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

Information on methods and tools for impact, vulnerability and adaptation assessments

Submissions from Parties

Addendum

1. In addition to the seven submissions contained in document FCCC/SBSTA/2007/MISC.12, one further submission has been received on 4 September 2007.
2. In accordance with the procedure for miscellaneous documents, this submission is attached and reproduced* in the language in which it was received and without formal editing.

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SUBMISSION FROM CANADA

Nairobi Work Program on Impacts, Vulnerability and Adaptation to Climate Change (NWP)

Methods and Tools

Canada is pleased to offer this submission as a means of sharing information on, and improving understanding of, methods and tools for impact and vulnerability assessments, as outlined in paragraph 33 of FCCC/SBSTA/2006/11.

General

There have been significant advances in the development and application of methods and tools for impacts and vulnerability assessment in the past five years. Canada notes that Chapter 2 of the Intergovernmental Panel on Climate Change Working Group II Fourth Assessment Report (Carter et al., in press) is focused on new assessment methods, and believes that this chapter will provide a useful foundation for further discussions of this issue by the SBSTA. With respect to integration with development programs, an upcoming (2007) OECD paper "*Stocktaking of progress on integrating adaptation to climate change into development co-operation activities*" presents an excellent summary of tools available. Canada further notes the value of the UNFCCC's "*Compendium on methods and tools to evaluate impacts of, vulnerability and adaptation to climate change*" (UNFCCC, 2005) as an inventory of existing tools and approaches, and the need for periodic updating of the compendium to reflect latest developments. While there is great value in continued refinement of assessment methodologies, and the sharing of lessons learned from the application of these methods, Canada believes that one of the most significant gaps at present relates to decision-support tools for adaptation planning and the assessment of specific adaptation options.

Methods and Tools for Impacts and Vulnerability Assessments

The most appropriate methodology for any specific impacts and vulnerability assessment depends on many factors, including the scale (geographic, thematic and temporal) of the assessment and the questions that it is attempting to answer. The trend towards more integrative assessments, cooperation with agencies not traditionally associated with climate change (such as emergency response) and consideration of both climate and non-climate stressors are producing results that are increasingly policy relevant. We have seen a convergence of approaches (often referred to as "top-down" and bottom-up") that allows for more comprehensive and rigorous assessments.

Canada is presently completing its second report on national-scale assessment of climate change impacts and adaptation (http://www.adaptation.nrcan.gc.ca/assess_e.php). Individual chapters present regional (sub-national) analyses that encompass a broad range of economic sectors. It uses a standard approach through analysis of existing knowledge captured within peer-reviewed and gray literature, derived from scientific research, traditional knowledge and practitioner experience. Such assessment provides a broad perspective on a wide range of issues, and is able to highlight the linkages between issues with direct relevance for policy development.

It is recognized that assessment at the national scale cannot provide the level of detail needed to directly inform most adaptation decision making, and therefore must be complemented by sub-national, local and sectoral assessments. One example of integrated regional / sectoral assessment in Canada focuses on agriculture production on the Canadian prairies, using combined biophysical (Environmental Policy Integrated Climate Model – EPIC) and socio-economic models (Canadian Regional Agriculture Model –

CRAM) to assess future benefits and risks, and evaluate possible adaptation responses. This scenario-driven impact assessment utilizes both climate and socio-economic scenarios.

It is in local scale assessments where we see greatest use of participatory assessment methods. Elements common to these assessments include incorporation of local expert knowledge, community-defined indicators, and a focus on key current and future vulnerabilities. One ongoing vulnerability assessment focuses on Old Crow, a community of approximately 300 residents in the northern Yukon and home of the Vuntut Gwitchin First Nation. Much of the community relies on traditional ways of life that are inextricably linked to the health and viability of the Porcupine Caribou Herd. Ensuring the community maintains control (or ownership) of the assessment process is an important overarching principle. The community recognizes local changes as a result of changing climate, the risks presented by these changes and devises ways to manage them. Primary input to the assessment was obtained through a questionnaire completed by community members and subsequent facilitated discussion. The approach has proven effective in linking science and local and traditional knowledge into a risk assessment framework. It utilizes elements of both vulnerability- and adaptation-based approaches. Lessons learned from the assessment include the value of community ownership, direct community participation in the assessment and the importance of local solutions. Training and education are essential elements of participatory assessment that further strengthen the resilience and adaptive capacity of the community.

Methods and Tools for Adaptation Planning, Measures and Actions

In Canada, awareness of the impacts of climate change has grown significantly in recent years, and there is now increasing interest in methods and tools that move beyond identification of risk and contribute directly to adaptation decision making, including the evaluation of adaptation options. In 2005 Canada's Climate Change Impacts and Adaptation Program funded six projects to develop tools for communities that simplify the process of assessing risks and planning adaptations to climate change (http://www.adaptation.nrcan.gc.ca/projdb/index_e.php?class=116). The projects represent a variety of community types from small remote aboriginal communities to large metropolitan areas. The tools were each developed and tested in one community and then the results were evaluated.

The projects were:

- *Risk Management Guidelines for Adaptation Decision-Making in Municipalities.* This product adapts existing Canadian risk management guidelines to assist communities in assessing the risks related to a changing climate.
- *Climate Change Planning Tools for First Nations: Adapting to Climate Variability and Change.* This project developed user friendly guidebooks for adaptation planning, based on the issues of concern to two northern Manitoba communities. The approach is adaptable for other communities.
- *Costing the Impacts of Climate Change in Atlantic Canada using Recent Climate-Related Events as Benchmarks.* This project developed a method for costing future impacts based on information about past extreme events and their costs to create a scale of future potential costs.
- *Adaptive Decision and Planning Tools (ADAPT) in Canadian Arctic Communities.* In the end, this project did not produce a tool per se, but examined the context and challenges in which adaptation decisions will be made in Canadian Arctic communities
- *Climate Adaptation for Land Use Planners.* This project reviewed a variety of tools currently used in land use planning and identified ways in which they could be adapted to better incorporate a changing climate in analysis for land use planning.
- *Climate-SMART (Climate Change Sustainable Mitigation and Adaptation).* This tool provides a step wise process for a larger urban centre, in this case Halifax, Canada, to use to assess both mitigation and adaptation needs and responses.

These projects highlight that there are a variety of tools that are currently used by communities for planning purposes that can be adapted to assess risks and plan adaptations for climate change. New tools are not necessarily needed. However, there is a need for information on the regional to local scale population trends, economic data and simplified scenarios of future climate as input. Economic analysis remains a major short-coming with respect to decision-support tools. In addition to the need for tools for cost / benefit analysis, the collection and storage of information on past extreme events and their social and economic impacts will assist communities in assessing future risks and costs. Tools related to risk management resonate strongly with most decision-makers, and may allow for more effective mainstreaming of climate change adaptation into broader decision-making processes.

It is also necessary to build the awareness and expertise of the planning community to address climate change adaptation and the use of available tools. To this end, Natural Resources Canada is working with the Canadian Institute of Planners to develop learning modules for university and in-service education of planners and promote awareness of the issue among the planning community.

Integrated Approaches

An example of emerging methodologies and tools that integrate impact assessment and adaptation planning is recently completed work in the Okanagan Basin, a semi-arid region located in British Columbia, Canada. As part of a participatory regional assessment of climate change impacts and adaptation (Cohen et al., 2004, 2006; Cohen and Neale, 2006), the Okanagan Sustainable Water Resources Model (OSWRM) was constructed by combining scenario-based impacts and adaptation information with local expert knowledge of the current state of the Okanagan water system, and provides a learning tool for assessing the effectiveness of adaptation options within various scenarios of climate change and population growth for the Okanagan Basin (see http://www.ires.ubc.ca/aird/projects_completed.html)

OSWRM was constructed using a mediated modelling approach with local experts providing input throughout the process. The model is built on a STELLA™ platform, which accounts for changes in both natural and human-managed stocks and flows of water through the Okanagan system. OSWRM is not designed to be an operational tool, and the current version does not include land use change and adaptation costs. The current version of the model includes 3 climate scenarios, 3 population scenarios, and a wide range of options for managing residential and agricultural water demand, in-stream (conservation) flows for fish, storage capacity and storage release, mix of crop types, residential housing density, and access to Okanagan Lake. Some options are available as yes/no choices while others are selected through quantitative settings within specified limits. Performance indicators include water supply-demand balance for agriculture and attainment of conservation flow targets.

Application of OSWRM shows that within concurrent scenarios of climate warming and population growth, a broad portfolio of adaptation measures will be needed to offset projected increased risk of water shortage, which could occur as soon as the 2020s during relatively dry years, and the 2050s during relatively wetter years. This portfolio would need to include some augmentation of current managed supply. Demand management and urban densification would be important components of this portfolio, but on their own, would not be sufficient.

Gaps, Needs and Opportunities

There is a strong foundation of assessment methodologies and tools, and a growing body of experience in the application of these methods. At present, sharing of these experiences both within and between countries is generally limited. It would be valuable for all countries to find improved mechanisms for sharing of these experiences. One possibility might be a web portal that is complimentary to the exiting

UNFCCC Compendium, with ancillary products to reach practitioners without internet access. It is recognized that there is no single approach that can be considered best under all circumstances. A large number of factors need to be considered, including the scale of the assessment and the outcomes that it is trying to achieve.

Canada believes that there is still a great deal of work to be done in the areas of methods and tools to support adaptation decision-making. This involves evaluation of specific adaptation options, and requires tools for risk and economic analysis. At the sectoral level this may largely involve modification of existing planning tools and approaches. Key in such processes is the involvement of sectoral expertise and learning from local experience.

As many countries, international organizations and research institutions are beginning to invest more in the development and application of methods and tools in support of adaptation, there is an opportunity for increased international collaboration in this area. In 2006, Canada's Climate Change Impacts and Adaptation Program held a joint workshop with the United Kingdom Climate Impact Program focused on tools (final report to be available before CoP13). By collaborating at the earliest development stages, and potentially testing tools in a wider range of settings, there are opportunities to accelerate activities to address this important gap.

Sources of information referred to in this submission

Cohen, S., and T. Neale, eds. 2006. *Participatory Integrated Assessment of Water Management and Climate Change in the Okanagan Basin, British Columbia*. Vancouver: Environment Canada and University of British Columbia, 188 p.

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