WORLD METEOROLOGICAL ORGANIZATION

WMO PARTICIPATION IN THE NAIROBI PROGRAMME OF WORK

Specific topic:
Adaptation planning and practices

Geneva, Switzerland

July 2007

Scope of adaptation action *Regional level*						
***Type of adaptation action**	**Title of adaptation action, including projects**	**Status of adaptation action** - Ongoing - Under imple-mentation - Under deve-lopment - Under consideration	**Needs in order to successfully implement the adaptation action**	**Concerns/ Barriers**	**Experiences/ Lesson learned**	**References** i.e. publications, websites etc.
Approaches/ strategies	**Climate Applications and Services** Partnership building, vulnerability assessment and capacity building in key socio-economic sectors including health, energy, tourism and urban design and management, joint development of Early Warning Systems for individual sectoral issues, such as for heat waves as a health problem; joint development of information (brochures, notes, and other publications) aimed at the public and the media, and reports and Technical Notes aimed at professionals; and establishment of a global network of CLIPS Focal Points along with relevant capacity building through professional training.	Under implementation	Global and Regional coordination of climate services targeted to specific regions and user sectors; user-provider partnership; user awareness of climate sensitivity and climate products; integration of climate information into decision-making process; establishment of Regional Climate Centres	Lack of adequate resources for capacity building and infrastructur e for regional climate services; lack of sustained support to regional networking of climate as well as user sectors	Climate related risk management can improve policy formulation and operational decision-making; Climate information is under-utilized in user sectors	WMO Conference on Living with Climate Variability and Change (17-21 July 2006, Espoo, Finland); http://www.livingwithclimate.fi/; Espoo Statement; Espoo Conference Report (Draft): CLIPS Training Workshop Reports; Reports of the Working Groups on Climate Related Matters of the six WMO Regional Associations

***** Please be aware of the degree of adaptation within activities:

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

Type of adaptation action	Title of adaptation action, including projects	Status of adaptation action - Ongoing - Under implementation - Under development - Under consideration	Needs in order to successfully implement the adaptation action	Concerns/ Barriers	Experiences/ Lesson learned	References i.e. publications, websites etc.
Practices	**Climate Applications and Services** Support adaptation including development of Guidance documents aimed at ensuring that NMHSs implement and operate best practices in their work and educate the climate and sectoral, Regional Climate Outlook Forums (RCOFs), held in various parts of the world, climate specialists and user groups for any relevant sector come together to review climate conditions and to develop and discuss upcoming patterns. Another effective practice is multidisciplinary workshops and training events that focus on local participation in development of tailored products for sectors such as health and agriculture.	Under implementation	Sustained activities of Regional Climate Outlook Forums (RCOFs) and their expansion to other sub-regions; enhancement of human and infrastructural resources; increased user liaison; Operational activities of RCCs/RCOFs with user focus; further showcase projects with regional/sectoral focus	Lack of adequate resources, insufficient user awareness	RCOFs proven to be effective mechanisms in building regional consensus and sectoral partnerships;	RCOF climate outlook statements and their web sites; WMO El Niño/La Niña Update statements;
Technologies	**Climate Applications and Services, Climate Data Management** Provision of climate data and use of new Climate data management systems, analysis, prediction and advising on implications of climate change, technical analyses and advice to those developing such technologies	Under implementation	Access to global climate prediction products; global/regional climate modelling; Involvement of NMHSs and the associated regional centres in establishing infrastructures for regional climate model simulations of relevant	Insufficient computational resources and Internet access/bandwidth; Inadequate model evaluation	Downscaling tools are available, but not yet widely used in several regions; there is as yet no standardized framework	IPCC Assessment Reports; WCRP Coupled Model Data Model Archives; Regional climate modelling systems such as PRECIS and RegCM3

			climate change scenarios and effective downscaling strategies; tailored climate products; decision support tools to integrate climate information	at regional scales and lack of robust regional climate change scenario data; Lack of trained manpower; Inadequate financial resources	for generation and and disseminatio n of high-resolution regional climate scenarios; RCOFs active in climate variability but can also be used to provide climate change information	

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Approaches/ strategies	**Public Weather Services** Improving early warning services and products Establishing and promoting best practices in information dissemination Researching and providing information on social and economic aspects of weather services	Under implementation	International and Regional			
Practices	**Public Weather Services** Publication of guidelines which equip NMHSs with knowledge necessary in achieving the PWS objectives mentioned above; Organizing training workshops and seminars; and Facilitating consultative meetings between experts. Establishment of Expert Team on Services and Products Improvement (ET/SPI); the Expert Team in Support of Disaster Prevention and Mitigation (ET-DPM) and; the Expert Team on Communications Aspects of PWS (ET-COM). Continuous improvement of the "World Weather Information Service (WWIS)" and the "Severe Weather Information Centre (SWIC)" web sites. The SWIC web site provides information on tropical cyclones, rainfall, thunderstorms and heavy rainfall. The WWIS provides weather forecasts and climate data for cities of the world	Ongoing				Strategy for Developing Public Education & Outreach (PWS-1354); Guidelines on Integrat. Severe Weather Warnings into Disaster Risk Management (PWS-13); Guidelines on Weather Broadcasting & the Use of Radio for the Delivery of Weather Information (PWS-12); Guidelines on Cross-Border Exchange of Warnings (PWS-9); Guide on Improving Public Understand. of & Response to Warnings

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Practices (continued)	**Public Weather Services**					(PWS-8); Guidelines on Improvement of NMSs-Media Relations & Ensuring use of Official Consistent Information (PWS-3); Weather on the Internet & Other New Technol. (PWS-2). Guidelines on 'Communicating Forecast Uncertainty & Confidence' which will be very useful in getting users to better understand forecasts & warnings, & how to apply them in deci-sion-making. http://www.wmo.int/web/aom/pwsp/publicationsguidelines.htm http://www.wmo.int/web/aom/pwsp/downloads/WWIS_WebsiteHosts_%20Rpt_2007_HGK.pdf
Technologies						

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Approaches/ strategies	**World Weather Watch**					
Practices	**World Weather Watch** Global Observing System (GOS) provides earth and space based observations and information to prepare weather analysis, forecasts, advisories and warnings. WMO Information System (WIS) to improve and expand GTS operation for monitoring and prediction of hazardous events, tsunami, geo-hazards, earthquake and nuclear accidents.	Under implementation				
Technologies	**World Weather Watch** Global Observing System (GOS) Global Telecommunication System (GTS) Global Data-Processing and forecasting System (GDPFS) Environmental Emergency Response Activities Programme					

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Approaches/ strategies	**Global Climate Observing System** Facilitate development and implementation of the Climate for Development in Africa Programme, an important objective of which is to assist adaptation to climate change in Africa **Global Climate Observing System** Assist generally in the improvement of observing networks for climate at global, regional, and national scales to support sustainable development and adaptation **Global Climate Observing System** Facilitate implementation of GCOS Regional Action Plans	Ongoing Ongoing Ongoing	Leadership in Africa; engagement of key institutions; assistance from donors; links to other sectors Effective collaboration between met services and users and also between WMO & other international organizations Leadership at the regional level	Funds needed Funds needed Funds needed	Endorsement by regional, intl organizations needed; regional champions very important; assistance by the international donor community essential	Climate Information for Development Needs: An Action Plan for Africa (Report and Implementation Strategy) GCOS Regional Action Plans for 10 developing regions (see web)
Practices						
Technologies						

Scope of adaptation action *National level*						
Type of adaptation action	**Title of adaptation action, including projects**	**Status of adaptation action** - Ongoing - Under implementation - Under development - Under consideration	**Needs in order to successfully implement the adaptation action**	**Concerns/ Barriers**	**Experiences/ Lesson learned**	**References** i.e. publications, websites etc.
Approaches/ strategies	**Climate Applications and Services** Partnership building, vulnerability assessment, capacity building in key socio-economic sectors including health, energy, tourism and urban design and management; linking climate and development	Under implementation	Mainstreaming user targeted climate services within the NMHSs; partnerships between the climate services and sector agencies; systematic integration of climate information into national development plans	Lack of user awareness; Lack of formal mechanisms for sustained user-provider interaction; lack of human and infrastructural capacity	Well-planned showcase projects are essential to create user awareness	
Practices	**Climate Applications and Services** Mechanisms for end-user liaison in climate sensitive sectors; develop guidance on best practices in generation and dissemination of tailored climate information products; Showcase projects to demonstrate the application of CLIPS products in the key sectors.	Under implementation	Training of users in understanding climate information; Development of decision making tools relevant to the sector and region; Appropriate integration of climate information with other factors	Lack of guidance to users in using climate information; Inadequate communication/appreciation of	Incorporating uncertainty in decision making sectors is well-developed, yet not fully exploited in climate	

			relevant to decision making	uncertainties inherent in climate products; Limitations of available options to manage climate risks	related risk management ; Socio-economic benefits of climate services need to be convincingly demonstrated	
Technologies	**Climate Applications and Services** Facilitate the use of new Climate data management systems, improve performance in analysis, prediction and advising on implications of climate change; development of multi-hazard early warning systems; Operationalization of decision-making tools integrating climate information	Under implementation	Regional climate change scenario development and impact assessment; dissemination of scenario products; identify the relevant vulnerabilities to climate variability and change, including extremes, and develop appropriate multi-hazard early warning systems;	Lack of human and infrastructural resources	User sectors need authentic sources of climate information on national scale; National climate centres in some countries	

Scope of adaptation action *Local (community) level*						
Type of adaptation action	**Title of adaptation action, including projects**	**Status of adaptation action** - Ongoing - Under implementation - Under development - Under consideration	**Needs in order to successfully implement the adaptation action**	**Concerns/ Barriers**	**Experiences/ Lesson learned**	**References** i.e. publications, websites etc.
Approaches/ strategies	**Climate Applications and Services** Partnership building, vulnerability assessment, capacity building in key socio-economic sectors including health, energy, tourism and urban design and management; Integration of climate information into decision making	Under implementation	Vulnerability assessment using downscaled climate information; enhancement of user awareness	User awareness and local capacities	Early warning systems need to be customized to meet the local needs, in consultation with climate providers and users	
Practices	**Climate Applications and Services** Show case projects in selected locations (e.g., Shanghai, China; Paris, France; New Delhi, India) on the demonstration of early warning systems such as those for the heatwaves and health; training workshops for end-users in applying climate information	Under implementation	Joint coordination of application projects by users and climate experts; operational decision making process to integrate climate information and other required inputs into decision making	Weak or non-existing interaction between users and climate providers; lack of resources and incentives		
Technologies	**Climate Applications and Services**		Impact assessment	Lack of		

	Facilitate the use of new Climate data management systems, improve performance in analysis, prediction and advising on implications of climate change.		models and decision support tools; user awareness	resources and capacity		

Scope of adaptation action *Sectoral level*						
Agriculture						
Type of adaptation action	**Title of adaptation action, including projects**	**Status of adaptation action** - Ongoing - Under implementation - Under development - Under consideration	**Needs in order to successfully implement the adaptation action**	**Concerns/ Barriers**	**Experiences/ Lesson learned**	**References** i.e. publications, websites etc.
Approaches/ Strategies	**Agricultural Meteorology Programme (AgMP)** 1) To review the strengths and weaknesses of existing national drought policies and recommend ways and means to establish and strengthen policy guidelines including future climate change scenarios 2) To promote and develop drought management strategies across WMO programmes	Under development	Regional and National			Drought Monitoring and Early Warning: Concepts, Progress and Future Challenges. 2006. WMO #1006.
Practices	**Agricultural Meteorology Programme (AgMP)** 1) The CAgM Expert Team on Drought and Extreme Temperatures will summarize the status of drought preparedness and drought coping strategies and prepare a report on these strategies. 2) A Cross-cutting Project on Drought Management in Southeastern Europe and Africa has been develop that will incorporate Data, Drought, and Risk assessment and Training and capacity building and Data and Information Delivery sections including Identification of response/mitigation measures and drought policy recommendations	Under development	Regional and National			

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Technologies	**Agricultural Meteorology Programme (AgMP)** The CAgM Expert Team on Drought and Extreme Temperatures will assess the current status of monitoring and predicting droughts and develop standards for drought indices in different Regions. It will also recommend ways and means of improving drought monitoring and prediction. The World Agrometeorolgical Information Service (WAMIS) provides agrometerological bulletins and tools and resources on a variety of issues including drought.	Under development	Regional and National			WAMIS website: www.wamis.org

Water resources						
Type of adaptation action	**Title of adaptation action, including projects**	**Status of adaptation action** - Ongoing - Under implementation - Under development - Under consideration	**Needs in order to successfully implement the adaptation action**	**Concerns/ Barriers**	**Experiences/ Lesson learned**	**References** i.e. publications, websites etc.
Approaches/ Strategies	**Hydrology and Water Resources Programme (HWR)** Improving hydrological information systems through the World Hydrological Cycle Observation System (WHYCOS); Improving early warning & flood forecasting services; Strengthen capabilities of countries to assess their freshwater resources; Launching of an initiative to bring climate information to water managers		Under implementation	Regional and national		
Practices	**Hydrology and Water Resources Programme (HWR)** The strategies & approaches are put into practice through programmes & activities including WHYCOS, the WMO Flood forecasting Initiative, the Water Resources Assessment Programme & the World Climate Programme – Water (WCP-Water)					

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Technologies	**Hydrology and Water Resources Programme (HWR)** Means of implementation are the production of guidelines and manuals, facilitation of field projects both national and regional, the conduct of demonstration projects, building of communication platforms on national, regional and global levels, technology transfer through the HOMS Programme, Training workshops etc geared to build capacity that enables the development and implementation of adaptation measures built on sound information and high quality data products.					

Health						
Type of adaptation action	**Title of adaptation action, including projects**	**Status of adaptation action** - Ongoing - Under imple-mentation - Under deve-lopment - Under consideration	**Needs in order to successfully implement the adaptation action**	**Concerns/ Barriers**	**Experiences/ Lesson learned**	**References** i.e. publications, websites etc.
Approaches/ Strategies	**Climate Applications and Services** Guidance on development of Early Warning Systems for heat waves and Health is in development through the CCl Expert Team on Climate and Health, in partnership with WHO. Enhancing user awareness	Under implementation	Partnership between health (e.g., WHO) and climate sectors; historical information on health impacts of climate	Inadequate interaction between health and climate sectors; lack of resources	Active participation in and support to WHO Regional Workshops on Climate Change and Health has helped to develop an effective framework for partnerships at various levels.	A WHO/WMO infonote on Climate and Health is being developed. WMOIWHO Guidance on Development of Early Warning Systems for Heatwaves and Health (Draft under review)
Practices	**Climate Applications and Services** Outlooks for Malaria outbreaks are being developed in Southern Africa and in the Greater Horn of Africa Region. The process is called MALOF, and these are held with both climate and health experts in conjunction with regular RCOFs.	Under implementation	User awareness and capacity within the health sector on aspects of climate related risk management.	Inadequate correspond ence between the scales of health interest and the scales of climate information available; lack of	WMO co-sponsors WHO workshops at sub-regional levels (e.g. small Island states, mountain areas, semi-arid states, etc.) on	

				downscaled climate products; lack of resources	health impacts of climate variability and change. These workshops are vital instruments in knowledge and capacity-building for both climate and health sectors in a region.	

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Technologies	**Climate Applications and Services** Climate and health surveillance data; decision making tools; downscaling tools	Under development	The spatial density and availability of climate data, and of health surveillance data Better observations in and modelling of urban environments for analysis of impacts of heatwaves. Greater effort in communication between the sectors is needed (conferences, workshops) Joint research into multidisciplinary models for disease outbreaks Intercomparisons of various Early Warning Systems for heat waves and health Climate-related health issues and knowledge needs to be addressed in government actions & policies for emer-gency response & in	Lack of resources	Early warning systems and the required tools have been demonstrate d in Europe, Asia and North America; Expertise available but needs resources	

			the mandates of NMHSs			

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Approaches/ Strategies	**World Climate Research Programme (WCRP)** WCRP plans on holding subsequent Sea-level Rise workshops every two years especially for Least Developed Countries and Small Island Developing States.					
Practices	**World Climate Research Programme (WCRP)** Operation of Global Sea Level Observing System (GLOSS) Ocean modeling systems					
Technologies	**World Climate Research Programme (WCRP)** Early warning of changing risks and of specific ocean inundation, especially during intense storms, is vital for national infra-structure planning and adaptation strategies. Ocean modelling systems Study on changes in water storage on land, alterations in gravity and geometry of the ocean basin and coasts Global Sea Level Observing System (GLOSS) Update and integrate complementary geodetic capabilities (SLR, VLBI, DORIS, and GPS)—co-locating them where possible—into a reliable and consistent global geodetic ground and space network. • Install GPS positioning at all appropriate GLOSS tide gauge stations to determine changes in global					

	and regional sea level.					
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Technologies (continued)	**World Climate Research Programme (WCRP)** Develop an integrated geodetic modeling capability that can be combined with those for the Earth sciences. • Utilize observations of the time-invariant gravity field from the Gravity Field and Steady-State Ocean Circulate Explorer (GOCE), once launched, to determine the precise geoid, thereby enabling an estimation of the absolute ocean circulation for constraining climate models, as well as an improvement in understanding of geophysical processes related to sea level.					

Energy						
Type of adaptation action	**Title of adaptation action, including projects**	**Status of adaptation action** - Ongoing - Under imple-mentation - Under deve-lopment - Under consideration	**Needs in order to successfully implement the adaptation action**	**Concerns/ Barriers**	**Experiences/ Lesson learned**	**References** i.e. publications, websites etc.
Approaches/ Strategies	**Climate Applications and Services** WMO's Commission for Climatology Expert Team on Climate and Energy is building partnership with UNEP.	Under implementation	Improvement in the spatial density & availability of climate data for effective analysis of the role of climate in various segments of the energy industry. Better observations in & modelling of wind fields is for siting of wind farms. Greater effort in communi-cation between the sectors is needed (conferences, work-shops).Climate-related energy issues and knowledge need to be addressed in govern-ment actions & policies for emergency response and in the mandates of NMHSs. Wider use of renewable energies as a key adaptation strategy; development	Inadequate financial mechanism s; lack of user awareness	Systematicall y prepared databases on renewable climate-related resources (e.g., solar radiation, wind energy potential) are essential pre-requisites to optimally utilize their full potential.	A new WMO Technical Note on 'Meteorological Aspects of Utilization of Renewable Energy Sources' being developed. An info note on Climate and Energy is planned to be developed in summer 2007.

			of appropriate risk transfer strategies (e.g., insurance) to protect against energy disruptions due to climate related hazards			

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Practices	**Climate Applications and Services** Seasonal predictions from NMHSs and through Regional Climate Outlook Forums are an important source of advance information on upcoming climate patterns	Under implementation	More targeted dissemination of the services to the energy sector, and design of tailored climate products	Lack of user awareness and inadequate partnership; lack of appropriate decision making strategies.	RCOFs and NMHSs have the potential to meet the needs of the energy sector; Showcase projects essential to demonstrate the potential.	
Technologies	**Climate Applications and Services** Seasonal prediction models, information on climatic elements that could affect the renewable energy industry, particularly hydro, solar and wind power generation; downscaling of the climate information to the scales of energy operations	Under development	Data management tools, preparation of tailored products, downscaling techniques, communication of climate information products and the appropriate decision making tools.	Lack of resources to support research in the decision support systems	Technolgies do exist in developed countries, but their transfer to developing countries need to be facilitated	

Urban Sector						
Type of adaptation action	**Title of adaptation action, including projects**	**Status of adaptation action** - Ongoing - Under imple-mentation - Under deve-lopment - Under consideration	**Needs in order to successfully implement the adaptation action**	**Concerns/ Barriers**	**Experiences/ Lesson learned**	**References** i.e. publications, websites etc.
Approaches/ Strategies	**Climate Applications and Services** Documentation of technical information useful for building and urban climatology, with special focus on climate change, and wide dissemination to all the stakeholders.; partnership building with relevant sectors;	Under implementation	Engaging world renowned experts in preparing the documentation; synthesis of all the existing technical knowledge; bibliography on building and urban climatology; user liaison	Lack of resources; inadequate user awareness and capacity	Close coordination with other related sectors (e.g., health, water) will be essential.	The Commission for Climatology Expert Team on Urban and Building Climatology is developing two new WMO Technical Notes on 'Building Climatology in a changing climate' and 'Urban Climatology and its relevance to urban design', to replace outdated versions of these documents, published as Technical Notes Numbers 149 and 150.
Practices	**Climate Applications and Services** Development of climate input into national building codes, based on sound climatological analyses of averages and extremes in wind, rain, temperature, runoff, snowloads, etc. ; adequate consideration of climate information in urban planning and design; development of guidelines for standardization of scientific communication on	Under implementation	Improve the spatial density and availability of climate data in urban areas for effective analysis of the role of urban heat and cool islands, flash flooding, wind	Lack of resources; inadequate user awareness and capacity	Cross-cutting issues with health, urban planning, water disaster reduction, etc. sectors	

	urban climate issues		canyons, etc. Better modelling of the urban environment for improved urban design. Ensure appropriate partnerships and effective communication mechanisms between relevant sectors (architecture, health, risk reduction and emergency services, planning, energy, transportation, etc.; Conferences, workshops with professionals and the public will help build resilient societies that can better adapt to a changing environment. Because of the anticipated growth of many urban centres and the proliferation of mega cities, often in vulnerable areas such as flood plains and near coastlines, the importance of under-standing the impacts of climate extremes in high-density areas is vital to development of risk reduction and adaptational strategies and policies.		need to be identified and addressed.	

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Technologies	**Climate Applications and Services** Facilitate use of modelling tools to represent urban surface atmosphere processes; develop a directory of available models and promote model intercomparisons; develop an inventory of climatologically significant characteristics of the world's cities.	Under development	Workshops and conferences to promote modelling studies and create user awareness; capacity building in the use of modelling tools; showcase projects; technical documentation	Lack of resources and inadequate user awareness	Modelling tools are available but not widely used in urban planning and design	Technical Notes on Urban Climatology & its relevance to urban design (WMO/TN 149); Application of Building Climatology to the problems of housing and building for human settlements (WMO/TN 150), 1976. WMO/TN 665 on Guidance material on the calculation of climatic parameters used for building purposes, 1992 . A long-term bibliography on urban climatology exists and is kept up to date by the CCl Expert Team. WMO held a conf. on Tropical Urban Climates 28 March-2 April 1993 in Dhaka, Bangladesh

						(WMO/TD-No. 647)

Tourism						
Type of adaptation action	**Title of adaptation action, including projects**	**Status of adaptation action** - Ongoing - Under imple-mentation - Under deve-lopment - Under consideration	**Needs in order to successfully implement the adaptation action**	**Concerns/ Barriers**	**Experiences/ Lesson learned**	**References** i.e. publications, websites etc.
Approaches/ Strategies	**Climate Applications and Services** WMO-UNWTO partnership and joint studies on the impacts of climate variability and change on the tourism industry, particularly for the most vulnerable regions the sector (e.g. mountain and coastal areas). Understanding the impacts of tourism on the environment (stress on biodiversity, land use change, emissions from aviation, etc.)	Under implementation	Improve the spatial density and availability of climate data for effective analysis of the role of climate in various segments of the tourism industry Better observations in and modelling of mountain and coastal climates for siting of resorts for long term planning in a changing climate. Greater effort in communication between the sectors is needed (e.g., through conferences, workshops)	Lack of resources and inadequate user awareness at the local level	Members of the Commission for Climatology (CCl) Expert Team on Climate and Tourism are actively involved in UNWTO initiatives on the subject, helping to strengthen the partnership; WMO actively participates in UNWTO workshops/conferences; Further linkages between NMHSs and	A meeting of Experts on Climate, Tourism and Human Health, Topes de Collantes, Cuba, 22-29 January 1995 (WCASP 33; WMO/TD-No. 682, WMO, May 1995) WMO Bulletin: Tourism, Climate and Weather, P. An info note on Climate and Tourism is under development. Shackleford & L.E. Olsson, WMO Bulletin, Volume 44, No. 3, July 1995; & Climate Services for Tourism & Recreation, L. Lecha & P. Shackleford, WMO Bulletin, Volume 46 No. 1, January 1997. UNWTO & WMO jointly published the Handbook on Natural Disaster Reduction in Tourist Areas in 1998.

					local tourism sector need to be developed.	UNWTO held an Internat. Conf. on Climate Change & Tourism, in Djerba, Tunisia (9-11 April 03
Practices	**Climate Applications and Services** Joint studies of climate change impacts on tourism; Seasonal predictions from NMHSs & through Regional Climate Outlook Forums (RCOFs) are an important source of advance information on upcoming climate patterns (e.g. temperature & precipitation patterns) that could affect the tourism industry in the medium term.	Under implementation	Identifying the climate information needs of the tourism sectors; development of tailored products; capacity building; communication of climate prediction products to the different stakeholders within the tourism sector; enhanced partnerships between NMHSs and RCOFs and the local/regional tourism sectors .	Lack of resources; inadequate user awareness, inadequate user-provider coordinatio n	WMO-UNWTO joint initiatives have been highly successful and similar activities need to be developed at the national and regional levels.	UNWTO-UNEP-WMO Study on "Climate Change and Tourism: Impacts, Adaptation and Mitigation" to be completed in October 2007.
Technologies	**Climate Applications and Services** Seasonal prediction models, heatwaves & other extreme events, retreating glaciers, etc. that could affect the tourism industry; develop methodologies to establish empirical relationships between climatic conditions and touristic frequentation and destination choice; development of multi-hazard early warning systems; develop templates for climate-related outreach products to disseminate the climate information generated by NMHSs more effectively in the tourism sector	Under implementation	Design of specialized climate products for the tourism sectors; development of effective communication strategies; showcase projects, assessment of tourism business on climate change; promotion of the concept of climate as a resource; quantification of socio-economic benefits of climate	Lack of resources	CCl ET on Climate and Tourism has been making concerted efforts to address these issues; Some NMHSs and RCOFs have established partnership with the tourism sector at the	Updated WMO Technical Note (under an advanced stage of completion) on Socio-economic Benefits of Climatological Services has a chapter devoted to the Tourism sector.

			services to the tourism sector		respective levels.	