

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

Type of adaptation action¹	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.
Scope of adaptation action <i>Regional level</i>						
Approaches/ strategies	Institute for Social and Environmental Transition (ISET) Project on Adaptation to Climatic Variability and Change				NOAA and other partners support ISET's efforts to test mechanisms for incorporating climate information in relief and reconstruction programs and to increase understanding of the role climate information could	http://www.i-s-e-t.org/

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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<i>Sectoral level³</i>						
<i>Agriculture</i>						
Approaches/Strategies						
Practices	Farmer Managed Natural Regeneration	ongoing	Appropriate legal structure, patience on part of farmers		3 million ha of tree cover have been added in Niger due to farmers taking advantage of changes in national forestry code. Results: better soil condition, water infiltration, reduced wind damage, more resilient livelihoods.	http://usinfo.state.gov/products/pubs/desertific/land.htm
	Sustainable Adaptations to Drought and Climate Variability in Agricultural Production Systems	ongoing			In both mail-back surveys and during ethnographic interviews, farmers and ranchers reported on a range of responses to drought effects, including: cattle culling	http://drought.unl.edu/index.htm

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

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

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

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

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