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**Nairobi work programme on impacts, vulnerability and adaptation to climate change**

## **Synthesis of information and views on adaptation planning and practices submitted by Parties and relevant organizations**

**Note by the secretariat**

### *Summary*

This document presents a synthesis of information and views submitted by Parties and relevant organizations on adaptation approaches, strategies, practices and technologies at the regional, national, and local levels in different sectors. The document also synthesizes views on needs, concerns, and lessons learned from such actions and measures, and concludes with issues for further consideration.

## CONTENTS

|  | <i>Paragraphs</i> | <i>Page</i> |
|--|-------------------|-------------|
| I. INTRODUCTION .....  | 1–3               | 3           |
| A. Mandate .....   | 1–2               | 3           |
| B. Scope.....  | 3                 | 3           |
| II. SUMMARY OF THE SUBMISSIONS.....                            | 4–58              | 3           |
| A. Background and synthesis approach.....                      | 4–10              | 3           |
| B. Adaptation planning and practices at different levels ..... | 11–28             | 5           |
| C. Adaptation planning and practices by sector.....            | 29–54             | 7           |
| D. Technologies.....   | 55–58             | 11          |
| III. EXPERIENCES, NEEDS AND CONCERNS .....                     | 59–65             | 12          |
| A. Needs and concerns .....                                    | 60–64             | 12          |
| B. Experiences and lessons learned.....                        | 65                | 13          |
| IV. ISSUES FOR FURTHER CONSIDERATION .....                     | 66                | 13          |

## I. Introduction

### A. Mandate

1. The Subsidiary Body for Scientific and Technological Advice (SBSTA), at its twenty-fifth session, in its conclusions on the Nairobi work programme on impacts, vulnerability and adaptation to climate change,<sup>1</sup> requested the secretariat to prepare, by its twenty-seventh session, a synthesis report of information submitted by Parties and relevant organizations<sup>2</sup> on adaptation approaches, strategies, practices and technologies for adaptation at the regional, national and local levels in different sectors, as well as on experiences, needs and concerns.

2. At the same session, the SBSTA requested the secretariat to prepare, by its twenty-seventh session, a synthesis report based on outputs relevant to adaptation planning and practices from the work of the Least Developed Countries Expert Group (LEG), the Consultative Group of Experts on National Communications from Parties not included in Annex I to the Convention (CGE) and the Expert Group on Technology Transfer (EGTT).<sup>3</sup>

### B. Scope

3. This document synthesizes the information submitted by Parties and relevant organizations on approaches, strategies, practices and technologies for adaptation to climate change. The information contained in this note, as well as the synthesis of outputs relevant to scientific and technical aspects of adaptation planning and practices under the Nairobi work programme, produced from the work of the constituted bodies under the Convention, namely the LEG, the CGE and the EGTT, served as input to the deliberations of a workshop on adaptation planning and practices that take place in Rome, Italy, on 10–12 September 2007.

## II. Summary of the submissions

### A. Background and synthesis approach

4. The overall objective of the Nairobi work programme is to assist all Parties, in particular developing countries, including the least developed countries and small island developing States, to improve their understanding and assessment of impacts, vulnerability and adaptation, and to make informed decisions on practical adaptation actions and measures to respond to climate change on a sound scientific, technical and socio-economic basis, taking into account current and future climate change and variability.<sup>4</sup>

5. Activities in the area of adaptation planning and practices under the Nairobi work programme are undertaken in line with the objective in the annex to decision 2/CP.11 to advance sub-themes 3 (b) (ii), “Collecting, analysing and disseminating information on past and current practical adaptation actions and measures, including adaptation projects, short- and long-term adaptation strategies, and local and indigenous knowledge”, and 3 (b) (iv), “Facilitating communication and cooperation among and between Parties and relevant organizations, business, civil society and decision makers, and other stakeholders”.

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<sup>1</sup> FCCC/SBSTA/2006/11, paragraph 57.

<sup>2</sup> Submissions from Parties and organizations are compiled in documents FCCC/SBSTA/2007/MISC.10 and FCCC/SBSTA/2007/MISC.11 as well as in an online database available at <[http://maindb.unfccc.int/public/adaptation\\_planning](http://maindb.unfccc.int/public/adaptation_planning)>.

<sup>3</sup> The synthesis report is contained in document FCCC/SBSTA/2007/10.

<sup>4</sup> Decision 2/CP.11, annex, paragraph 1.

6. Activities in the area of adaptation planning and practices can contribute to efforts by Parties and organizations, including:

- (a) To exchange information on experiences, lessons learned, constraints and barriers of past and current adaptation measures and actions, and the implications for sustainable development;
- (b) To promote different ways and means for information sharing and for the enhancement of cooperation among Parties and relevant sectors, institutions and communities, including in the areas of disaster risk reduction and management;
- (c) To promote understanding of response strategies, including early warning systems and local coping strategies, and of lessons learned that can be applied elsewhere;
- (d) To assess ways and means to support adaptation, and address barriers and constraints to its implementation.

7. Submissions were received from 13 Parties (representing the views of 31 Parties), seven United Nations organizations and intergovernmental organizations (IGOs), and three non-governmental organizations (NGOs). The Parties are: Argentina, Australia, Bangladesh, Canada, Cuba, El Salvador, Germany on behalf of the European Community and its member States, Japan, Mexico, New Zealand, South Africa, Tajikistan and the United States of America. The IGOs are: the secretariat of the Convention on Biological Diversity (CBD), the Food and Agriculture Organization of the United Nations (FAO), the United Nations International Strategy for Disaster Reduction, the Organisation for Economic Co-operation and Development (OECD), the Bureau for Crisis Prevention and Recovery of the United Nations Development Programme, the World Food Programme of the United Nations (WFP) and the World Meteorological Organization (WMO). The NGOs are: the International Research Institute for Climate and Society (IRI), Practical Action and the Tyndall Centre for Climate Change Research.

8. Most information was presented in accordance with the format provided by the secretariat, produced in response to a request by the SBSTA.<sup>5</sup> In the format provided, Parties and relevant organizations were invited to categorize adaptation actions in structured tables by type (approaches and strategies, practices or technologies), scope (regional, national, local, sectoral) and status (ongoing, under development, under consideration, etc.), and to identify specific concerns and barriers as well as lessons learned that should be shared or could be acted upon under the Nairobi work programme.

9. Because of the cross-cutting nature of many adaptation actions, Parties and organizations were invited to choose the category that best reflected the characteristics of the action concerned, and to also mention other possible categories. Parties and organizations were also invited to provide references, where more information about the specific adaptation actions can be found.

10. In order to keep to the same structure as the submissions, this synthesis report is organized into four main sections. The first section presents adaptation approaches, strategies and practices at the regional, national, and local and community levels. The second section focuses on different sectors such as water resources, agriculture, health, coastal zones, ecosystems and forestry. The third section briefly summarizes information submitted on technologies for adaptation.<sup>6</sup> The fourth section recapitulates common needs and concerns as well as experiences and lessons learned that were identified in the submissions.

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<sup>5</sup> FCCC/SBSTA/2006/11, paragraph 56.

<sup>6</sup> The secretariat has prepared a separate synthesis report (FCCC/SBSTA/2007/6) further elaborating on technologies for adaptation as noted in the structured tables under this sub-theme.

## **B. Adaptation planning and practices at different levels**

### 1. Adaptation at the regional level<sup>7</sup>

11. Relatively few regional initiatives on adaptation were identified in the submissions. Examples include the Ibero-American Programme on Impacts Assessment, Vulnerability and Adaptation to Climate Change, the Mainstreaming Adaptation to Climate Change Project in the Caribbean, the Pacific Island Climate Prediction Project, the Climate Change and Southern Hemisphere Tropical Cyclones Project, and others in the Mediterranean and the Baltic Sea regions, as well as European programmes relating to spatial planning and water resource management. Most projects are at an early stage of development or implementation, and centre on climate observation and monitoring, assessment, capacity building and awareness-raising.

12. A number of other projects, such as the South Pacific Vulnerability and Adaptation Initiative and the Climate Change Partnerships in the Asia-Pacific region, support practical adaptation initiatives, primarily addressing water security and coastal zone management. In addition, WMO, FAO, IRI and other organizations report on the development of regional frameworks, standards and databases.

13. The WFP is collaborating with the African Union Commission and the New Partnership for Africa's Development to integrate climate information into its food security and vulnerability monitoring systems. Regional Climate Outlook Forums are highlighted by the WMO and the United States as effective mechanisms to provide advance information about seasonal climate fluctuations in Africa, the Americas and Asia, and build sectoral partnerships.

14. At the regional level, barriers commonly identified by Parties include the need for political commitment, data access and compatibility, and ongoing support. It is especially important to harmonize climate monitoring and prediction and the development of global and regional data sets.

15. The submissions highlight the importance of capacity-building, specifically in global information systems (GIS) and data analysis, and for regional leadership. Several organizations note that the engagement of the international donor community is essential.

### 2. Adaptation at the national level

16. Fifteen of the 31 Parties who submitted information are in the process of developing or considering national adaptation plans or frameworks, or climate change plans that include adaptation. The majority of these are Parties included in Annex I to the Convention.<sup>8</sup> There are, in addition, many national research and assessment programmes and projects, as well as various directives addressing specific impacts (mostly floods and drought, as well as heatwaves in Europe) or dealing with spatial planning (such as integrated coastal zone management or accounting for flood risk).<sup>9</sup>

17. Efforts by organizations at the national level tend to focus on integrating adaptation policies into national planning, as well as in partnership and capacity-building. Submissions from Germany and Japan note various initiatives that are part of international aid and cooperation; these focus on providing assistance in the development of national climate change or adaptation plans and in capacity development through, for example, participatory risk assessments, integration of climate change issues in

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<sup>7</sup> In this context, and in line with the mandate, regional refers to activities that are undertaken among a number of countries that share similar geographic or climatic situations. Activities undertaken at a subnational level are included in chapter II.C.

<sup>8</sup> Submissions by organizations also point to others that are considering or have developed national adaptation plans or national adaptation programmes of action. These include: Cambodia, Maldives, Saint Lucia, Samoa and the United Republic of Tanzania. Countries that do not have national adaptation plans or frameworks often have them at the sub-national level (see chapter II.C).

<sup>9</sup> These are covered under the specific sectors in this synthesis report.

school curricula, and technical training courses. Some organizations and Parties draw attention to reports on the integration of adaptation into development cooperation and the existence of guidance manuals for incorporating climate change into the design of development projects. The OECD refers to various reports on this issue, including a stocktaking paper on progress in integrating adaptation into development cooperation.

18. Besides capacity and budget constraints, the greatest challenge at this level of action is coordination among different levels of government, across sectors, and with academia and relevant organizations. Ensuring political buy-in and crossing institutional boundaries are also recurrent challenges, as is the lack of mechanisms for sustained interaction between user and provider. Considerable efforts have been made in creating or integrating adaptation policies; however, in the case of South Africa it was found that integrating climate risk into development planning and approval processes by incorporating guidelines into existing legislation was time-consuming and costly, and might not be an efficient approach.

19. Submissions highlight the importance of, inter alia: identifying the co-benefits of existing work programmes; recognizing the needs of relevant sectors and stakeholders; using case studies; calculating the social and financial cost of inaction in order to justify the need for change; and establishing an ongoing science-policy interface. Experiences related to the challenge of coordination include incipient initiatives to create regional networks (e.g. KLIMZUG in Germany) or programmes linking researchers and decision makers in order to address climate change (e.g. the UK Climate Impacts Programme (UKCIP)). Some lessons learned point to the importance of the diagnosis phase in creating cooperation among experts and institutions. With regard to projects undertaken as part of international cooperation, there is general agreement on the need to work broadly within the framework of sustainable development strategies in a manner that enhances resilience to climate change impacts.

### 3. Adaptation at the local level

20. Two types of actions were distinguishable under this heading: (1) local-level adaptation actions, including provincial, municipal, city- and town-level initiatives of various types (such as the Spanish Network of Cities for Climate initiative, or measures to prevent flood risk in the city of Jekabpils in Latvia); and (2) community-based adaptation actions. With few exceptions, the former were described in submissions from Parties, while information on the latter was found mostly in submissions by organizations. This may indicate a shortage of information on community-based adaptation at government level and the need to increase knowledge flow from the bottom up.

21. The majority of local-level initiatives identified in the submissions are target specific; for example, adjusting river basin management plans, or providing specialized assistance to farmers. Many initiatives follow national approaches, such as developing climate change plans for the city or region, or establishing policies such as subsidies for using rainwater in homes in Brussels, Belgium. Other initiatives focus on integrating national policies, such as in the contingency plan for heatwaves of Portugal.

22. There are other more focused programmes and projects, for the most part addressing water resource management, coastal management, flood prevention and health. Under this heading submissions also include management plans aimed at protected natural areas and adaptation studies of specific regions and features. There are also a number of university or institute-based research programmes intent on improving climate information and its incorporation in decision-making. Submissions from New Zealand and the United States provide some examples of these initiatives.

23. The barriers most commonly identified at the local level are the lack of local awareness and political buy-in among policymakers. It is frequently noted that local planners need guidance, ideally from the national level and backed by sound science, that clearly identifies the advantages of action and includes consideration of socio-economic factors. As an example of a positive experience, the process of

compiling Local Climate Impacts Profiles under UKCIP was found to be very useful in creating awareness among council officers and politicians on the kind of work they may face when responding to severe weather events.

24. When addressing community-based adaptation, many initiatives identified in the submissions refer to the formation of local action committees that undertake awareness campaigns (including climate risk and vulnerability assessment, mapping and response plans); or to specific adaptation projects such as control of river flow in Malawi, cost-effective retrofitting to make homes flood- and typhoon-resilient in Viet Nam, community-based dune restoration in New Zealand, or seed saving and exchange of drought-tolerant crops in Kenya.

25. The submission from El Salvador refers to a broadly conceived strategy, involving municipal and national-level authorities as well as communities, that aims to increase the coping range of people in certain rural areas through economic diversification and by enhancing their capacity to influence public policies. Overall, the emphasis is on rural areas. One example of the fewer projects that are directed to urban areas is the work of WMO in tracking urban heat islands and cool islands.

26. With regard to community-based adaptation, all submissions emphasize the need for participatory assessment of risks and actions required, cooperation by local authorities and the rescue and incorporation of traditional knowledge to facilitate the adoption of adaptation initiatives by local people. As with the other levels, the benefits of action have to be clear.

27. A serious concern is that because community-based work is time-consuming, undertaken mainly by NGOs and dependent on donors for funding, its scale and impact is limited – something which, the submissions stress, would need to be changed in order to meet the scale of climate change impacts. A number of submissions also express concern that the prevailing criteria and procedures within current financial mechanisms and implementing agencies is rigid and, as such, hampers adaptation initiatives.

28. Submissions highlight the importance of a conceptual framework that integrates both natural and social processes, and suggest enhancing community-to-community exchange as a means of expanding uptake. A frequently stated lesson learned is that, generally, local communities do have a certain capacity to adapt – what they need is additional capacity and support to expand their coping range in order to meet the challenges posed by climate change.

### **C. Adaptation planning and practices by sector**

#### **1. Water resources**

29. Water resources management is the sector that receives the most attention in the submissions, and the majority of the frameworks at national and subnational level are primarily concerned with water management, in particular flood risk and drought control. The focus is largely on the risks of increased frequency of floods and/or droughts. There are few references to sanitation or to the reuse of grey water or recycling. There are, however, several incipient initiatives to integrate climate change considerations into spatial and water resources planning, mostly in developed countries such as the Netherlands, Spain and the United Kingdom of Great Britain and Northern Ireland.

30. Besides policy directives, submissions also note various research projects on impacts in specific regions and initiatives to raise awareness. The latter activities focus mainly on decision makers and less on the general public. Measures range from enhancing flood plain areas of rivers and designating certain rural areas, for example in the Netherlands, for storage of freshwater surpluses, to the establishment of underground rainwater harvesting such as in the project in Zimbabwe funded by Practical Action, an international NGO.

31. With regard to adaptation in the water resources sector, the emphasis is on integrated water resource management, and, in particular, on integration with other national policies and sectors,

especially land-use, urban planning, energy and tourism. Important links with biodiversity and conservation, entailing finely balanced trade-offs, are also noted. Specific barriers include: limited understanding and incorporation of climate information into water management strategies; budget limitations to assess vulnerability under different climate change scenarios; and the lack of transnational cooperation among co-riparian countries, for example to exchange data from upstream areas in order to increase lead time for flood warnings.

32. Submissions highlighted the importance of the early involvement of the water industry and local water users in the adaptation planning process, of the availability of institutional arrangements conducive to such engagement, and of including cost-effectiveness considerations in this process. It was also stressed that the water sector is one where learning from the experience of other countries, for instance on quality standards, good practice guidance for water reuse and efficient water conservation practices, is considered very valuable.

## 2. Agriculture

33. Adaptation needs and measures in agriculture differ between developed and developing countries. While it is at the core of efforts by organizations in developing countries, the sector does not figure prominently in submissions by developed countries. Overall, action is centred largely on research, and to a lesser extent on awareness-raising and capacity-building, although numerous pilot projects have also been implemented, notably in Bangladesh. Australia has developed a specific national agriculture and climate change action plan.

34. For the most part, however, adaptation in the agriculture sector is incorporated in national development plans, usually within rural development, as a recognition of climate change impacts, or part of climate change plans. Most adaptation projects and initiatives focus on the development of more efficient irrigation techniques, new cultivars or changes in cropping patterns, with many of the changes proposed being aligned with best-management practices. Research concentrates mainly on new varieties and technologies, while indigenous and local technologies are described in submissions as undervalued and under-researched.

35. Some developed countries and organizations have established information services (e.g. drought watch) and support funds for agriculture. WFP, for example, has developed comprehensive food security and vulnerability analyses, conducted in collaboration with national adaptation programmes of action teams where they exist, to identify major risks to food security, and is preparing livelihood profiles or livelihood atlases. A few Parties also draw attention to the creation of stakeholder forums. Insurance approaches are under consideration or ongoing in some countries, such as Argentina, but remain limited because of lack of awareness and data, as well as the low value of crops.

36. The United Kingdom also notes agri-environment and environmental stewardship schemes, which are expected to enhance the performance of local policies and could be suitable for adaptation because of the regular review of management and payments. The submission by the European Commission notes the link between adaptation and mitigation in this sector and the need to implement appropriate soil management practices that will minimize carbon losses. Several submissions indicate that there is a general lack of understanding of the potential of agricultural adaptation.

37. The key concern affecting adaptation in the agriculture sector as identified in the submissions is lack of information, both on the impacts at the relevant scale and the costs of adaptation options. This lack of information is also reportedly related to insufficient communication and feedback from end-users. There is broad consensus on the importance of stakeholder engagement, on the supportive role of governments, and on the need to change the use of information from reactive to proactive. FAO notes that existing extension methods and tools are suitable if capacity is built. Because it is difficult to fully understand the impacts faced, and given the relation to flood and drought risk management, biodiversity and market changes, a cross-sectoral approach is noted as particularly important for agriculture.



38. Barriers include lack of coordination among the large number of institutions and support facilities dealing with agriculture, and lack of long-term planning. In developing countries, poverty – and its concomitant lack of adequate credit facilities – is the critical barrier: the benefits of certain actions (e.g. improved irrigation or mulching for example) may be clear to farmers, but lack of financial resources for investment impedes their application.

39. The submissions highlight the importance of several factors, including: farmer-to-farmer training and technology development; building on the expertise and experience of other countries; involving the private commercial sector at an early stage; creating awareness of options available on the basis of appropriate ('no-harm') technologies; and incorporating cost-benefit considerations throughout. A number of submissions emphasize that diverse varieties and broad range tolerance to various stressors are more important than optimal tolerance to one sole stressor, and underscore the need for promotion of minor and traditional crops and diversified seeds. In this regard, Practical Action points to macroeconomic barriers relating to control by transnational businesses of seed and chemical input markets, which promote mostly high-yielding modern varieties that are not well suited to drought-prone regions.

### 3. Health

40. Most of the adaptation efforts in the health sector centre on awareness campaigns and research. By far the most developed strategies are those addressing heatwaves in Europe, put in place following the 2003 heatwave. The initiatives noted in the submissions concentrate on improving delivery by the health care system, in particular in emergency situations. Others include a report currently being reviewed in the United Kingdom on the health effects of climate change, including the health effects of flooding, and investigations into raised ozone levels in hot weather, sustainability of food stocks, and forced migration.

41. Other approaches include vaccination programmes (Cuba), the development of an early warning system network for famine, malaria, meningitis and pests (United States), and independent policies such as aircraft fumigation (Malta). Measures relating to malaria or waterborne infectious diseases are identified mostly under the framework of development cooperation, for example a project in the United Republic of Tanzania, with assistance from Japan, on measures for enhancing the early diagnosis of malaria.

42. According to the submissions, adaptation in the health sector is impeded by a low level of understanding of the direct and indirect impacts of climate change on health, lack of institutional collaboration and a general lack of capacity in public health services, especially in developing countries. In some cases, for example for disease vectors, current research programmes are reported to be insufficient or lacking in depth, with lack of funding being the major obstacle. Submissions also note a shortage of research on emerging diseases and on the effectiveness of management interventions in malaria risk and on spraying programmes and their environmental impacts. Epidemiological studies on the effect of droughts on human morbidity and mortality are also lacking.

43. Submissions highlight the importance of consolidating research groups into core groups and guiding research activities, and of involving different care providers from hospitals, municipalities and nursing homes. France notes that its heatwave plan saved many lives in a heatwave in 2006: besides coordination across levels of government, the plan includes improvement of weather prediction information tailored to the needs of the health system in heatwave situations.

### 4. Coastal zones

44. Adaptation measures in coastal zones, as reported in the submissions, often involve investments in infrastructure (such as enforcement of coastal dune belt and construction of land drainage systems), and also changes in practices, regulations and rezoning (as in new regulations on land use in areas in Portugal prone to coastal flooding or restriction of coastal development in South Africa). There are also

some studies undertaken by organizations on the integration of adaptation into coastal zone management, and references to the construction of seawalls or multi-purpose cyclone shelters as part of international development assistance.

45. Concerns about adaptation in the coastal zone sector generally refer to: lack of expertise and data; the large investment required; competition for public funds; and continuous pressure to promote development in coastal areas. In accordance with an integrated coastal zone management approach, the needs identified include a multi-disciplinary approach and cross-sector cooperation. For example, Malta draws attention to its Coastal Area Management Programme, which was considered a success in that it brought together all regulatory and implementing agencies, stakeholders and NGOs concerned in discussing one goal. Parties also stress the need for demand-driven generation of knowledge, a good evidence base, political will and greater involvement of NGOs.

46. Submissions highlight the importance of cost-benefit analyses and guidance material to increase motivation. Incorporating environmental impact assessments and biodiversity valuation in planning is also recommended to avoid adverse consequences of adaptation measures. For example, the CBD submission refers to favouring packed-earth coastal protections that deliver the same adaptation benefits as concrete ones, without the negative effects of the latter on biodiversity (such as disturbing nesting sea turtles).

#### 5. Ecosystems and forests

47. Adaptation of ecosystems appears mainly as a cross-cutting theme in natural resource management frameworks and in specific programmes addressing, for example, mangrove conservation, coral bleaching and forest management. Examples include a coral bleaching response plan (Australia) and the development of a tree species that is resistant to infectious diseases and vectors (Japan). There are also some climate change adaptation strategies for natural parks under development, for example in Canada. Efforts centre mainly on research and assessment, and on strengthening monitoring abilities and community-based conservation programmes.

48. Forest disaster prevention was specifically addressed by a number of countries (notably by Latvia), and payment for environmental services in the forest sector was noted by Mexico; however, overall relatively few references are made to forestation. Several submissions also address adaptation planning and practices specifically relating to desertification, alpine environment, and protected areas. Italy, for example, draws attention to a recently launched National Action Plan and National Committee to Combat Desertification. The World Heritage Convention secretariat of the United Nations Educational, Scientific and Cultural Organization has published case studies examining expected climate change impacts and possible adaptation options in natural and cultural World Heritage sites.

49. The emphasis of adaptation planning and practices within natural resources management is firmly on an ecosystem approach. Uncertainty in impacts and costs, as well as poor quality data and lack of modelling skills were frequently noted concerns. Needs specific to this sector include developing baseline data, systematic monitoring and evaluation, clear targeting of vulnerable species, and decision support tools to design adaptation strategies at different levels. In this regard, CBD notes the existence of web-based guidance for the integration of biodiversity in adaptation planning. Submissions also point to the difficulties in understanding links between socio-economic and ecological systems, pressures relating to competing land uses and the need to take into account multiple pressure factors.

50. Submissions highlight the importance of ensuring awareness among stakeholder groups, involving them in assessing the vulnerability of ecosystems and dependent industries or communities, and in formulating and implementing stakeholder-specific adaptation strategies, possibly establishing effective partnerships and co-investments with them. Submissions also stress the importance of

incorporating environmental impact assessments and valuation of biodiversity resources into adaptation planning. Special reference is made to the need to incorporate indigenous peoples' knowledge.<sup>10</sup>

#### 6. Other sectors

51. With regard to infrastructure and the built environment, adaptation practices revolve mainly around establishing guidance for hazard reduction in national planning, or taking into account climate change impacts when revising or developing planning strategies, for example in directing development location, density and expansion. This guidance is developed more often for land use than for building codes, although there are several specific projects involving cyclone-resistant housing.

52. There are also some scoping studies and initiatives revising technical standards and operational procedures of highways and storm-water infrastructures. The submissions also include some references to adaptation in the energy sector, particularly in relation to hydropower (included under water resource management), and to assessments of impacts of climate change on electricity supply. WMO notes its work on climate monitoring in relation to renewable energy, in particular hydropower and solar and wind power generation.

53. A recurring concern about adaptation, in the built environment as well as in the energy sector, relates to the conflicting timescales of planning decisions or policy statements and climate change impacts. The need to address climate change mitigation and adaptation together is also noted.

54. Submissions highlight the importance of practice guidelines and of drawing on the expertise of others to challenge planning approaches. With regard to lessons learned, the submission from Australia refers to the experience generated from a programme on the integrated assessment of human settlements, which fosters partnerships to develop expertise in the use of integrated assessment methods in the urban environment.

#### **D. Technologies**

55. Most of the technologies reported in the submissions are related to water resources management, followed closely by agriculture, and distantly by coastal zones and biodiversity. The entries refer to hard technologies, including some simulation tools, in climate monitoring (remote sensing, modelling); water resources management (from desalination plants to sewage treatment); and agriculture (new crop varieties and species, breeding/cropping systems, no-tillage methods, management technologies, and web-based drought portals).

56. Technologies such as dunes, groynes, and wave barriers for coastal defence in Jamaica, or development of drip and other soil irrigation methods in Tajikistan, are also noted. Examples of measures employing technology at the household level include low-cost irrigation, embankment cropping, floating gardens and integrated farming systems in Bangladesh, and installing screens in homes to reduce indoor temperatures and to guard against insects in African countries.

57. Other low-technology measures noted by Practical Action include fish cage culture and improved portable cooking stoves that can be moved during flood periods. Projects undertaken as part of international aid and cooperation that involve technologies include a sub-surface dam for underground water use in Burkina Faso, with assistance from Japan. Using global positioning systems when travelling and hunting in the Canadian Arctic and tools for applying remotely sensed information to development assistance in the United States represent the application of more sophisticated technologies.

58. The most frequently stated barriers to applying technologies are lack of resources and capacity. A further significant concern is lack of demand from the social sector. On low-technology measures, Practical Action refers to the use of sand dams for capturing water from seasonal rivers in Kenya, instead

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<sup>10</sup> Further needs and recommendations are elaborated on in the submission from the CBD secretariat.

of the line ministries' preferred approach of higher technology interventions such as boreholes, which have been shown to lead to localized degradation of land and to have high maintenance costs. A number of submissions stress the need for increasing the diversity of local seed varieties and developing multi-hazard early warning systems. The submission from Mexico also commends the development of risk atlases and early warning systems, which have resulted in greater attention and resource allocation to risk prevention.

### **III. Experiences, needs and concerns**

59. Submissions provided information on specific projects which have been completed, and on other initiatives under consideration, most of which are at the early stages of development or implementation. Few initiatives are at the evaluation stage. The focus of the submissions is largely on integrated development, but many independent activities are also identified. Based on the submissions, this report found that despite the wide range of practices and approaches to adaptation, the barriers commonly identified are fairly consistent across levels and sectors, focusing mainly on the need for coordination, stakeholder engagement, case studies and cost–benefit analyses, and scaling information to the appropriate levels.

#### **A. Needs and concerns**

60. Despite the variety of approaches to adaptation at different levels, certain needs and concerns were repeatedly brought up in the submissions. The most recurrent one was the need for coordination, both across sectors and between levels of government, and also between academia and government, and among organizations working with communities. The submissions analysed for this synthesis reflect the existence of numerous isolated and dispersed initiatives at various levels and sectors and of ad hoc measures, and show that concerted action is needed.

61. Coordination includes developing a common understanding of the threats and opportunities and identifying roles and responsibilities. Calls for coordination are as basic as the need to share common input climate data for running the different sectoral models in a national adaptation programme in Spain. This is related to the stress frequently placed in the submissions on clear guidance and consistent frameworks with implementable, prioritized recommendations.

62. Some submissions note that climate change is often viewed by many departments in government as an environmental issue or an 'add-on', instead of as a cross-cutting structural problem. This is compounded by the lack of a clear understanding of the specific impacts of climate change. Therefore, the difficulty of securing political buy-in is a recurring concern. Early engagement of stakeholders, whether they be private companies, communities or local governments, is constantly recommended in the submissions.

63. In general, barriers also relate to the divergent outlooks between planning for long-term impacts of climate change and planning and policymaking for the short to medium term. A further barrier is the lack of detailed climate change scenarios that can be locally applied. The need for scaling to a suitable level, both in spatial and temporal terms, is therefore frequently stressed in order to address problems such as regional scenarios used in climate change models not matching the scale of socio-economic scenarios or water resources, and the different timescales needed depending on the climate-related problem.

64. Financial barriers relate both to insufficient resources and to the nature of the funds available, which are often referred to as inappropriate for the kind of cross-sectoral, multi-level and flexible approach needed for adaptation. For example, on a project aiming to link existing systems relating to climate change, disaster risk reduction, natural resource management and development in various countries, FAO found that donor policies and financial resource allocation practices hamper the process of better integration. The submission from El Salvador makes a similar point. Another frequently noted

concern is the problem of retaining highly skilled staff in competition with other job markets, especially in developing countries.

### **B. Experiences and lessons learned**

65. Experiences and lessons learned reflected in the submissions include:
- (a) The need to identify the major climate related impacts and stresses on sectors or areas in question and link them to climate variability and change. Many Parties and organizations are of the view that climate change cannot be emphasized as a primary topic with stakeholders on the ground, and that current exposure to natural hazard risk is the entry point to adaptation;
  - (b) The value of case studies, with tangible and specific results, to aid in engaging stakeholders. Numerous calls are made for applied research, cost-benefit analyses and integrated methodologies. Guidelines are also recommended, even when they provide generic advice;
  - (c) The importance of identifying opportunities for low-cost adaptation actions and co-benefits across sectors and programmes;
  - (d) The value of establishing programmes to coordinate research based on stakeholder needs, that would provide a bridge between researchers and decision makers in government, organizations and businesses;
  - (e) The importance of understanding, valuating and incorporating indigenous and local knowledge and technologies;
  - (f) The value of gender considerations to improve the understanding of differences in vulnerabilities;
  - (g) The effectiveness of employing a full-time coordinator to work on adaptation to enhance the scope of activities at various levels and sectors and their integration;
  - (h) The value of using the ecosystem approach in adaptation planning, and of GIS vulnerability maps combining ethnographic and physical data to design short- and long-term plans;
  - (i) The importance of dissemination and the need to maintain momentum beyond report publication.

### **IV. Issues for further consideration**

66. In view of the needs, concerns and experiences identified in the submissions, Parties may wish to consider the following questions in furthering their work on adaptation planning and practices:
- (a) What are the effective ways to enhance coordination and integration across sectors and between different levels of governance? How are institutional barriers crossed?
  - (b) What instruments exist to link research, policymakers and users? What ways are there to promote applied research and to generate demand-driven information?
  - (c) How can local adaptation initiatives be integrated into, and supported by, national and sectoral planning? What are the mechanisms that can increase knowledge flow from the bottom up? How can indigenous and local knowledge be further valued and incorporated?

- (d) What are the examples of low-cost adaptation actions and measures?
- (e) How can good practices be best disseminated?
- (f) What opportunities are there for international cooperation and synergies? How can actions on an international level promote and facilitate adaptation planning and practices at the national and subnational levels?

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