided to policy-makers through the UNFCCC Secretariat.)

Many adaptation-related activities are implemented by Parties and relevant organizations. Japan believes the UNFCCC should function to assemble and share relevant information on adaptation measures, while taking into consideration utilization of and consistency with existing information sharing networks in different areas and regions.

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2. Views on lessons learned, good practices, gaps, needs, barriers and constraints to adaptation, including implementation of adaptation projects

For the analysis of lessons learned, good practices, gaps, needs, barriers and constraints to adaptation, Japan would like to introduce the following elements (for other elements, refer to Table1).

Firstly, the Japanese Ministry of the Environment has published a report titled "Wise Adaptation to Climate Change" concerning national impacts of global warming and basic ideas for adaptation measures to be taken in Japan and developing countries especially in Asia-Pacific region (June, 2008)[1].

Second element is "International Cooperation for Adaptation to Climate Change in Developing Countries,"[2] recommendations finalized in March 2007 by the Experts Committee on ODA for Climate Change Adaptation, formed by the Japanese Ministry of Foreign Affairs (MOFA). Furthermore, building on the recommendations, the Experts' Panel on Development Cooperation in the Field of Climate Change, also established by MOFA, compiled another report, "Basic Policy on Development Cooperation in the Field of Climate Change: Recommendations by Expert's Panel for Realization of `Cool Earth`."[3] The latter report expanded the scope of discussion to actions to be taken by developing countries themselves and basic policies that should be commonly conducted by all actors in the context of development cooperation in the field of climate change.

Another output is from the Japan International Cooperation Agency (JICA). JICA selected good practices for adaptation to climate change from its past technical assistance activities, grant aid and ODA loan financed projects. JICA compiled them in the brochure "JICA's Cooperation for Climate Change"[4]. JICA is also conducting a study to develop a methodology to assess physical and socio-economic vulnerability of urban coastal area in Asia.

Japan has provided significant amount of ODA so far, in the form of grant aid, technical cooperation and concessional loans to support many adaptation–related projects/activities in developing countries under the Japan's ODA Charter and several initiatives such as the Kyoto Initiative, Water and Sanitation Broad Partnership Initiative (WASABI), disaster reduction, assistance toward the Pacific Island Forum (PIF) member countries. Last year, Japan launched the "Cool Earth Partnership" with a view to providing financial support on the scale of 10 billion U.S. dollars to assist developing countries striving to achieve both emission reductions and economic growth and aiming to contribute to climate stability. In order to analyze the experiences in such projects, the Government of Japan and JICA have been conducting evaluation of each project upon completion.

Further details of effectiveness, impact and other lessons learned from each past adaptation–related project/activity can be obtained at the websites of MOFA (http://www.mofa.go.jp/policy/oda/note/index.html) and JICA (http://www.jica.go.jp/english/index.html)

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 receiving related information from other Parties.

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[1] The report can be downloaded at: http://www.env.go.jp/en/earth/cc/wacc_080618.pdf

[2] The report can be downloaded at: http://www.mofa.go.jp/gaiko/oda/bunya/environment/pdf/recommendations.pdf

[3] The report can be downloaded at: http://www.mofa.go.jp/policy/environment/warm/cop/policy0803.pdf

[4] JICA, "JICA's Cooperation for Climate Change," December 2008 (this brochure will be uploaded at JICA's website (http://www.jica.go.jp/english)).

Table 1

Type of adaptation action in integrating and expanding adaptation planning and 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**	**Barriers/ Constraints**	**Experiences/ Lesson learned**	**References** i.e. publications, websites etc.
Approaches	Asian Water Cycle Initiative (AWCI) Bangladesh, Bhutan, Cambodia, China, India, Indonesia, Japan, Korea, Laos, Malaysia, Mongolia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Uzbekistan, Vietnam	-under implementation The implementation was approved at the 3rd Asian Ware Cycle Symposium, 3-5 December 2007. After the technical instruction offered in Beijing, 5-6 November, 2008, the river basin hydrological data submission to the data integration system started and two capacity building seminars were held. Three workshops and two capacity building programs will be held in 2009. Preliminary case studies started in Vietnam, Bangladesh, Thailand, Pakistan, Indonesia, Bhutan, Cambodia, Philippines, and Japan. Implementation period: 2008-2010	Consensus on the well-described data opening policy. An advanced data integration and analysis system including convenient user-interfaces. Well-organized community activities. .	Due to the national data policy, one country can not submit the hydrological data to this framework.	Improvement of flood control and water use management. Assessment of the climate change impacts on floods and droughts.	http://monsoon.t.u-tokyo.ac.jp/AWCI/

Approaches	Study on Advanced Prediction System and Counter Measures of Regional- and Meso- scale Water Cycle	10/2002-03/2007	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	http://www.kakushin21.jp/kyousei/k051open/index.html

PAPER NO. 6: NEW ZEALAND

Nairobi work programme on impacts, vulnerability and adaptation to climate change: Adaptation planning and practices

New Zealand submission
March 2009

New Zealand welcomes this opportunity to make a submission under the Nairobi work programme providing information on approaches to and experiences in integrating and expanding adaptation planning and action at national, sub-national, community and local levels (FCCC/SBSTA/2008/6, paragraph 9 refers). This submission updates some of the information provided in New Zealand's May 2007 submission under the Nairobi work programme.

New Zealand's approach has concentrated on the preparation of guidance and information material at central government level hich is then available to local governments, and at community level to raise awareness of climate change impacts and assist in the incorporation of adaptation to climate change into the planning process. The submission is divided into two parts: the first covers materials developed for local government in New Zealand, and the second highlights some of the approaches being taken in the land based sectors: agriculture and forestry.

Materials for local government

In New Zealand local government is responsible for a range of functions that may be affected by climate change. These responsibilities occur under the Local Government Act 2002, the Resource Management Act 1991 and other legislation. Local authorities have both social and legal obligations to take climate change effects into account in their community planning. Long-term planning functions need to embrace expected long-term shifts and changes in climate extremes and patterns to ensure future generations are adequately prepared for future climate conditions. Following the success of similar materials prepared in 2004, the New Zealand Ministry for the Environment recently proceeded with updating several technical reports and guidance manuals that are aimed at providing local government with information to assist them in carrying out their statutory responsibilities with respect to climate change effects. The updated materials are consistent with the most up to date assessment of the science in the IPCC 4th assessment report.

General guidance:
Climate Change Effects and Impacts Assessment: A Guidance Manual for Local Government in New Zealand (2nd ed)
Preparing for climate change: A guide for local government in New Zealand
The guidance manual and its summary overview (*Preparing for climate change*) together provide the latest projections of the expected physical impacts of climate change, both at the national level and for regions around New Zealand. They are designed to help local government identify and quantify opportunities and risks that climate change poses for their functions, responsibilities and infrastructure. They also demonstrate how to incorporate climate risk assessment into local government regulatory, assessment and planning processes to reduce vulnerability to the impacts of climate change.

For further details refer to:
http://www.mfe.govt.nz/publications/climate/climate-change-effect-impacts-assessments-may08/index.html
http://www.mfe.govt.nz/publications/climate/preparing-for-climate-change-guide-for-local-govt/

Building on the above documents an information sheet is also available designed to assist local government planners to include adapting to the physical impacts of climate change in plans required under the Resource Management Act (RMA). The information sheet (***Climate Change Adaptation and***

Second Generation RMA Plans) provides check lists to assist local authorities in their plan development and review. For further details refer to:
http://www.mfe.govt.nz/publications/climate/adapt-climate-change-second-generation-rma-2008-09/index.html

Coastal zone guidance:
Coastal Hazards and Climate Change – A Guidance Manual for Local Government in New Zealand (2nd ed)
Preparing for Coastal Change – A guide for local government in New Zealand
The guidance manual and its summary overview (*Preparing for coastal change*) together highlight the impacts that climate change is expected to have on coastal hazards. They provide detail on the climate change impacts that are expected not only through sea-level rise but also through storm surge, wind and waves. A risk management framework is presented in which to assess the associated risks, and guidance is provided on appropriate response options.

For further details refer to:
http://www.mfe.govt.nz/publications/climate/coastal-hazards-climate-change-guidance-manual/
http://www.mfe.govt.nz/publications/climate/preparing-for-coastal-change-guide-for-local-govt/

In order to make the coastal hazards information even more accessible, a set of information sheets are also available covering:

- Components of sea level
  http://www.mfe.govt.nz/publications/climate/preparing-for-coastal-change-guide-for-local-govt/components-of-sea-level.pdf
- Tides
  http://www.mfe.govt.nz/publications/climate/preparing-for-coastal-change-guide-for-local-govt/tides.pdf
- Storm surge
  http://www.mfe.govt.nz/publications/climate/preparing-for-coastal-change-guide-for-local-govt/storm-surge.pdf
- Waves
  http://www.mfe.govt.nz/publications/climate/preparing-for-coastal-change-guide-for-local-govt/waves.pdf
- Coastal erosion
  http://www.mfe.govt.nz/publications/climate/preparing-for-coastal-change-guide-for-local-govt/coastal-erosion.pdf
- Coastal inundation
  http://www.mfe.govt.nz/publications/climate/preparing-for-coastal-change-guide-for-local-govt/coastal-inundation.pdf

Approaches in the agriculture and forestry sectors

For the agriculture sector, at the **national level** adaptation to climate change is part of the **Sustainable Land Management and Climate Change Plan of Action**. The focus is on partnerships with the land based sectors, Māori and local government. The key adaptation component is development of a Five Year Adaptation Programme. The Programme outlines agreed outcomes and directs priorities for actions including research and technology transfer to understand the impacts of climate change and adapt to these. The
Programme has been endorsed by a key stakeholder group and, as of March 2009, is about to be considered by Ministers.

In developing the Five Year Adaptation Programme we have found that it is important to work with the land management sectors to understand the issues and also to make use of sector networks. The information gathering phases, including workshops provided good information to develop the programme but also served to disseminate information and raise awareness of climate change.

As part of developing the Five Year Adaptation Programme, the Ministry of Agriculture and Forestry funded a report (the ***EcoClimate Report: Climate change and agricultural production***) that uses down-scaled global models to make projections on future temperatures, rainfall and droughts across the regions of New Zealand. The economic effect of these projections was then estimated on dairy, sheep and beef farming production. The results provide useful information for New Zealand's land management sectors, including farmers, foresters, growers and regional councils, to use for risk assessment and future planning.

For further details refer to:
http://www.maf.govt.nz/climatechange/slm/
http://www.maf.govt.nz/climatechange/slm/ag-production/page.htm

Under the Sustainable Land Management and Climate Change Plan of Action, the Government has provided additional funding for research in the agriculture and forestry sectors. The research is to help the land-based sectors to reduce their greenhouse gas emissions or enhance sinks and to build the capability and resilience of the agricultural and forestry sectors to adapt to a changing climate. As an example, research money was made available for funding **case studies in the kiwifruit industry**. The funding allowed the researcher to work extensively with growers and industry organisations on impacts and adaptation using a participative approach. Experiences and lessons learnt show an already a high degree of awareness of climate change in the kiwifruit industry because of environmental concerns of target markets in Europe. This provided a good platform for grower action once the case studies had been completed. For further details refer to:
http://www.maf.govt.nz/climatechange/slm/grants/research/2007-08/2008-25-summary.htm

Various fact sheets for land managers and case studies of land managers adapting to climate change are under development. These will be used by the Ministry of Agriculture and Forestry and the sectors as part of technology transfer programmes.

Targeting actions at the **community level**, the Ministry of Agriculture and Forestry administers the **Sustainable Farming Fund: Climate Change**. This initiative funds community driven programmes that specifically incorporate climate change, including adaptation. The Fund does this by funding projects that are based around solving problems, or taking up opportunities, related to climate change and sustainable resource use, and that are defined and driven by a farmer, grower or forester-led community of interest. These are groups of stakeholders drawn together by common problems or opportunities. Experiences and lessons learnt include that the programme provides an opportunity and funding for communities to understand what climate change may mean for them and how to develop best practice. For more information refer to:
http://www.maf.govt.nz/sff/about-projects/

PAPER NO. 7: SAUDI ARABIA

SUBMISSION BY SAUDI ARABIA

Nairobi work program on impacts, vulnerability and adaptation to climate change
Submission under the area of adaptation planning and practice

REFERENCE

The SBSTA, at its 28th session, invited Parties and relevant organizations to submit to the secretariat, by 20 March 2009:

> (a) Views and information on approaches to and experiences in integrating and expanding adaptation planning and action at national, subnational, community and local levels, including scaling up of local and community-based adaptation;
>
> (b) Views on lessons learned, good practices, gaps, needs, barriers and constraints to adaptation, including implementation of adaptation projects.
>
> Refer to paragraph 59 of document FCCC/SBSTA/2008/6 (24 July 2008)

Saudi Arabia welcomes the opportunity to submit its views and information on the above subject

Saudi Arabia feels that the Nairobi Work Program should establish and enhance grounds to provide financial and technical support, to share experiences, and to take up opportunities, in order to incorporate and integrate adaptation within sustainable development, specifically in the area of adaptation to the impact of climate change and response measures.

Saudi Arabia is highly concerned about the lack of progress in addressing the economic impact of response measures. A clear process should be identified in the programme to advance solutions and opportunities to contribute to sustainable development, through adaptation to the impact of response measures. Specifically, the program should establish methodologies to guide Annex I Parties in implementing win-win policies and measures, which have long been requested and advocated by developing countries. Such policies must meet both the need to reduce emissions and the need to minimize adverse social, environmental and economic impacts on developing country Parties, especially those identified in Article 4.8. This should be given a high priority since no methodological work is established under Article 4.8 on impacts of response measures.

As many developing countries lack the capacity to assess their scope and magnitude of the impacts of climate change and response measures, the program should promote the exchange of information and sharing of experiences and views, to improve and enhance efforts towards:

a. Understanding of the scientific, technical and socio-economic impact of climate change and the impact of response measures;
b. Identifying innovative and efficient adaptation technologies for both the impacts for climate change and the impact of response measure.

Moreover, the program should address capacity building and transfer of adaptive and advanced technologies to adapt to climate change and response measures and also assessment of cost effective options including capacity building and transfer of technology for adaptation to contribute to sustainable development in the area of adaptation to climate change and adaptation to the impact of response measures;

We certainly look forward to participating in the technical workshop before SBSTA 31, which will consider how to advance the integration of various approaches to adaptation planning, and involve representatives from Parties, relevant organizations, communities and experts. It should be held with a view to making informed decisions on integrated practical adaptation actions and measures at various levels and for various sectors and livelihoods taking into account the miscellaneous document and the synthesis report that is to be made by the Secretariat based on submissions from parties.

We also look forward to relevant organizations being given the opportunity, prior the Secretariat's report, to contribute information on their assessments of efforts undertaken by Annex I parties, including the effectiveness of policies and programs and how to address gaps and needs.

We share the view that a synthesis report to be made by the secretariat by SBSGA 32 should be aimed at facilitating the development of indicators for assessing the implementation of adaptation projects, policies and programs and look forward to the web-based interface on adaptation practices to enable practitioners to share information and experiences with the different adaptation practices and lessons learned.

PAPER NO. 8: SRI LANKA

Nairobi work programme on impacts, vulnerability and adaptation to climate change (SBSTA)

Submissions under the Adaptation planning and practices:

Since Sri Lanka is highly vulnerable to climate change impacts, the relevant sector agencies, ministries and private sectors are taking action to assess and quantify the impacts to address this critical situation. The main drawbacks for these are inadequate capacity, knowledge and financial resources the sector agencies are unable to move forward to address this issue. However the on going Second National Communication (SNC) process provides the opportunity for the development of national adaptation measures and policies.

Ministry of Environment and Natural Resources has established Climate Change Secretariat to act as a national platform and to coordinate the adaptation activities relevant with the stakeholders' agencies. In view of the cross cutting nature of climate change impacts the National Advisory Committee for Climate Change (NACCC) has been established.

In order to facilitate harmony, prosperity and dignity of human life through effective prevention and mitigation of natural and man-made disasters, the government of Sri Lanka has established the Ministry of Disaster Management and Human Rights in 2006. Adaptation planning for events of natural disasters like floods and land slides for evacuation and provision of temporary relief measures are available with this ministry. They have completed few studies to develop plans to reduce damages caused by natural disasters in Sri Lanka such as flooding, sediment disasters and Tsunami by strengthening the capacity of concerned organizations and communities. Under this ministry the Multi Hazard Early Warning & Evacuation system has been established.

Due to the higher intensity of rainfall during south west monsoon period and inter monsoon periods the major river basins frequently experience severe floods. Therefore a study conducted to formulate Flood Management Master Plan recommends that an integrated water resources development and management plan will be implemented. The Disaster Management Centre under the Ministry of disaster management and Human rights coordinates and implements these programmes with all the relevant agencies. However Sri Lanka has a long way to develop practices and measures for formulating and implementing action plans for adaptation.

Assistance similarly to that provided for LDC and SIDS for the development of NAPA will be very much useful in this regard.

PAPER NO. 9: UZBEKISTAN

Opinion of the Republic of Uzbekistan on the methods and work experience in the area of integration and development of adaptation planning and activities at the national, sub-national and local levels

Republic of Uzbekistan supports the activities of Secretariat on performance and further development of Nairobi Program in the area of the impact, vulnerability and adaptation to climate change.

Analysis of the adaptation requirements and current activities carried out in the Republic of Uzbekistan in the framework of preparation of the Second National Report has demonstrated the existence of a series of national and sectoral programs, measures and activities which facilitate in direct or indirect way to adaptation.

The following sectors of national economy in the Republic of Uzbekistan are: agriculture, water resources, public health, severe hydrometeorological phenomena, aquatic eco-systems and fishery resources, forests and forest management, municipal economy and separate industrial sectors (oil-gas sector, transport sector, civil engineering, designing, power supply).

On the base of the performed analysis of the dynamics of climate change, its influence on different factors of sustainable development for each specific sector the adaptation measures are recommended, the part of which is realized with realization of the national action plans.

Integrated approach in the field of «Agriculture» and «Water resources» sectors revealed the adaptation measures in the following directions:

- Improvement of monitoring of the water and land resources, improvement of normative base of the research and improvement of the knowledge level;
- Introduction of technologies directed at the decrease of the water loss in the fields;
- Improvement of infrastructure of irrigation and drainage;
- Combating the land degradation;
- Mitigation or prevention of the damage of drought and other severe weather phenomena;
- Increase of productivity of agriculture.

For the “Public Health” sector the highest adaptation potential is in the following strategy: organization of warnings and preventive measures, preservation of the environment and supply of the population with the good-quality drinking water, improvement of public awareness, introduction of the new technologies and improvement of the existing ones directed at the cleaning of water, preserve of the heat comfort in the living premises and reduction of the urban heat islands.

As the analysis of adaptation needs shown for the sector “Severe hydrometeorological phenomena” the cost-effective adaptation measures are those which are directed at the improvement of the insurance system, strengthening of the capacity of the effective response and protection as well as increase of the public awareness. The highest adaptation potential contains the measures aimed at the development of the regional monitoring of the outburst lakes. The measures related to the improvement of hydrometeorological monitoring and forecasting as well as the technical measures for the protection of the highest important objects against severe hydrometeorological phenomena are also of the priority ones.

For the sector «Aquatic eco-systems and fishery resources» the strategy aimed at the preservation and increase of the fishery resources was revealed, the second priority is – the development of political dialogue in the area of transboundary water resources management, the third is – the development and improvement of the system of the complex ecological monitoring of the water and related coastal ecosystems.

For the "Forest and forest management" sector the following is defined: improvement of the system of the forest economy management including the legislative initiatives and institutional changes, increase of the efficiency of the forest-economy activities, improvement of the scientific and staff capacity of the field.

For the oil-gas and transport sectors, for the design and municipal economy the measures related to the applied research for every sector aimed at the elaboration of the new approaches to the assessment of the climate factors influence and updating of the relevant normative documents attained the higher priority. Thus, for the oil-gas and transport sectors the following adaptation measures are the most effective:

- use of the update climatic information in the assessment of the natural decrease of the oil products and of the natural gas, in the assessment of the norms of the consumption of fuel and of the combustive-lubricating materials;
- elaboration of specialized climatic zoning and new approaches to the account of the climatic factors;
- production and import of technical devices and materials following the conditions of the hot climate.

In their turn for the sectors of «Civil engineering», «Designing», «Power supply» and «Municipal economy» the needed prerequisites are: updating of normative documents including the climatic parameters once per 10 years; improvement and adaptation of the urban planning and architecture with the aim of decrease of the heat stress; improvement of the design of the industrial zones and of the road-transport communications for the reduction of the urban heat islands; improvement of he system of the account of the consumption of the cold and hot water and heat (for the "Municipal economy").

Regardless that all the adaptation measures mentioned above facilitate sustainable development, increase the resistance against the negative impact of the climate change, reduction of the green-house gases emission and implementation of the National programs up to now only a small part of the planned activities is actually being realized. The financial and organizational barriers are encountered on the way of their realization which hamper the integration of the measures of adaptation to climate change to the national development plans.

In this concern we think that it is necessary to create the mechanisms of "encouragement" of adaptative measures in the developing countries at international level, possibly via the educational programs on the development of adaptation projects; educational programs on the assessment of adaptation measures including the issues of economical efficiency, workshops for the decision makers, demonstration projects in the area of introduction of adaptation technologies, etc .

Opinion of he Republic of Uzbekistan on the lessons learnt, good practice, gaps, needs, handicaps and uncertainties in the adaptation process

Republic of Uzbekistan supports the activities of secretariat on implementation and further development of Nairobi program on the impact, vulnerability and adaptation to climate change.

In the framework of preparation of Second National report a series of the handicaps, gaps and needs in the process of assessment of vulnerability and adaptation in the Republic of Uzbekistan was revealed.

The main handicaps and limitations for the «mainstreaming» process – uniform organized common stream of actions in the area of adaptation to climate change in Uzbekistan are as follows:

- at the moment the problem of climate change in Uzbekistan is not given a status of priority, all executed adaptation measures are forced;
- lack of support/assistance from the part of donors for the institutional strengthening in the field of the assessment of impact, analysis of adaptation measures and support of adaptation measures;
- low expertise capacity in the field of adaptation and insufficient awareness at all levels;

- uncertainty of climatic forecasts in time and space – the assessments differentiated in time and space are needed which is required for the economical assessment of adaptation and decision making;
- lack of differentiated social-and-economical data and methods for the assessment of impacts, elaboration and implementation of the relevant local measures which is needed for the demonstration of adaptation effects to the public, introduction of adaptation technologies and involvement of small business.

Up to the moment the assessment of vulnerability with the analysis of damage and study of adaptation alternatives with the use of models are not studied yet. That is why taking the inner deficit of resources into account the following should be done:

- development of the program of scientific studies focused on climate change;
- formation of the research networks facilitating the interdisciplinary studies and distribution of information;
- improvement of coordination between different sectors and implemented initiatives on climate change which will facilitate the uniting of the efforts and their integration to the policy and sectoral programs which facilitate the adaptation.

There is also a need in the approval of the studies related to climate change, with the needs of decision makers in different sectors and with the need of informing the public about the future risks, possible ways and concrete measures which lessen the vulnerability and implementation of adaptation measures afterwards.

To start the process of «mainstreaming» in Uzbekistan the strengthening of capacity at all levels is of the utmost importance. To our opinion, the measures which enable the improvement of the national capacity in the field of assessment of vulnerability and adaptation can be as follows:

- thematic education – application of crop- and irrigation models, the best practice for the models of WEAP-type, models for the assessment of impact on health, the best practice for the assessment of impact on the ecosystems, integral methodologies of assessment, etc.;
- education should be performed for the groups of countries with the same problems and involvement of several specialists to guarantee the establishment of the expert groups in the countries (with the further monitoring).

PAPER NO. 10: CARIBBEAN COMMUNITY CLIMATE CHANGE CENTRE

Submission by the Caribbean Community Climate Change Centre on the Nairobi Work Programme on Impacts, Vulnerability and Adaptation to Climate Change, and in particular: Information and Experiences in Integrating Adaptation Planning and Action at the National Level

Introduction

The Subsidiary Body for Scientific and Technological Advice (SBSTA) invited organizations to summit their (a) Views and information on approaches to and experiences in integrating and expanding adaptation planning and action at national, subnational, community and local levels, including scaling up of local and community-based adaptation;

(b) Views on lessons learned, good practices, gaps, needs, barriers and constraints to adaptation, including implementation of adaptation projects. (FCCC/SBSTA/2008/L.13/Rev.1 paragraph 50)

Background

The Caribbean Community Climate Change Centre (CCCCC) is a regional intergovernmental organization established by the Heads of Government of the Caribbean Community to coordinate the Members' response to climate change.

Information and Experiences in Integrating Adaptation Planning and Action at the National Level

The Members of the Caribbean Community have participated in regional climate change adaptation projects since 1997 beginning with the Caribbean: Planning for Adaptation to Global Climate Change (CPACC) project which was funded by the Global Environmental Facility (GEF), implemented by the World Bank and executed by the Organization of American States (OAS). A Project Implementation Unit (PIU) located within the Centre for Sustainable Development of the University of the West Indies (UWICED) was responsible for local project management. The project had four regional components and five pilot components. It was implemented in twelve Member States. One regional component developed an adaptation policy framework which was used as the basis to develop national adaptation policies in the twelve participating countries. Three countries adopted the adaptation policies.

CPACC was a Stage I adaptation project in the three-stage adaptation project cycle recommended by the Intergovernmental Panel on Climate Change (IPCC) and the GEF. As this four-year project drew to a close, the Members recognized that the project execution process had to be institutionalized to ensure the sustainability of its outputs and maintain regional capacity.

The next regional project was the Canadian funded Adaptation to Climate Change in the Caribbean (ACCC). Among several outputs, this project developed risk management guidelines for climate change adaptation decision making, developed a guide to assist practitioners to integrate climate change in the environmental impact assessment (EIA) process, developed a Master of Science Degree programme at the University of the West Indies (UWI), and developed the business plan for the CCCCC.

The stage was thus set for the local execution of the Stage II adaption project: Mainstreaming Adaptation to Climate Change (MACC). This project is being funded by the GEF and implemented by the

World Bank, but executed by the Caribbean Community (CARICOM) Secretariat and later by the CCCCC. This project also has several components. Four pilot components conducted vulnerability studies on ground and surface water, tourism and agriculture in four Member States. The outputs of these pilots are being used to develop national policy and adaptation strategies in these sectors in these countries. One government has adopted and implemented the policy and strategy while the others are at various stages of the adoption process. Another component has drafted a regional climate change strategy to address all aspects of climate change in all important socio-economic sectors. The strategy will be presented to the CARICOM Council of Trade and Economic Development (COTED) for submission to the next session of the CARICOM Heads of Government for their endorsement. Members are then expected to use this as the basis for the development of national climate change implementation strategies.

The Centre is also managing the execution of a pilot Stage III adaptation project in three member States: the Special Programme for Adaptation to Climate Change (SPACC). This GEF/World Bank project will implement concrete adaptation interventions in Dominica, Saint Lucia, and Saint Vincent and the Grenadines. One component in Saint Lucia has led to the modification of its building codes to incorporate climate change. The strengthened codes are presently being considered by the government for its adoption. Upon its approval, it will used in the retrofitting of a building designated as a hurricane shelter on the island.

Views on lessons learned, good practices, gaps, needs, barriers and constraints to adaption, including implementation of adaptation projects

The region has over ten years of experience in the implementation of adaptation projects. Most of the interventions have focused on developing local capacity. This has been highly successful as the region has been able to retain and build its local capacity and manage its adaptation projects. The integration of climate change adaptation into national policies is ongoing and has already met with some success in several countries. The MACC project will convene its final regional workshop which will be followed by a high-level seminar where the results and recommendations will be presented to the highest regional and national political leaders. This is expected to stimulate the adoption of the adaptation policies and strategies.

In several instances the adoption of sector specific or national adaptation policies and strategies have been delayed because of changes of decision makers, changes in political portfolios and changes in the political directorate. A new round of awareness building, identification of new champions and amendments of the policies and strategies are then required. However, these renewed interventions usually exceed the project funding and execution cycle. Consequently, efforts are now underway on developing a strategy to facilitate countries to develop the capacity to undertake a sustained effort to adopt and implement national adaptation policies and strategies. This will require further capacity building and financial resources.

There have been several pilot interventions that have successfully led to the adoption of sector specific adaptation policies and strategies. These interventions should be extended to other sectors and to other countries. The region now has the institutional framework, as embodied in the Centre, to expand these activities. However, significant new funding is required to undertake these activities.

In conclusion, the region has developed its capacity to develop national adaptation policies and strategies and implement adaptation measures. It has also developed the institutional frameworks to maintain and increase these capacities by the establishment of a specialized Climate Change Centre and a tertiary-level climate change programme. The region's leadership recognize the challenges being posed by climate change and the need to maintain sustained interventions by supporting the establishment of these mechanisms. However, additional international financial and technological support is required to accelerate the implementation of the required adaptation measures.

PAPER NO. 11: FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Adaptation Planning and Strategies

FAO Contribution to

"The Nairobi Work Programme (NWP) on impacts, vulnerability and adaptation to climate change"

On invitation of SBSTA to submit to the secretariat, by 20 March 2009, on information on approaches to and experiences in integrating and expanding adaptation planning and action at local levels, including scaling up of local and community-based adaptation and lessons learned, good practices, gaps, needs, barriers and constraints to adaptation, including implementation of adaptation projects.

1. Management of crises and climatic accidents in rural areas

The environment, as evidenced by micro-changes in the climate in turn caused by both global warming and the impact of natural climatic disasters, is not only the "victim" of disasters, but also one of the reasons that there has been an increase in risk and in vulnerability. Indeed, poor environmental management practices increase the physical vulnerability of developing countries who generally must cope with a risky natural environment. In addition, these practices can promote prolonged droughts and progressive desertification. Thus, the links between the environment and disasters are known to be links of cause and effect. In the context of Madagascar and Haiti, countries with fragile environments and which are extremely vulnerable to climatic risks, the political choices concerning risk and disaster management strategies must be preceded by an analysis of the risks and the indispensable consideration of the vulnerability of their populations with respect to their environment.

Madagascar, for example, is one of the most vulnerable countries to weather-related risk in the world. The country is notably exposed to seasonal cyclones, floods and droughts. These threaten agricultural production and livelihoods just as much as public infrastructure and the national economy. It is estimated that between 1970 and 2004 the country was hit by 29 cyclones, suffered 6 periods of extreme drought, 3 major floods and severe locust infestations, causing damages of approximately US$1.75 billion. According to World Bank studies, 11 million people have been affected over 30 years. In 2008, the central plain of Antananarivo and the Alaotra Mangoro regions were struck by two consecutive cyclones (Fame and Ivan), causing heavy rain on most of the island. These shocks have affected over 239,000 people, causing the loss of 45,000 ha of rice production (in addition to the 90,000 ha that were flooded), the loss of 50,000 ha of cash crops and an additional 42,000 ha of other agricultural production (OCHA estimate, 2008).

Meanwhile, Haiti, a country equally known for its climatic vulnerability, experiences an average of one cyclone or flood every 19 months, creating an average US$15 million in damages. The fragility of the physical environment, the complexity of the climate itself and the high level of population pressure on the land (1,400,000 farmers occupying 1,500,000 ha of which 730,000 are unsuitable for any agricultural activity) all combine to result in significant natural resource degradation.

The impacts of climate variability and change are generally much greater in the rural areas of these countries, as the agricultural and livestock farming sectors are the most sensitive to climatic shocks.

When formulating policies related to risk management and improving the resilience of its communities to risk, Madagascar, where 85% of the population lives in the rural areas, must consider the continuous and increasing vulnerability of farmers, who are the most at risk (economic loss, soil erosion, siltation of rice paddies, water shortages, precarious housing…), and the least well equipped to cope.

Vulnerability can be defined as the exposure to a shock or a disaster, itself defined as a "break in a trajectory, in the reproduction of a system (...) followed by the emergence or forging of a new trajectory and the establishment of a new system" (Brunet 1993). Vulnerability is generally broken down into three main components: exposure to shocks; sensitivity to shocks which can characterize the impact of the shock; and the capacity to adapt, or resilience (Guillaumont, 2006). Specifically, productive vulnerability such as the fragility of a rural system confronted with a shock, during which producers are hardly able to cope with the risk through risk minimization strategies and an acceptable reduction of their losses. Vulnerability evaluates to what extent a socio-spatial system risks being affected by the adverse effects of a hazard, the principle socio-spatial factors of vulnerability being, for the most part, linked to poverty.

Despite a constant adaptation of development strategies in order to enable populations to address the consequences of these disasters, effective tools for weather-related risk management as an integral part of the elaboration of policies fighting against poverty and food insecurity are lacking. Indeed, existing institutions have until now tended to adopt reactive strategies vis-à-vis risks and disasters, associated with emergency operations. Without an explicit link between the rationale of an emergency situation and development, relief aid in a crisis situation creates long-term dependence among beneficiaries, destabilises social structures, changes consumption patterns and introduces a rift between beneficiaries and the rest of the population.

In countries like Madagascar or Haiti, which are poor in financial resources and disaster-prone, strategies which aim to reduce poverty, address the risks associated with disasters, and protect the environment must be mutually reinforcing. Only development assistance that seeks to reduce disaster-related risk and emergency assistance oriented towards development will achieve lasting improvements.

2. Vulnerability to climate change and resilience capacities

2.1. Vulnerability of socio-ecological systems

The concept 'socio-ecological system' was defined to allow for a coherent approach to understanding the dynamic that exists when eco-systems and communities are intricately linked to each other. In this context, the concepts of vulnerability and resilience appear well-suited to understand socio-ecological responses to climatic risks and global climate change. According to Turner (2003), the concept of vulnerability is the probability that a system where man and the environment are coupled has of suffering significant damage as a result of its exposure to a stress (shock, change) that affects the surrounding society or environment, despite the latter's efforts to adapt.

A disaster is the fulfilment of a risk which, on a given territory, by the extent and costs of the damages caused, provokes the severe interruption in the functioning of the society occupying that territory. The human, material or environmental losses incurred can not be overcome solely with the resources which the affected society disposes of (Veyret[1], 2004).

To perceive vulnerability implies accepting that risks are also the result of factors that are internal to a society, and not only the result of random chance (hazards). This weak perception generates (just as much as the absence of perception of a hazard) an under-estimation of the risk. The concept of resilience, borne

[1] Veyret Y. and Meschinet de Richemond N. - *Géographie des risques naturels en France. De l'aléa à la gestion* - Hatier - 2004

out of research on the dynamic of ecological systems (Holling, 1973), is defined in a way that is almost diametrically opposed to that of vulnerability: indeed, it is "the capacity of a complex system to absorb shocks while still maintaining function, and to reorganize following a disturbance."

In more practical terms, the issue is to first take into consideration the principal impacts of global changes on local ecosystems, describe the immediate implications of these on living conditions and resource levels populations dispose of, show which responses they deploy- with varying degrees of success- in the face of these changes, and finally study the consequences or potential consequences of these responses on ecosystems. Understanding this entire process is necessary in order to define governance options, tools for "adaptive management" and public policies that could reduce vulnerability and develop the resilience of socio-ecologic systems confronted with global changes.

2.2. Vulnerability and adaptation to climate change: Analysis of the PANA

The objectives of the Malagasy plan for adaptation to climate change (National Action Plan for Adaptation, PANA, 2006) fits well within this logic: *"Madagascar's vulnerability to climate change requires the adoption of an adaptation policy and coping strategies which mainstream climate considerations into the different processes of sustainable development planning and programming. Implementation requires staggering activities through time and space and certain expected results will only be manifested over a long time period. […] Projects are designed to provide increased protection to poor populations who are more vulnerable".* In fact, adaptation measures to climate change include the development of tools for taking into consideration the climatic risks inherent in economic and social development policy.

The actions proposed by Madagascar's PANA directly affect agricultural production, community institutions and infrastructure, while indirectly affecting the well-being of rural households. The following elements can be found within the PANA:

- The adaptation of cultural techniques and of livestock farming to climate change:
  - Establishment and/or strengthening of a decentralised Weather Service;
  - Training/Supervision of farmers to adapt their cultural calendar to the Weather Service's climate predictions;
  - Popularisation and support for the adoption of cultural practices that respect the environment; enhancement of watersheds by restoring soil fertility;
  - Intensive grazing that requires the rational use of green fodder during the rainy season;
  - Use of conservation techniques and storage of fodder (hay, silage) during the dry season.
- Standardisation, Construction and Upgrading of Infrastructure:
  - Improvement and protection of production infrastructure (water systems, watersheds, irrigated areas)
  - Development of water ponds; promoting the construction of communal and regional silos.
- Food Security:
  - Extension of the "Safety-Net" program to all 22 regions;
  - Raise awareness and provide farmers and herders with nutritional education;
  - Make secure all farmers and their areas of production.

This overview of environmental risk management policy allows us to understand the complex nature of different social, economic and ecological systems. It also highlights the interconnection between different types of vulnerability (production, infrastructure, watershed and household food insecurity).

We must consider how to develop responses that would be integrated into such systems, i.e. the operational actions which would allow for a combined impact on several factors (securitisation of production centres, infrastructure resilience and social safety-nets). This brings us to the case of watershed management in Madagascar and Haiti, while integrating relevant tools for the safety-nets that protect the communities in question.

3. Reactivating resilience to climatic accidents: public works and safety-nets

3.1. Climatic risks and the role of watersheds in Madagascar and Haiti

Whether or not they arrive with tropical cyclones or hurricanes, floods generally follow heavy rains and generally affect a country's low geographical areas (basins, low-levels, etc.). Highlighting and protecting watersheds is generally the most suitable tool for managing flood risk. Indeed, the value of a forested watershed stems from it capacity to absorb and clean water, recycle excess nutrients, maintain the stability of the soil and therefore prevent flooding. When vegetation is removed or disturbed, not only do water and wind rush through the earth, but they carry the precious arable topsoil with them.

In Madagascar, coastal areas, especially in the East of the country, are the most prone to flooding, as a result of their topographical attributes and their exposure to cyclones and storms. Certain upland regions are also prone to flooding due to excess runoff after extreme rainfall. In 2001, 606 municipalities of the 1385 surveyed (44%) perceived the silting of low-lying land to be a very serious issue (Table 1).

Table 1: Perception of municipalities of the silting of low-lying lands (2001)

Perception	Nb Communes	%
Very serious	259	18,7
Serious	347	25,1
Ss Total Municipalities	606	43,8
Not at all serious	377	27,2
Not very serious	402	29,0
Ss Total Municipalities	779	56,2
Worried municipalities	1385	100,0

Source: FOFIFA / INSTAT / Cornell – 2001

The status of soil degradation is also considered an important cause of problems related to poverty and malnutrition in Haiti. It is the source of many natural disasters that have hit the country in recent years. The current situation is characterized by a low forest cover (1-3% of Haiti's total surface). Nearly 85% of the watersheds in the country are heavily or entirely deforested. The degradation of national resources is manifested through such phenomena as soil erosion, salinization, loss of fertility, deforestation and the depletion of water resources and of their quality. In Haiti, it is increasingly the North-East of the country and the coastal plains that are affected by floods. The same scenario of excess runoff due to the sharp deterioration of stripped watersheds is systematically reproduced. Whatever the causes, the effects of excess precipitation are heavily determined by the topography of the area and its vegetation, and they are often exacerbated by the degradation of the environment. Floods can be highly destructive as a result of the intensity of their flow or their duration (crops cannot resist immersion for more than a limited number of days, depending on the species, variety and maturation stage) as well as the silting of irrigation canals, dams and the fields they run through.

3.2. Land management and risk prevention policy: Integration of "social safety-net" tools

In 2000, the World Bank started a watershed development and management project (PGBV) in Madagascar with the support of FAO. By focusing on (a) increasing the productivity of irrigated lands; (b) enhancing degraded and poorly exploited (tanety) zones; (c) preserving production infrastructures (promoting soil conservation techniques, reducing the sedimentation of perimeters; maintaining canals); (d) strengthening the institutional environment (support for water users' associations); and (e) improving producers' access to agricultural inputs, credit and trade opportunities, this program aims to balance the goals of climate risk prevention and environmental protection as well as the economic objectives of productive development.

This program suffered institutional resistance to the detriment of its watershed components, which were only partially implemented (comparable to a "lesser component"); In addition, the institutional strengthening of users' associations and the local capacities for land-use management are not yet sustainable. In addition, a social "safety-net" dimension which would protect vulnerable communities that are the most likely to deteriorate watersheds through the cultivation of tavy is absent. To some extent, this illustrates the challenges that exist within current programs that combine irrigation and watershed management.
More generally and towards the goal of integrating these social and institutional dimensions, the issue is to define an approach for the development of communal land-use management which would reinforce the survival of both production centres and public infrastructure through the intermediary of public works sites. Land-use policy[2] is a part of prevention policies whose goal is to anticipate the eventual manifestation of a risk by mitigating its destructive effects, which brings about a greater resilience on the part of the area where these infrastructures have been developed.

The elaboration of communal development plans, liked with land-use management plans, would be an interesting operational basis from which to identify the priorities of such public works projects. In this way, a first diagnostic would allow for the elaboration of a needs assessment related to maintenance-based public works, the reinforcement of infrastructure and the development of sensitive zones at the municipal level.

The establishment of workplaces for the maintenance/rehabilitation of public capital and structural infrastructure (roads, irrigation schemes, management of watersheds and catchment areas) in districts where the environment has been particularly degraded would require the sustained mobilisation of a specific workforce for several months out of the year. Such an initiative on the part of semi-permanent public works projects (6 months per year) with high labour intensity would provide the opportunity to establish safety-nets for households that are structurally vulnerable and particularly affected in times of crisis.

4. Grassroots community development and scaling up

4.1. Complexity and potentials of scaling up dynamics

Grassroots community development (GCD) is encouraged by government, multilateral agencies, NGOs and other partners, but, with the exception of a few, these initiatives are most often taken on a small scale. Its potential to generate a large-scale impact through its adoption by a high number of

[2] **Land-use planning** is also an intelligent response to the issue of economic growth and the security of the society. An efficient land-use scheme insures good spatial distribution of activities and guarantees a coherent rural renovation policy. Specifically, this ultimately means rebuilding the national territory on the basis of integrating the national space, solidarity between rural and urban areas and the competitiveness of different areas.

communities has rarely been confirmed through practice. Even though we can speak of marginal GCD activities, this type of activity is not yet taken into consideration during the formulation of substantial national projects. Even if dispersed local activities are very effective, the achievement of national and international goals (MDGs) will not be possible without shifting them into a larger scale (IFPRI, 2003[3])

Scaling up allows for "higher quality benefits for a greater number of people in a larger geographical area, in a way that is faster, more equitable and which comes at a propitious time." This change can occur either vertically or horizontally. A vertical procedure begins with grassroots organizations and is applied at the level of national institutions and policies. A horizontal procedure refers to either a geographical expansion or a replication on a larger scale of households, from hundreds to thousands, if not millions of people. (*Sustainable Agriculture and Rural Development, SARD, Policy Brief 21*[4])

Within the framework of Participatory and Decentralized Development (PDD), the challenge of generalisation is that of developing a replicable methodological approach which simultaneously ensures the effective participation of the entire community, the strengthening of organisational capacity, the accountability of partners and the sustainability of the system.

4.1.1. Case study of scaling up dynamic: FENU[5]

In the field, the Fund achieves concrete results by implementing programmes through an innovative approach in the local development and microfinance sectors, with a view to replicating these programmes on a larger scale. This approach begins with the creation of a partnership with local community groups, local authorities, community organizations, civil society and the private sector. The use of Local Development Programmes (LDP) allows for the combination of technical assistance and support for local community group budgets, in order to pilot innovative experiences at the local level.

It is also a question of providing appropriate assistance for institutional strengthening at the local and central levels. Indeed, it is necessary to give actors at local institutions the responsibility to manage financial resources, finance local development and establish a framework for fiscal transfers. A real scaling up is initiated using the lessons learned through the pilot initiatives and promotes a decentralization policy and local governance reforms to contribute to poverty reduction, better infrastructure and social service provision and sustainable natural resource management practices.

When a community-based approach leads to a successful project while remaining limited to a few communities, it will not really contribute to national or international development objectives such as the MDGs unless it is multiplied within a larger implementation framework. This requires a geographic extension or an expansion of activities through other projects or partners (GILLEPSIE 2004).

4.1.2. MERET (Managing Environmental Resources to Enable Transitions to More Sustainable Livelihoods and PNSP (PAM) Programs in Ethiopia

Ethiopia is one of the poorest countries in the world, whose natural resource degradation constitutes a serious obstacle to development. In this context, for more than 30 years donors and WFP have developed a partnership with the government on the topic of reforestation and soil conservation within the framework of the MERET project (Managing Environmental Resources to Enable Transitions to More

[3] IFPRI, Scaling Up Community Driven Development: A Synthesis of Experience, Stuart Gillespie, 2003 http://www1.worldbank.org/sp/ldconference/Materials/Parallel/PS2/PS2_S5_bm1.pdf
[4] ftp://ftp.fao.org/SD/SDA/SDAR/sard/SARD-upscaling%20good%20practices%20-%20english.pdf
[5] Fonds d'Equipement des Nations Unies

Sustainable Livelihoods). This project covers 600 communities, and benefits over one million people every year. It is based on a participatory approach to supporting local communities. Since 1991, soil and water conservation uses a local-level participatory planning approach (LLPPA), through which local district (woreda) authorities collaborate with communities for participatory planning, implementation and evaluation. Regional and federal authorities ensure the piloting of accompanying measures and provide technical and financial resources.

Since 2005, the MOARD (Ministry of Agriculture) rallied heavily in order to train technical personnel at the district levels to implement a large-scale Productive Safety-Nets Programme (PSNP), supported by WFP and other donors. It includes employment in public works programs which have the ability to cover the construction of soil and water conservation structures in zones that are not covered by the MERET project. We are currently tending towards the expansion of funds destined toward social safety-nets for vulnerable populations. The example of PSNP, launched in 2007 to consolidate the resilience of vulnerable populations to shocks which are becoming increasingly severe with the effects of climate change, exemplifies this phenomenon. (Source: IRIN: Africa safety nets help to climate-proof the poor http://allafrica.com/stories/200712050944.html.)

4.2. Recommendations and innovative approaches: Towards socio-environmental safety-nets

In a recent study conducted on behalf of DFID, IDS researchers revealed how country experiences of social protection instruments can enhance the resilience of vulnerable communities and point to ways in which social protection measures could better integrate climate change adaptation (*Social Protection and Climate Change adaptation, Commission on climate change and Development, March 2008, www.ccdcommission.org).*

In Madagascar, a Fund for the Strengthening of Community Infrastructure was thus proposed to fill a triple role: (i) Strengthen the social safety-net of structurally vulnerable populations in rural areas, (ii) Strengthen the resilient capacity of infrastructure and fragile areas faced with bad weather through the reforestation of hillside ponds, anti-erosion dams, consolidation of embankments and bridge infrastructure, (iii) Fill the gaps in maintenance and desilting of irrigation canals in order to reduce the recurrence of floods and the loss of crops.

The Fund would also allow for (i) an improvement in the resilience of production centres (irrigation, terraces, watershed reforestation), trails, markets, etc., and (ii) the creation of jobs for structurally vulnerable populations.

Its ability to operate would require the development of a communal planning approach which strengthens the resilience of production centres and public infrastructure with a harmonisation of social, property and land, environmental and agro-climatic risk mitigation aspects. It would become a reality with the establishment of work places specialized in maintenance/public capital rehabilitation and structural infrastructure (roads, irrigation schemes, watershed management). These would be organised as semi-permanent, professionalised, highly labour-intensive workplaces (6 months per year), mobilising 5-10% of the most vulnerable households usually targeted by social safety-nets.

Such activity would require the consideration of the following factors:

- Strengthening the quality of HIMO work in order to attain professional norms (standardisation, supervision with the support of agricultural engineers);
- Strengthening the capacity of NGO partners to manage such workplaces;
- Collaboration in the development of Communal Development Plans (CDP) and Regional Development Plans (RDP), as well as land-use planning initiatives;

- Mobilisation of funds.

In Haiti, in terms of rendering more secure the economic activities in rural areas, similar activities have been identified. (i) Preparation of specific intervention plans in the high-risk areas (agricultural damage, irrigation infrastructure or road damage), (ii) strengthening and consolidating infrastructure (anti-erosion dams, protection of riverbanks, etc.) through HIMO public works projects, (iii) taking advantage of CRIF (Caribbean Catastrophe Risk Insurance Facility) funds, managed by the MEF, in order to finance projects.

In this way, the articulation of risk – land-use management (silting problems, maintenance of irrigation areas and the issue of watershed reforestation which would reduce the effects of flooding) seems strategic. This brings us to recommend the following points:

- The involvement of the Technical Minister in charge of Decentralisation and Land Use Management (MDAT) is very important.
- A joint expertise in irrigation, local development, land-use management and social safety-nets (Cash for Work) must be mobilised.
- The need to consult the service for land-use policy because the integration of the proposed tools may require adjustments to the current land-use policy, in order to strengthen the operational capacity of each municipality.
- The importance of not neglecting the aspects of property and the utilisation of land because their economic re-evaluation could provoke usage conflict.

The expansion of such an approach, essentially managed at the community and district levels, would require an accompaniment in terms of capacity-building of the municipalities and decentralised institutions.

Thus, as a practical example, with an annual budget of semi-permanent workplaces (6 months per year) of 50-80 people/workers per municipality, supervised by a technician in agricultural engineering totalling between US$30,000 and US$40,000/year/municipality, such an approach would be easy to expand on the basis of social safety-net funds for vulnerable populations in rural areas or funds aimed at the mitigation of climate change (MDP, GEF, etc.) With a basis of US$6 million per year, it would be possible to maintain a constant activity in the 200 most vulnerable municipalities of the targeted country while strengthening resilience to climate change, ensuring a social safety-net for 16,000 of the most vulnerable households and generating a highly positive carbon balance.

"Social protection initiatives are as much at risk from climate change as other development approaches. They are unlikely to succeed in reducing poverty if they do not consider both the short and long-term shocks and stresses associated with climate change. Adaptive social protection involves examining opportunities that approaches to social protection provide for adaptation, and for developing climate-resilient social protection programmes". (www.ccdcommission.org

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PAPER NO. 12: PRACTICAL ACTION

Nairobi work programme on impacts, vulnerability and adaptation to climate change (SBSTA)

Submissions under the area of adaptation planning and practices by Practical Action

Views on lessons learned, good practices, gaps, needs, barriers and constraints to adaptation, including implementation of adaptation projects

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Scaling up community based adaptation: a submission based on Practical Action's project experience in south Asia and Africa

Practical Action is an international NGO with headquarters in the UK and seven overseas offices. Our experience in helping communities adapt to climate change builds on several programmes over the last ten years in Asia and Africa:

- livelihoods-based approach to disaster risk reduction (5 Asian countries)
- programmes for disaster preparedness planning (in Nepal, Sri Lanka, Bangladesh), programmes to strengthen food security & food production (in Bangladesh)
- food security programmes in Kenya, Sudan, Zimbabwe, Zambia and Mozambique.

This experience led the organisation to develop a project designed to help communities to cope with climate change. This ran from 2004-7 in four South Asian countries: Bangladesh, Nepal, Sri Lanka and Pakistan.

Based on our extensive work on community-based development, the project took a very practical approach to community based adaptation, with the following processes and activities:

- explain to local communities understand what is happening to the climate and why
- finding out how communities cope with and adjust their lives in the face of climate variability
- working to strengthen these coping strategies, bringing external knowledge to link with local knowledge
- building links with local government and other stakeholders to improve communities' access to information and resources
- Using the project experience as the basis for influencing government

In Bangladesh, the adaptation strategies selected with the communities' input included:
Floating vegetable gardens (so that when land was flooded, seedlings could be growing, ready for planting out when floodwater recedes)
Rearing fish in cages, anchored in ponds that are created by monsoon rains, when the river is too fast flowing for fishing boats to go out
Planting a variety of rice that matures before the monsoon rains
Using ponds for duck and fish rearing – ducks providing eggs for the market, being more resilient to floods than chickens.

Learning from the project

The modest funding for this project provided the opportunity to implement an innovative project that brought together learning and experience from four South Asian countries in developing practical approaches to community-based adaptation to climate change. The project has also been a vehicle for some influencing of policy process at international level, at workshops and side events at the UNFCCC COPs in Nairobi and Bali, and is contributing to the developing body of knowledge on how to enable poor communities to cope better with climate change. A book is about to be published by Practical Action Publishing, drawing on the project and a number of other projects. Title: Understanding climate change adaptation: lessons from community based approaches. ISBN: 978 1 85339 6830

A three year project does not provide enough evidence that the technologies adopted by the communities will enable them to adapt to climate change. Nevertheless, many approaches and technologies on NRM and livelihood strengthening offer 'win-win' outcomes benefiting the communities and their assets. Many of the technologies promoted in the project in Bangladesh and Nepal are being tested further in other programmes in the two countries, both by Practical Action and former partner organisations.

Practical Action has developed an approach to scaling up that will be tested in the coming years. The process is based on a bottom-up approach. Links with local government and other stakeholders are made, to improve access to information and resources, and ensure continuity of support after projects end. Raising awareness on climate change and its local impacts amongst local officials and politicians is important since local government knowledge is often limited. Our experience is that if we provide information and guidance that is relevant to people's regular work, then it will be taken on board. A key aspect to scaling up is sharing information and experiences through district- and national-level networks.

Scaling up

Scaling up involves replication of what works. This can mean in other similar localities, or by other institutions and organisations. The challenge for community- based adaptation is that it must be location specific. Minor differences in ecosystems, access to resources and livelihood opportunities may mean that what works even in the same sub-region in one community will not lead to successful adaptation in another. There is therefore a need to recognise approaches that are worthy of replication, with context specific activities – defined by the communities as stakeholders. Hence the crucial importance of participatory approaches.

Successful replication has to involve 'mainstreaming' – meaning adoption of good practices, dissemination of relevant knowledge and technologies, building of capacity –amongst a variety of stakeholders, depending on the political/social/economic context: local NGOs, community leaders, local/district government.

Needs

Sharing of knowledge is vital. New initiatives include the web-based knowledge hubs, www.cba-exchange.org, and www.weadapt.org. A new grouping, initially largely of NGOs and research institutes, was launched at the recent Third international workshop on community-based adaptation. It is called the Global Initiative on community-based adaptation, and will aim not just to share good practices, but develop clarity about what constitutes community based adaptation. While there are many initiatives including those of UN organisations, to collate good practices and share them, it is still not easy for practitioners to find concrete experiences of good practice. It is important that the concept of regional centres, drawing on a range of expert individuals and specialist institutions (proposed by a number of

Parties) is developed more fully and included within the financial and institutional architecture of the Copenhagen agreement.

Gaps

Incorporation of sound ecosystem management into adaptation planning at all levels- international, national and local

Climate change directly affects natural ecosystems and threatens the services they provide including food, clean water, coastal protection, fuel-wood, soil stability and fretility, and pollination. While the impact of the loss of some ecosystems is visible and generally understood (for example, forest loss causing soil erosion), the impact of changes in soil microfauna through temperature and moisture change, is much less well understood. Loss of ecosystem services will affect global food production and water availability, but impacts will also severely affect people who depend directly on natural resources, who are often among the poorest and most vulnerable, are affected most severely.

There is a great need to increase understanding among all sectors and professionals involved with national and local planning, including engineers, agriculturalists and economists, of the independency of economic and social development and healthy ecosystems. Basic training in the concepts of interdependence will be essential so that ecosystem vulnerabilities are assessed in national adaptation planning and measures for sound management and restoration are incorporated. The Nairobi Work Programme could begin this process through a specific workshop on this theme. Technical panels supporting adaptation planning would need to include expertise on this issue.

Incorporation of conflict resolution into training programmes at all levels of adaptation planning and programme and project design

It has been highlighted in many documents including the IPCC fourth assessment reports that water in particular will become a scarce resource. Conflict over access to water is certain to increase, both at regional level (for example in the Himalayas and the Andes, and in many parts of Africa) and at local level, where upstream and downstream communities will fight over scarce water resources. Adaptation will require much improved water resource management and skills in resolving conflicts peacefully. There will be a need for increased training in consensus-building, at all levels of government and within communities. At present this training is largely provided by international NGOs. There is a great need to broaden this skill base and for wider recognition of the importance and value of conflict resolution in the process of adaptation planning.

Some challenges to scaling up

Scaling up community level approaches must involve all tiers of government, other institutions (such as national agricultural research institutes, and where feasible, private sector input providers. A major challenge is changing the policy of the government to favour approaches to service delivery that really support the most vulnerable communities. One case is that of community-based extension, where Practical Action has over 20 years experience in developing a community-driven model that delivers low-cost basic veterinary services through locally trained paravets. Improved livestock health is crucial in strengthening resilience in the face of climate change, and the additional health hazards likely to arise. Most governments, however, (influenced by professional technical staff in their agricultural ministries) favour instead a top-down approach with government experts sent out to farmers. Yet, with too few professionals available in government service, and many communities in remote areas where professionals do not wish to work, such systems fail to deliver. A community based extension system can be viable financially but needs to be supported by government line departments who commit to update technical skills, and by private agricultural service providers operating as a channel for inputs such as seeds and other materials.

Community-based adaptation programmes need a commitment on the part of local government to listen to the voices of the small farmer producers' groups, and facilitate implementation of plans developed by local communities which meet their priorities. Local NGOs and CBOs will need to work together in partnership with local government, involving the target beneficiaries in decision making processes and in project design and implementation.

Changing policy at national level is one hurdle. Another is changing practice. National Research Institutes must take up the research needs of smallholders on food production, processing and marketing. Research institutes will need to commit to run training courses for local farmers' organisations and local development NGOs to update their skills, since climate change is ongoing and will require ongoing review of appropriate technologies for adaptation strategies. Government and NGOs need to allocate resource to promote exchange visits and farmer to farmer extension, as part of the learning and sharing.

Some of these activities are indeed specific to adaptation – and should receive additional funding; others are part of good development practice, and would not necessarily cost more than 'business as usual' approaches to service delivery and development.

Barriers and constraints to Creating an enabling policy environment

It is still being assumed that demonstrating successful adaptation, and widely disseminating the findings and building national capacity, will be sufficient to lead to scaling up through government programmes. Some evidence from one area crucial to successful adaptation will be offered to illustrate that this is unlikely to be sufficient. Small-scale farming is crucial as a livelihood option for a majority of the world's poorest people including those most vulnerable to climate change. Small-scale farming is now more understood too as crucial to future global food security, as the recent IAASTD report concluded. Crucial to global food security is agricultural biodiversity – the conservation of the widest possible range of seeds, both on and off farm. Yet in recent years, there have been many moves by large agricultural and biotechnology corporations to privatise plant genetic resources thus making farmer seed saving illegal. This threatens participatory plant breeding at community level. The pressure that corporations are putting on many governments to favour genetically modified food crop development through enabling policies poses a serious threat to agricultural biodiversity, since contamination by pollen from trial crops and food crops or their wild relatives can take place. This favouring of GM crop development comes despite the fact that after nearly thirty years of GM crop development, the commercial sector and the public/private sector have failed to introduce one GM food crop which is targeted at small holder or family farmer in the Global South. This case illustrates the way in which private sector interests can threaten the implementation of policies supporting adaptation.

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