Report to Congress on the Needs of Developing Countries in Adapting to Climate Change Impacts Required by 684 (2) of the Consolidated Appropriations Act, 2008

August 2008

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INTRODUCTION

This report is prepared in response to section 684(2) of the Consolidated Appropriations Act, 2008 (Public Law 110-161). This provision of law requires that an interagency committee be convened to evaluate the specific needs of developing countries in adapting to climate change impacts and that a report be submitted to the appropriations committees by September 1, 2008 describing such needs and actions planned and being taken to address those needs, including funding provided.

Climate shapes a wide range of activities and decisions, from the types of crops grown to the design and construction of buildings, water delivery systems, and other infrastructure. Climate change will impact a range of human and natural systems, necessitating planning and response from decision makers at local, national and international levels. Climate change creates vulnerabilities for all countries and is likely to pose an additional challenge to sustainable development, especially in regions already at risk from food insecurity, ecosystem degradation, weak institutional capacity, or other social and economic stresses.

Vulnerability is the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the type, magnitude, and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity.[1] The Intergovernmental Panel on Climate Change (IPCC) defines adaptation as the "adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities."[2] Examples of adaptation include changing crop variety used or shifting timing of crop planting in response to temperature changes, encouraging people to transition to activities in less climate-sensitive economic sectors, and restricting development in low-lying areas at risk of flooding.

The ultimate goal of adaptation is to develop resilient societies and economies that have the knowledge and capacity to address both the challenges and the opportunities presented by changing climatic conditions. In this sense, adaptation is of a piece with broader development efforts aimed at strengthening social institutions and response capacity for a range of economic, social, and development challenges. Building climate resilience is a matter of reducing present vulnerability, increasing adaptive capacity, and minimizing future vulnerability to climate events.

The United States collaborates with developing country partners in a broad range of activities designed to better understand climate and its implications for development and to build resilience to climate variability and change. These activities include scientific research to understand processes that underlie climate change, analyzing data from Earth observations, developing decision support tools, and integrating climate information into development programs and projects. The United States also encourages developing countries to establish their own national

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[1] Working Group II Contribution to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. *Climate Change: Impacts, Adaptation, and Vulnerability*, 2007.
[2] Working Group II Contribution to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. *Climate Change: Impacts, Adaptation, and Vulnerability*, 2007.

development plans with the view that creating thriving, prosperous economies must be predicated upon education, rule of law, good governance, the protection of human freedom and economic reforms. This successful and proven approach underpins our wide range of programs and activities that assist developing countries through our development assistance programs, international trade and economic policies, and international environmental initiatives, as well as our support for such internationally-agreed strategies as the Monterrey Consensus of the International Conference on Financing for Development, the Paris Declaration on Aid Effectiveness, and the Delhi Declaration on Climate Change and Sustainable Development.[3]

Estimates of the cost of adaptation in developing countries range from $10 billion to $50 billion per year.[4] The broad range of estimates reflects uncertainty in whether and how rapidly greenhouse gas emissions may be reduced, how climate change impacts manifest themselves, and the speed and success of development efforts that will reduce or adapt to those impacts. Regardless of the specific estimate, the scale of the potential cost suggests that adaptation efforts should leverage funds dedicated to development assistance, and that the donor community alone cannot take responsibility for adaptation in the developing world. The role of the donors should be to provide tools, information, and assistance to developing countries so they can entrain the resources – human and financial – of the private sector as well as donors to build resilient futures.

This report draws on information from multiple sources, including U.S. Government experts, academic studies, information from United Nations Framework Convention on Climate Change (UNFCCC) expert meetings and papers, and needs expressed by developing countries themselves through their UNFCCC national communications and their national adaptation plans. The UNFCCC represents a particularly rich source of information on adaptation needs, as it brings together adaptation experts and practitioners as part of its work, conducting expert meetings and workshops, and synthesizing adaptation information from developing countries and other UN organizations and international bodies on adaptation needs. The United States is an active participant in UNFCCC adaptation activities.

This report is divided into four main sections. The first section presents country by country adaptation needs, both by sectors and as identified by developing countries themselves. The second section presents an overview of adaptation needs at the global and regional levels, highlighting key components of the adaptation process. The third section presents examples of current and planned U.S. Government international adaptation activities, and includes activities directly developed to address adaptation needs and those that indirectly provide adaptation benefits. The fourth section details the adaptation elements of the President's new Climate Change Initiative.

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[3]These multilateral declarations re-characterize development assistance as a partnership between donors and developing countries. Taken together, they suggest that: development is the responsibility of the sovereign country; assistance will be most successful when provided in an environment of sound governance; and, climate and other environmental factors play a role in the success or failure of development efforts.

[4] *Adapting to climate change*, Oxfam Briefing Paper, May 2007. http://www.oxfam.org/files/adapting%20to%20climate%20change.pdf

SECTION I: COUNTRY BY COUNTRY ADAPTATION NEEDS

Adaptation needs vary from country to country and within countries. Poorer countries and communities require assistance with providing for basic needs – improving food security by building resilience into agricultural systems and improving agricultural productivity and trade, improving water security by increasing water use efficiency and promoting watershed management, and reducing hazard risks and improving hazard warning and response. In contrast, more developed countries and communities may need assistance protecting infrastructure or building new climate-resilient infrastructure and in diversifying economic activity and building redundant systems so communities can recover quickly from shocks. For all countries, it is also necessary to promote laws and governance structures that will ensure the sustainability of adaptation activities. As many countries have considerable needs, the United States focuses on partner countries and communities in which our assistance can be most effective. Assistance should be tailored to the circumstances of a particular country or community.

Climate change is just one of many stresses on development that should be addressed; adaptation efforts can ensure that development efforts succeed as planned. The goals of many of the U.S. Government's development efforts – a well educated population, a diverse and open economy, a secure and stable government – will serve countries well in efforts to build resilience to climate change. Likewise, incorporation of adaptation work will enhance those broader development efforts. The U.S. Government's approach to assistance is a partnership where partner countries identify their own priority development needs. Adaptation has tended not to be a priority area of focus for many partner countries in the context of their broader development strategies and more pressing immediate needs, though it is emerging as a more prominent issue, and the United States and other donor countries emphasize the importance of developing countries working to integrate adaptation into their development strategies. Adaptation needs will vary from country to country, although there are tools and approaches common across many countries and regions.

Comparing adaptation needs across countries is difficult. Given the myriad sources of vulnerability, it is difficult to compare needs of an extremely poor, agrarian society prone to drought with those of a low lying island country with little arable land and subject to storm surge and sea level rise. Further, there are no sound, peer-reviewed, comprehensive indices or rankings of vulnerability or needs that cover all countries. There exist a few attempts to rank vulnerabilities, but most of these focus on a narrow set of impacts in specific sectors, rather than considering exposure, sensitivity, and ability to adapt to climate change for a range of impacts and sectors. The first half of this section, on sector based needs, is compiled from studies on vulnerability rankings and drawn from a variety of academic and non-governmental (NGO) sources. It is not intended as a comprehensive review or evaluation of all assessments, but rather to present some illustrative examples of the types of information available.

Many developing countries have also undertaken studies to identify their own adaptation needs, as part of their national adaptation planning. There is a UNFCCC process to assist Least Developed Countries (LDCs) to prepare National Adaptation Programmes of Action (NAPAs)

(Table 1).[5] NAPAs provide a forum for LDCs to identify priority activities that respond to their urgent and immediate needs to cope with climate variability and change. The second half of this section, on country-identified adaptation needs, is drawn from developing county information sources, including National Communications, NAPAs, and UNFCCC Submissions.

The United States Agency for International Development (USAID) is using the NAPAs to identify common sectoral needs across multiple countries. Tools and guidance can be developed to address those needs (e.g., coastal management, resilient agricultural practices; managing water resources) across a range of countries, with the guidance able to be tailored to and applied in specific communities, such as where USAID or another donor is active. This approach has worked successfully with the USAID Adaptation Guidance Manual, and is being replicated on a sector specific basis.

SECTOR-BASED NEEDS

AGRICULTURE

Seventy percent of the world's 1.2 billion poor (defined as consuming less than one purchasing power adjusted dollar per day) live and work in rural areas. Subsistence and smallholder livelihood systems experience a number of interlocking stressors, including risks associated with climate. An increasing number of regional and global simulation studies focus on projecting impacts associated with climate changes. The results of such simulations are generally highly uncertain due to many factors, including large discrepancies in General Circulation Model (GCM) projections of regional precipitation change, poor representation of impacts of extreme events and assumed strength of CO2 fertilization. Nonetheless, the simulations provide an indication of impacts at various levels of temperature rise. Simulations generally find that in low-latitude regions, moderate temperature increases are likely to have negative yield impacts for major cereal crops, and larger increases cause broad reductions in agriculture yields.

A recent study by Lobell et al (Science, 2007) [6] utilized crop models and climate projections to help prioritize adaptation efforts to improve food security. Twelve food insecure regions were initially identified, each of which contained a substantial proportion of the worlds malnourished people. The authors considered how important each major crop in each of these regions was to food security (based on contribution to per capita caloric intake), and then ranked crop-region combinations to form an index of global hunger importance. When they focused on crop-region combinations for which more than 95% of models predicted some negative impact, investment priorities were South Asian wheat, Southeast Asian rice, and Southern Africa maize. When they instead focused on risk of a potentially large impact (5% of models projecting at least a 10% yield decrease), investment priorities were South Asian millet, groundnut, and rapeseed, Sahel sorghum, and Southern African maize. These differences underscore some of the complexities in identifying adaptation priorities. The authors also acknowledged that factors such as existing

[5]National Adaptation Programmes of Action (NAPAs) website, http://unfccc.int/adaptation/napas/items/2679.php.
[6]Lobell, David, et al. 2008. Prioritizing Climate Change Adaptation Needs for Food Security in 2030. *Science* 31 (5863): 607-610.

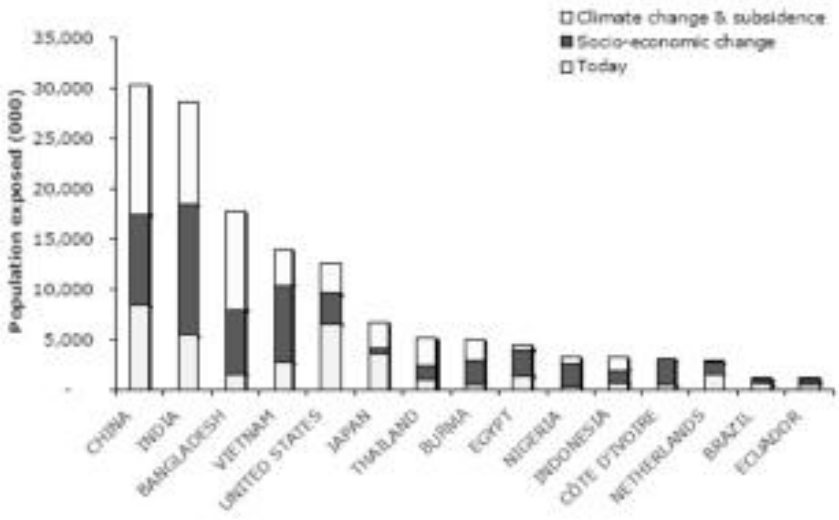
adaptive capacity, the social and technological feasibility of adapting particular crops, and regional needs should also be considered in setting priorities.

COASTAL FLOODING

Another illustrative example of a multi-country sectoral study is a recent OECD paper (2007)[7] that evaluated the vulnerability of the world's largest port cities to coastal flooding due to storm surges and to damage due to high winds. The study evaluated exposure of population and assets to a 1 in 100 year flood in 136 port cities, each of which had at least 1 million inhabitants in 2005. It is important to note, the study does not incorporate or evaluate the adequacy of current or potential flood defense systems or other adaptations. An elevation-based GIS analysis was used to evaluate vulnerability now and in 2070, considering projected impacts of climate change (specifically, global sea level rise; increasing storm intensity), population growth, and urbanization. The analysis found that in the 136 cities considered, approximately 40 million people and U.S. $3 trillion in assets (5% of global GDP) were exposed to risks of flooding and sea level rise in 2005. If the present trends of population growth in these cities continue, it is very likely that the level of exposed population would increase as well, with levels depending upon assumptions about environmental factors, population and economic growth, patterns of urban development, and adaptive capacity. Future exposure to storms, storm surges, and sea level rise is projected to be particularly severe in many Asian countries (Figure 1). The extent to which exposure leads to impacts will depend upon the level of wind and sea protection and the robustness of infrastructure to damages, factors that are typically correlated with the level of development, and which were not included in this analysis. In addition, adaptive capacity and development decisions, such as effectiveness of early warning and response systems and urban planning that reduces risk of exposure, will have a significant impact on what might occur in 2070.

[7] Nicholls, R. J. *et al.* 2008. Ranking Port Cities with High Exposure and Vulnerability to Climate Extremes: Exposure Estimates, *OECD Environment Working Papers*, No. 1, South Hampton: OECD Publishing. http://www.oecd.org/dataoecd/16/58/39720578.pdf

Figure 1: Top 15 countries in terms of exposed population today and in 2070. These projections do not account for flood defenses and other adaptations.

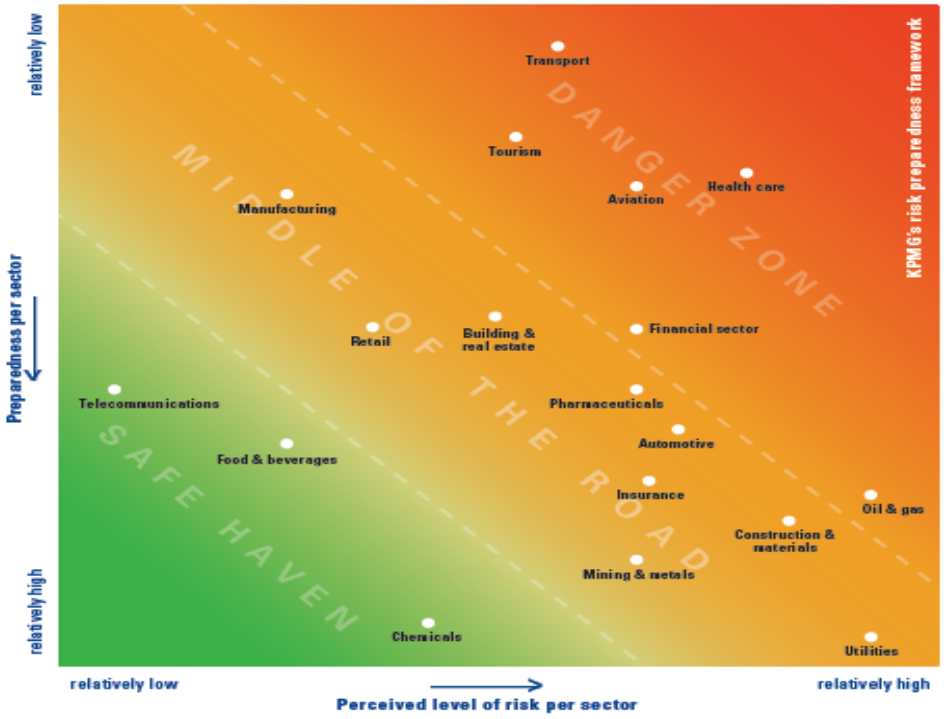


BUSINESS SECTORS

The business and investment community has produced a number of detailed studies that examine how climate change is likely to impact different business sectors. These studies typically do not provide country level analyses, and when they do those analyses are likely to be restricted to a small number of relatively more developed countries. Nonetheless, these analyses can provide some additional insight into livelihood sectors which may be most impacted by climate change. . The KPMG Report "Climate Changes Your Business,"[8] evaluated regulatory risk, risk to reputation, and risk of litigation, and physical risk. Sectors projected to have the highest physical risk include: agriculture, forestry, health, pharmaceuticals, insurance, and tourism. Overall estimated risk was also compared to preparedness per sector - sectors with the worst ratio of Risk to Preparedness were: transportation, health, aviation, tourism, oil and gas, and financial (Figure 2).

[8] KPMG. 2008. *Climate Changes Your Business*. Amsterdam: KPMG. http://www.kpmg.nl/Docs/Corporate_Site/Publicaties/Climate_Changes_Your_Business.pdf

Figure 2: Sector map of perceived risks versus preparedness.



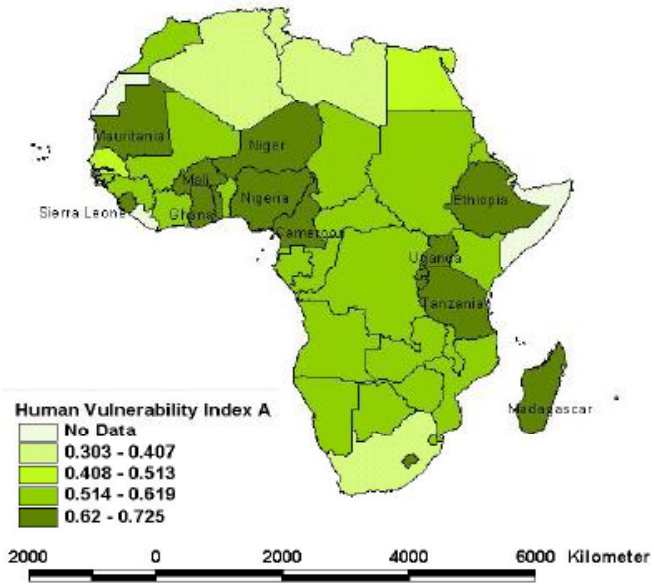
SOCIAL VULNERABILITY

Economic, political, and social factors will impact how well a country is able to cope with physical stresses due to climate change. Difficulties of such studies include choosing appropriate indicators, deciding how to weight or combine indicators into an index, and obtaining similar data from across a wide range of countries. In a working paper from 2004, Katherine Vincent[9] created an index for social vulnerability in Africa and analyzed 49 of 52 sovereign states[10] in Africa. This index incorporates factors related to economics (weighted as 20% of the index), demography (20%), institutional stability and infrastructure (40%), global interconnectivity (10%), and natural resource dependence (10%), and relies primarily on World Bank and UN data from 2002. Results are shown in Figure 3. There was insufficient data from across all countries to consider corruption as a factor in the main model, though this was recognized as very important, and the 22 countries for which this data was available were also analyzed separately. In addition to many of the nations shown in dark green below, Angola and Zambia were also in the most vulnerable category when corruption was considered.

[9] Vincent, Katharine. 2004. Creating an index of social vulnerability to climate change for Africa. *Tyndall Centre Working Paper 56*. Norwich: Tyndall Centre for Climate Change Research. http://www.tyndall.ac.uk/publications/working_papers/wp56.pdf

[10] The analysis of 49 states excludes Liberia, Sao Tome e Principe, and Somalia due to lack of data. Republic of Seychelles is not included in the study.

Figure 3: Social Vulnerability Index data for Africa. Increased value indicates higher vulnerability.



Brooks et al (2005) [11] developed a set of indicators that measure vulnerability and adaptive capacity. While most studies chose indicators subjectively, Brooks et al performed an empirical analysis to determine which of their candidate indicators of vulnerability were most strongly associated with mortality from climate related disasters. This study did not consider how climate and physical risks are likely to change, and rather evaluated current capacity to cope with current disasters and stresses. They considered 46 broadly defined generic indicators in the areas of economic well being and inequality, health and nutritional status, education, physical infrastructure, governance, geographic and demographic factors, agriculture, ecosystems, and technological capacity, and evaluated data from 1970-2000 for 205 countries. Factors found to be most strongly associated with mortality were identified and expert validation was used to generate a number of different vulnerability indexes. Of the 59 countries found to be most at risk, thirty-three were in Sub-Saharan Africa, five were small island states, and many of the rest were conflict or post-conflict countries.

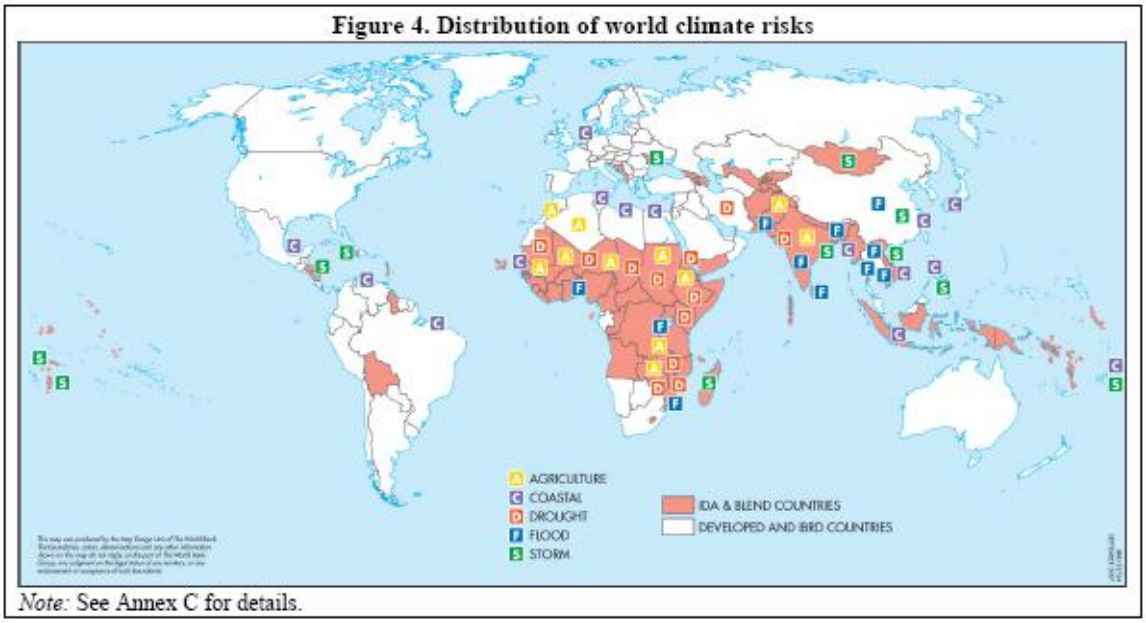
MULTIVARIATE RANKINGS

The World Bank's report on climate vulnerability, developed to inform the Bank's decision making processes, takes into account risk of climate hazards, exposure (the number of people at risk), and vulnerability, which is based on social, economic, environmental and other factors which increase susceptibility to hazards. The hazards considered in the World Bank paper, "IDA

[11] Brooks, N., N. Adger, P. M. Kelly, 2005. The determinants of vulnerability and adaptive capacity at the national level and the implications for adaptation. *Global Environmental Change*, 15, 151-163. http://www.cru.uea.ac.uk/~e118/publications/Brooksetal_GEC_2005.pdf

and Climate Change"[12] were droughts, floods, storms, and impacts on coasts and agriculture. For droughts, floods, and storms, data from 1980-2005 was used to examine per capita risk of being affected, total number of people affected, and number affected per $Million of GDP (nominal). For coastal vulnerability, land area and number of people living on less than 1 or less than 5 meters above sea level was considered. For agriculture, climate risk estimates were based upon Cline 2007,[13] which applied climate model data to a variety of agricultural impact models to project change in crop yield. The World Bank paper notes that developing countries will be most severely impacted by climate change, and that these impacts will occur across a broad range of sectors and vary according to local conditions. Many countries throughout Africa are projected to face more frequent droughts, with resulting impacts on agricultural productivity, while an increased frequency of storms, flooding, and coastal damage is projected for Southeast Asia. Note, however, that these projections assume little or no mitigation or adaptation. Summary results of the International Development Association (IDA)[14] countries most at risk from particular hazards are shown in Figure 4. Impacts on water and human health, both of which may be substantial, were not considered in this study. There currently are no existing models projecting impacts on the water and health sectors across a broad range of developing countries.

Figure 4: Distribution of climate risk by country & sector (World Bank, 2007).



[12]World Bank. 2007. *IDA and Climate Change: Making Climate Action Work For Development*. Board Report. http://siteresources.worldbank.org/IDA/Resources/Seminar%20PDFs/73449-1172525976405/3492866-1175095887430/IDAClimateChange.pdf.

[13]Cline, William. 2007. Chapter five: Country-Level Agricultural Impact Estimates. In *Global Warming and Agriculture.* Washington DC: Center for Global Development.

[14]The International Development Association (IDA) is the part of the World Bank Group that assists the world's 78 poorest countries through provision of interest-free credits and grants.

COUNTRY-IDENTIFIED ADAPTATION NEEDS

Most of the Least Developed Countries have prepared National Adaptation Programs of Action (NAPAs) (Table 1).[15] NAPAs provide a process for Least Developed Countries (LDCs) to identify priority activities that respond to their urgent and immediate needs to cope with climate variability and change. The NAPA process recognizes the need to have developing countries lead the process of furthering their own development. Each country uses its own stakeholder driven process to identify priority actions. All NAPAs consider criteria related to likelihood and magnitude of climate impacts, expected cost effectiveness of activities, and consistency with country goals. Countries individually decided what specific criteria to use and how those criteria would be weighted in determining priorities. Examples of criteria include: human health and lives saved by the intervention, arable land with associated water supply and productive forests saved by the intervention, essential infrastructure established as the result of the intervention, and capacity to contribute to poverty reduction. NAPAs identify urgent needs and therefore typically focus on coping strategies at the grassroots level, rather than scenario-based modeling to assess future vulnerability and long-term policy at the state level. In the NAPA process, prominence is given to community-level input as an important source of information, recognizing that grassroots communities are the main stakeholders. NAPAs typically use existing information; no new research is needed. Most NAPAs conclude with a list of 10-20 priority adaptation needs, identified by host countries, that is intended to provide development agencies with a menu of priorities, into which to put assistance for adaptation efforts. However, there is great variability among NAPAs in terms of their quality, the inclusiveness of the NAPA development process, and their utility as a development planning guide.

Table 2 & Figure 5 summarize the adaptation priorities of 12 geographically diverse countries which have completed NAPAs. These 12 NAPAs are a representative selection chosen for their geographic diversity and because they identify priority actions specific enough to be categorized for this analysis. All 12 countries identified priority actions in the areas of coping with hazards, natural resource/forest related adaptation, reducing water scarcity, and improving food security. Looking across all countries (Figure 5), these four areas were roughly similar in their importance to each country. When only the top four priorities of each country were considered, water security (27% of top 4 responses) was the issue of most concern, followed by food security and climate related natural hazards (~21% each). Other areas were prioritized strongly only by a subset of countries. In some cases, such as for coastal impacts, this is because the problem is not relevant to all countries. For other areas, such as coping with climate impacts on human health, it may be that stakeholders in some countries are not yet aware of or thinking about possible risks. In addition to conveying country perceptions of broadly defined areas of concern, the comparative NAPA data is also useful for identifying more specific project areas for which there is particularly strong demand. For instance, all countries surveyed included at least one project related to water supply (either water collection or watershed management) on their list of priority activities (Table 2).

[15] National Adaptation Programmes of Action (NAPAs) website, http://unfccc.int/adaptation/napas/items/2679.php.

Table 1: LDC countries, NAPA completion, and USAID Missions.

	LDC	NAPA	USAID Country
Afghanistan	X		X
Angola	X		X
Bangladesh	X	X	X
Benin	X	X	X
Bhutan	X	X	
Burkina Faso	X	X	X
Burundi	X	X	X
Cambodia	X	X	X
Cape Verde	X	X	X
Central African Republic	X		X
Chad	X		X
Comoros	X	X	X
Congo (Democratic Republic of the)	X		X
Djibouti	X	X	X
Equatorial Guinea	X		X
Eritrea	X	X	X
Ethiopia	X	X	X
Gambia	X	X	X
Guinea	X	X	X
Guinea-Bissau	X	X	X
Haiti	X	X	X
Kiribati	X	X	
Lao People's Democratic Rep.	X	X	X
Lesotho	X	X	X
Liberia	X	X	X

	LDC	NAPA	USAID Country
Madagascar	X	X	X
Malawi	X	X	X
Maldives	X	X	
Mali	X	X	X
Mauritania	X	X	X
Mozambique	X		X
Burma	X		X
Nepal	X		X
Niger	X	X	X
Rwanda	X	X	X
Samoa	X	X	
Sao Tome and Principe	X	X	X
Senegal	X	X	X
Sierra Leone	X	X	X
Solomon Islands	X		
Somalia	X		X
Sudan	X	X	X
Timor-Leste	X		X
Togo	X		X
Tuvalu	X	X	
Uganda	X	X	X
Tanzania	X	X	X
Vanuatu	X	X	
Yemen	X		X
Zambia	X	X	X
Zimbabwe			X

Table 2: Priority actions identified in twelve NAPAs.

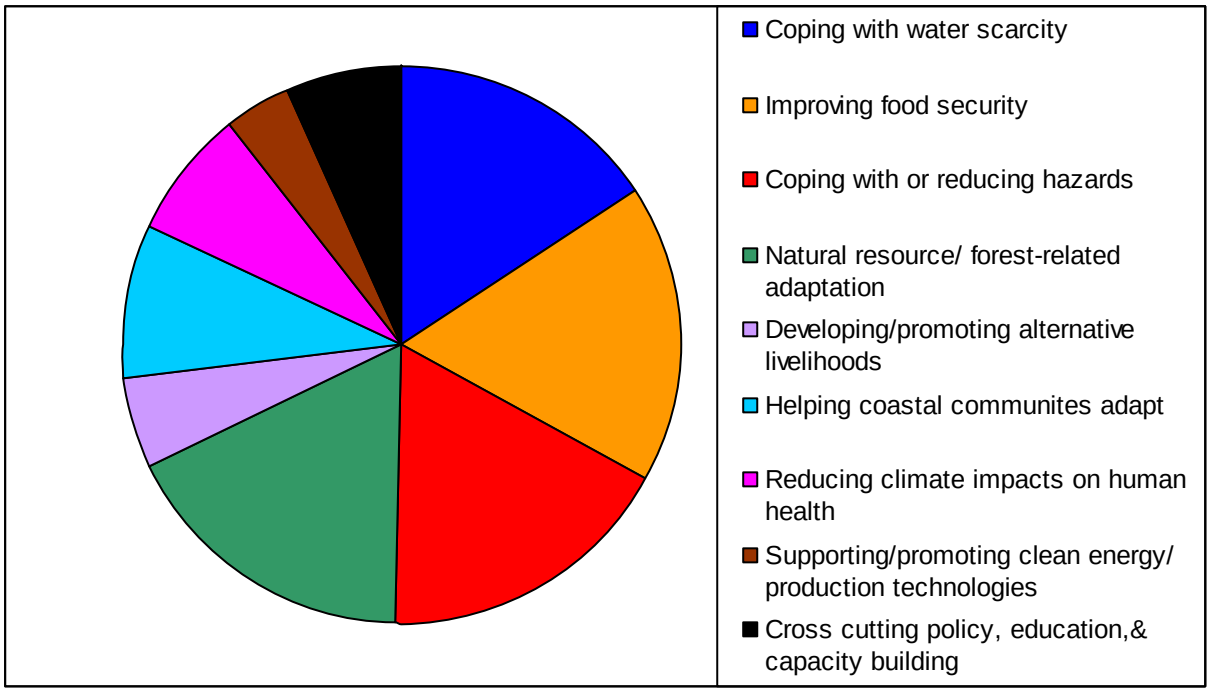
	Bangladesh	Bhutan	Burundi	Cambodia	Cape Verde	Ethiopia	Haiti	Niger	S. Tome & Principe	Sierra Leone	Tanzania	Zambia
Submission Date	11-05	5-06	2-07	3-07	12-07	6-08	12-06	7-06	11-07	6-08	9-07	10-07
# of priority actions[16]	15	9	14	20	16	11	8	14	22	24	13	10
1. Coping with water scarcity												
a. Water collection/watershed management	X	X	X	X	X	X	X	X	X	X	X	X
b. Irrigation/improved water use				X	X	X		X		X	X	X
c. Capacity building/ planning	X					X			X	X		
2. Food security												
a. Weather forecasting	X	X	X			X		X	X	X		X
b. Improving food production efficiency	X		X	X	X			X	X			
c. Adaptation planning				X	X	X	X	X		X	X	X
3. Coping with or reducing hazards												
a. Early Warning Systems/communication/ capacity building	X	X	X	X	X	X			X	X		X
b. Improving infrastructure/ community relocation	X	X	X	X	X		X		X		X	

[16] Priority actions could be classified in multiple activity categories (e.g. a coastal agriculture project could be classified as 2b and 6a).

	Bangladesh	Bhutan	Burundi	Cambodia	Cape Verde	Ethiopia	Haiti	Niger	S. Tome & Principe	Sierra Leone	Tanzania	Zambia
c. Adaptation/improved natural resource management	X	X		X								
4. Natural resource or forest related adaptation												
a. Reforestation, aforestation, preventing deforestation	X		X		X	X			X	X	X	X
b. Soil conservation/ management			X	X			X	X				
c. Adaptation/natural resource conservation/ protected area management	X	X		X	X	X	X		X	X	X	X
5. Livelihoods												
a. Developing/ promoting improving livelihoods					X			X	X		X	X
6. Coastal community adaptation												
a. Livelihood related: fisheries management, etc	X				X				X	X	X	
b. Water supply	X			X								
c. Protection/ rehabilitation of natural systems/other planning				X			X			X	X	
7. Reducing climate impacts on human health												
a. Clean water				X		X				X		X
b. Malaria prevention				X		X		X	X			

	Bangladesh	Bhutan	Burundi	Cambodia	Cape Verde	Ethiopia	Haiti	Niger	S. Tome & Principe	Sierra Leone	Tanzania	Zambia
c. Education/awareness/ infrastructure/ planning				X					X	X		X
8. Supporting/promoting clean energy/production technologies												
a. Reducing use of fuel wood			X						X			
b. Clean energy			X		X				X	X	X	
c. Sustainable production/ general planning					X				X			
9. Cross cutting policy, education,& capacity building												
a. Education of community/ capacity building	X						X	X		X		
b. Outreach/ communication to policy makers			X								X	
c. Policy development/ establishment of research centers	X					X				X	X	

Figure 5: Average breakdown of priority activities within a country, across the twelve countries considered.



The United States has long been a leader in developing and promoting solutions for many of the priority areas identified above, such as coping with hazards, reducing water scarcity, and improving food security. Vulnerability to climate change results from a combination of exposure to climate and weather events, sensitivity to those events, and the adaptive capacity of the overall economy. Many of the goals of economic development are complementary to efforts to address the humanitarian consequences of climate change. Adapting is a matter of reducing exposure and sensitivity while building capacity. There is a wide range of adaptation tools and approaches to assist developing countries to enhance their resilience to climate change.

SECTION II: GLOBAL & REGIONAL OVERVIEW OF ADAPTATION NEEDS OF DEVELOPING COUNTRIES

Adaptation involves multiple components, from information on current and projected climatic conditions, Earth observations data and climate modeling, assessment of impacts and vulnerability, and development and implementation of adaptation actions. While climate change impacts and vulnerabilities vary across countries and regions, there are some adaptation needs that are common across developing countries. The material in this section is compiled from information from U.S. Government experts, and the IPCC, UNFCCC, and other international bodies. The UNFCCC reports include information provided by Parties to the UNFCCC through

regional workshops[17] held in Africa,[18] Asia,[19] and Latin America,[20] and expert meetings held in small island developing states,[21] as mandated by the Buenos Aires programme of work on adaptation and response measures (decision 1/CP.10 of the Conference of the Parties to the UNFCCC),[22] as well as information in national communications[23] and national adaptation programmes of action (NAPAs)[24] submitted to the UNFCCC, expert meetings on adaptation tools and methodologies (as mandated by the UNFCCC Nairobi programme of work on impacts, vulnerability and adaptation),[25] and reports from the IPCC,[26] multi-lateral development banks and other sources.[27]

EARTH OBSERVATIONS AND MODELING

Responding to a changing climate requires understanding of a baseline climate from which to measure change. There is a need for improved climate data and observations at multiple levels, better forecasting and climate services, recovery of historical data, and improved end-use of climate information, including through capacity building, training, and education and inclusion of socio-economic data and information. Improving access to such information, especially in developing countries, is also important. Developing countries also call for downscaling of global climate change projections (i.e., deriving local scale information from coarse resolution models) or development of higher resolution regional climate models, and training on model development and use. Specific regional needs highlighted in workshops on adaptation held under the UNFCCC included the following:

- African countries identified a lack of observation stations and maintenance, and a need to develop integrated programs of observations, climate services and climate risk management and policy.
- Asian countries identified a need to improve observations and data availability, especially in island, mountainous and coastal ecosystems.

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[17] UNFCCC. *Synthesis of outcomes of the regional workshops and expert meeting on adaptation under decision 1/CP.10*, Note by the secretariat (2007). http://unfccc.int/resource/docs/2007/sbi/eng/14.pdf.
[18] UNFCCC. *Report on the African regional workshop on adaptation*. Note by the secretariat (2007). http://unfccc.int/resource/docs/2007/sbi/eng/02.pdf.
[19] UNFCCC. *Report on the Asian regional workshop on adaptation*. Note by the secretariat (2007). http://unfccc.int/resource/docs/2007/sbi/eng/13.pdf.
[20] UNFCCC. *Report on the Latin American regional workshop on adaptation*. Note by the secretariat (2006). http://unfccc.int/resource/docs/2006/sbi/eng/19.pdf.
[21] UNFCCC. *Report on the expert meeting on adaptation for small island developing States*. Note by the secretariat (2007). http://unfccc.int/resource/docs/2007/sbi/eng/11.pdf.
[22] Decision 1/CP.10 website, http://unfccc.int/adaptation/implementing_adaptation/items/2535.php.
[23] Submitted National Communications from Non-Annex I Parties website, http://unfccc.int/national_reports/non-annex_i_natcom/submitted_natcom/items/653.php.
[24] National Adaptation Programmes of Action website, http://unfccc.int/adaptation/napas/items/2679.php.
[25] Nairobi Work Programme website, http://unfccc.int/adaptation/sbsta_agenda_item_adaptation/items/3633.php.
[26] Working Group II Contribution to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. *Climate Change: Impacts, Adaptation, and Vulnerability*, 2007.
[27] UNFCCC Report. *Climate Change: Impacts, Vulnerabilities and Adaptation in Developing Countries* (2008). http://unfccc.int/files/essential_background/background_publications_htmlpdf/application/txt/pub_07_impacts.pdf.

- Latin American countries identified the need to address gaps in observational coverage, especially in higher elevations, and to improve capacity building to undertake and maintain systematic, long-term, climate observational programs.
- Small Island Developing States (SIDS) identified needs for improved satellite windows for data transmission, and improved observing stations, climate prediction, telecommunication, and data rescue.

VULNERABILITY AND ADAPTATION ASSESSMENTS

The understanding and information provided by Earth observations and modeling feed into assessments of vulnerability and adaptation options. These assessments are vital for evaluating and implementing responses to climate change impacts. More specifically, key inputs into vulnerability and adaptation assessments, and for implementing effective adaptation actions, are information on past, current, and projected weather and climate from historical records and local weather stations, as well as Earth observations data, information, and products. Needs in this area include: enhanced training in vulnerability and adaptation assessments; improved Earth observations and data collection, and technical expertise at regional and national levels, including through training in use of models and tools; and preservation of indigenous knowledge on climate coping strategies. More specific regional needs identified by developing countries in UNFCCC workshops include:

- In Africa, many factors contribute and compound the impacts of current climate variability and will have negative effects on the continent's ability to cope with climate change (e.g., poverty, illiteracy, lack of skills, weak institutions, limited infrastructure, low levels of technology, health care, and primary education). Addressing these issues benefit climate change adaptation and a range of other needs.
- Asia faces formidable environmental and socio-economic challenges in its effort to protect valuable natural resources and is highly subject to natural hazards. Many environmental and development problems in Asia will be exacerbated by climate change, including projected increases in frequency or intensity of extreme weather events.
- Latin American sectors particularly vulnerable to climate change include: water, agriculture and health, the Andean glaciers, the Amazon region, and regions vulnerable to extreme climatic events.
- Small Island Developing States comprise 51 States and Territories spread over the Pacific, Indian and Atlantic Oceans, and Caribbean Sea, and are highly vulnerable to the potential effects of climate change including extreme weather events and storm surge, water availability, agricultural productivity, and tourism sectors.

ADAPTATION TO CLIMATE CHANGE

The most effective adaptation approaches for developing countries are those that address a range of environmental stresses and factors, link with coordinated efforts aimed at poverty alleviation, enhance food security and water availability, combat land degradation and reduce loss of biodiversity and ecosystem services. A critical difficulty is the movement from adaptation assessment and planning to implementation, due to a lack of resources and institutional capacities as well as a lack of integration of climate change concerns in national policies. A key

need is the integration of climate change considerations into all aspects of policymaking, including engagement of ministries of planning and finance in adaptation efforts. Other needs expressed by developing countries include: technical support for project preparation; research and training to enable adaptation; and improving public awareness of climate change risks and the need for adaptation through education and communication strategies.

Another area of interest for developing countries is risk reduction mechanisms, including innovative approaches to risk sharing and transfer, in support of climate change adaptation in developing countries.

SECTION III: EXAMPLES OF CURRENT AND PLANNED U.S. GOVERNMENT INTERNATIONAL ADAPTATION ACTIVITIES, BY FOCUS OF ACTIVITY AND U.S. GOVERNMENT AGENCIES INVOLVED

As the above discussion illustrates, adaptation needs span a spectrum of sectors and activities and vary widely among and within developing countries. The United States engages in a wide range of activities that enhance developing countries' resilience to climate risks. Examples of these activities are provided below, including the U.S. Government agencies involved in the activity and, where available, funding information. Some activities directly support adaptation to climate change in developing countries, including information and decision support tools. Other activities provide information, communication and decision support tools for adaptation, but are also designed to support other development needs. Many U.S. Government activities that constitute good adaptation practice and contribute to enhanced climate resilience in developing countries were not implemented expressly for the purpose of addressing climate change. These activities address a range of sectors (health, agriculture, water resource management, disaster mitigation, etc.) and are divided below into two sections – non-forest and forest-related activities.

Because of these considerations and the difficulty of separating out specific aspects of relevant U.S. Government activities that address climate change and related aspects of developing country resilience, providing exact funding amounts for U.S. GOVERNMENT adaptation activities is complex. While it is possible to identify funding for adaptation-specific activities, for the other activities described below, it was not possible to separate out the adaptation-component of the funding. Any funding amounts listed for those activities reflect funding for the entire project, only part of which may support climate change adaptation needs.

U.S. GOVERNMENT ACTIVITIES DIRECTLY SUPPORTING ADAPTATION TO CLIMATE CHANGE IN DEVELOPING COUNTRIES

USAID is one of the main U.S. Government agencies funding direct climate change adaptation activities in partner developing countries, although a number of other U.S. Government agencies also address adaptation needs. USAID has broadened its climate change portfolio to include activities aimed at strengthening the ability of developing and transition countries to respond to the challenges posed by climate-related impacts and risks. USAID seeks to strengthen the capabilities of program managers, host-country institutions, project implementers, and sectoral

experts to assess relative vulnerabilities to climate change and to evaluate and implement adaptation options for agriculture, water, forest and coastal zone management projects within USAID's development assistance portfolio. Adapting to climate change requires a hierarchy of linked efforts. USAID is linking information from observation systems to stakeholders lacking such information, improving their understanding of current climate, climate variability and future climate change. USAID is working to make Earth observation information readily applicable to development decisions, including creating innovative applications and appropriate tools to then communicate that information to stakeholders and decision makers. Through interaction with local partners and new tools, USAID can better understand how environmental changes may impact sectors critical for development. Once those impacts are understood, stakeholders need to assess and agree on preferred adaptation options. Then, on-the-ground actions are implemented to build the resilience of projects designed to promote economic development. Adaptation actions will vary depending upon the sector, and can include activities ranging from improving the use of weather forecasts, to changing planting dates or seed varieties, to modifying water harvesting approaches or key infrastructure.

USAID has developed several tools and programs and is leveraging the efforts of many other U.S. Government agencies to facilitate international adaptation. USAID funding for these direct adaptation activities (four USAID projects detailed immediately below – Adaptation Guidance Manual, Coastal Zone Adaptation Manual, Climate Mapper, and FEWSNET) was $14M in FY07, and approximately $13M in FY08, with some additional funding from NASA. Of the USAID funding, most of that supports the Famine & Malaria Early Warning Systems (funding for FY06-08, approximately $13.2M/yr). In addition, NOAA supports adaptation activities through the International Research Institute for Climate and Society (IRI) and co-designed and provides technical support to the GEF/CARICOM Mainstreaming Adaptation to Climate Change (MACC) Project.

USAID Climate Change Adaptation Guidance Manual

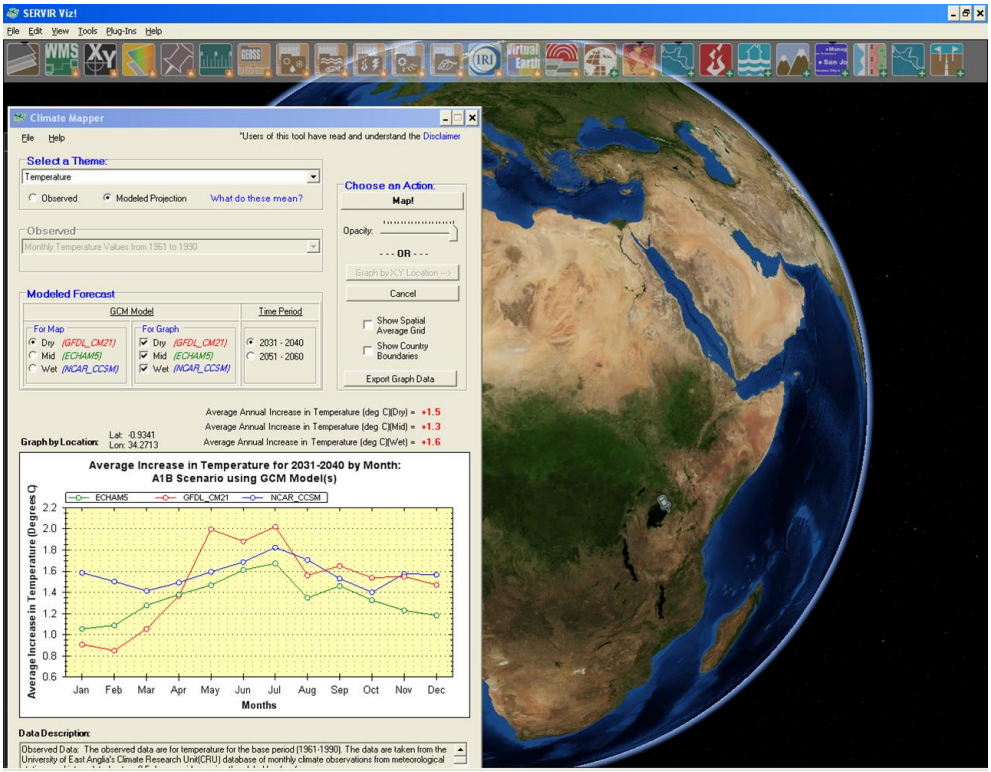
To facilitate the process of adapting development projects, USAID has developed a Climate Change Adaptation Guidance Manual to provide USAID staff, other donor organizations, and developing country planners with the tools to understand how climate change may affect their projects. The manual draws on lessons learned in four pilot projects that assessed impacts and vulnerability to climate variability and change, and developed adaptation implementation plans for: flood planning and coastal resources in Honduras, water resource planning and natural resource management in South Africa, rainfed agriculture and food security in Mali, and sustainable livelihoods and water management in shared river basins in Thailand. These pilot projects and the guidance manual are helping to improve the resilience and sustainability of USAID's development efforts by integrating climate change adaptation into project planning. The Adaptation Guidance Manual provides a step wise process for evaluation of climate change impacts applicable in the field, including a primer on climate-related risks, a framework for determining if a specific project is vulnerable, and guidance on interventions to increase project resilience. Training courses for USAID staff and partners are being developed, and have been requested by other donors. The Adaptation Guidance Manual has been enthusiastically received by the international development community, and has been disseminated by the U.S. Climate Change Science Program (CCSP), Columbia's IRI, and a variety of climate change and

development list serves. It is referenced in the OECD Guidelines on Integrating Climate Change Adaptation into Development Cooperation, and outside groups, including in Nigeria and Pakistan, are using it in their own training activities.

USAID Guidebook on Adapting to Climate Change in the Coastal Zone
Recognizing a need to provide sector-specific guidance to USAID staff and host country partners, USAID is finalizing a Guidebook that draws lessons learned in coastal zone management and in the tsunami recovery effort and places them in the context of building resilience to climate change. USAID and its partners led an initial seminar on climate change and coastal management at the 4th Global Conference on Oceans, Coasts, and Islands in April, 2008. The Guidebook will be released in Fall 2008. A pilot project is planned in the Pacific.

Climate Mapper for SERVIR Viz (NASA, USAID)
USAID, NASA, the Institute for the Application of Geospatial Technology (IAGT), the University of Colorado, and the Water Center for the Humid Tropics of Latin America and the Caribbean (CATHALAC) released in May 2008 the Climate Mapper tool. Climate Mapper is part of a larger program, called SERVIR – the Regional Visualization and Monitoring System, which is detailed in the next section. The Climate Mapper makes historical weather data and the results of climate change models accessible to a broad user community via the Internet. With the Climate Mapper, users can assess climate change projections for the 2030s and 2050s against 3D visualizations of landscape (Figure 6). By making climate change model results easily accessible and understandable, vulnerability assessments will be enhanced and development planners can consider improved adaptation strategies for projects. The Climate Mapper data are currently available for Africa at ½ degree latitude by ½ degree longitude areas, or roughly 50km x 50km areas near the equator; it will soon expand to cover the entire globe. The Climate Mapper also presents historical temperature and precipitation for the base period (1961-1990), which were taken from the University of East Anglia's Climate Research Unit (CRU) database of monthly climate observations from meteorological stations. As additional climate model scenarios are produced, they can be easily imported into the Climate Mapper and made available to the general public. Funding: FY07 - USAID $90K.

Figure 6: Screen-shot of Climate Mapper for SERVIR Viz.



Famine Early Warning Systems Network – FEWSNET & Malaria Early Warning System – MEWS (USAID, NASA, DOI/USGS, USDA, NOAA)

USAID, NASA, the Department of the Interior U.S. Geological Survey (DOI/USGS), the U.S. Department of Agriculture (USDA), and NOAA are collaborating with local, regional, and international partners to provide early-warning and vulnerability information on emerging or evolving food security and malaria issues, including information relating to variability and changes in regional climate conditions. A primary goal of the Famine Early Warning Systems Network (FEWS NET) program is to produce high-quality information for disaster and crisis prediction. FEWS NET provides demand-driven information products that pinpoint and assess emerging or evolving food security problems. Program professionals in the United States and Africa monitor data and information—including remotely sensed as well as ground-based data on meteorological, crop, and rangeland conditions—for early indications of potential threats to food security. The program also works to strengthen African early-warning and response networks by increasing local technical capacity, building and strengthening networks, developing policy-relevant information, and forming consensus about food security problems and solutions. Additional accomplishments include the development of capacity to prepare seasonal food security outlook scenarios from consensus forecasts of Regional Climate Outlook Forums, as well as analysis of food security implications of IPCC climate change scenarios for East and Southern Africa. The FEWS-NET Web site serves as a gateway of information about threats and updates on response measures.

The Malaria Early Warning System (MEWS) is part of the FEWSNET project. Malaria is a high priority infectious disease target for domestic and international health agencies. Malaria kills an estimated 3 million people yearly worldwide, many of whom are children. In addition, malaria costs African nations approximately $12 billion per year in economic productivity. Both FEWSNET and MEWS enhance USAID humanitarian programs by integrating NASA Earth observation and modeling results to improve famine and malaria early warning in sub-Saharan Africa. The project utilizes NASA Earth Science satellite observations of vegetation density, precipitation, and relative humidity. Recent accomplishments of MEWS include the analysis of rainfall patterns in sub-Saharan Africa using meteorological station data, rainfall estimated from satellite images, and malaria incidence. The analysis indicated strong links between clinical malaria incidence and rainfall patterns across Eritrea, with malaria incidence peaks lagging behind rainfall peaks by 2 to 3 months. Funding: USAID ($13.2M/yr, as noted above); NASA FY07 $467K.

International Research Institute for Climate and Society (NOAA)
A significant component of NOAA's programs addressing climate change adaptation in developing countries is undertaken through its sponsorship of the International Research Institute for Climate and Society (IRI), hosted at Columbia University. The IRI's work focuses on developing the capability to better manage climate related risks and opportunities. The emphasis of IRI outreach and stakeholder engagement is in developing country settings within Africa, Asia, and Latin America/Caribbean. IRI undertakes research in climate forecasting, environmental monitoring, water resources, public health, agriculture, food security, economics, institutions and policy, and other areas, collaborating directly with relevant stakeholder groups (local, national and international) in support of place and problem-based projects. Such engagements have pioneered, for example, malaria early warning/response systems in southern Africa; weather index-based insurance (bundled with loans and inputs) for small holder farmer groups in Africa and Latin America; new strategies for managing multipurpose reservoirs accounting for variable climate risks in Latin America and southeast Asia. All such approaches emphasize a holistic approach to managing the full range of climate risks from the current season out to 25 years or more in the future, and capitalize on win-win scenarios for better managing current risks (& opportunities) as well as building resilience for longer term climate changes.

IRI undertakes significant training and capacity building focused on different aspects of climate risk management, primarily targeting developing country policy and decision makers. IRI also brings its experience into formal education programs, particularly the Climate and Society Master's Program at Columbia, which has since its inception supported fellowships for qualified developing country students.

In support of larger-scale impact, IRI has developed active collaborations with major UN organizations (e.g., WMO, WHO, World Food Program), development banks (e.g., World Bank, African Development Bank); bilateral development agencies, nongovernmental organizations (Oxfam, CARE, International Federation of Red Cross Red Crescent Societies), and private foundations. All of these involve in some manner connecting aspects of managing climate risks into disaster prevention/response and development policies/practices across scales from local to international activities. Funding: 2001 – 2008, ~$9M/year; total, $72M.

Mainstreaming Adaptation to Climate Change Project (NOAA)
In the Caribbean region, the U.S. National Oceanic and Atmospheric Administration (NOAA) collaborates with the Secretariat of the Caribbean Community (CARICOM) on the Mainstreaming Adaptation to Climate Change Project. The U.S. works with partner countries to incorporate climate adaptation into national development planning and private investment decisions in key areas such as watershed planning, coastal zone management, and outreach. Through GEF and CARICOM funding, NOAA is able to share useful climate tools with, and contribute time of expert scientists to, decision-makers in the Caribbean. Funding: NOAA provided 2 months/year of Senior Scientist time; World Bank/Global Environment Facility funding was $5M over 2003-2008.

INFORMATION, COMMUNICATION, AND DECISION SUPPORT TOOLS FOR ADAPTATION

The activities in this section provide information and tools critical for evaluating climate change impacts and implementing effective adaptation actions. These activities contribute directly to adaptation, but the programs and projects described below are not aimed solely at addressing adaptation needs. Funding information is provided, where available, and is for the project as a whole. It was not possible to separate out the amounts directed specifically to adaptation.

Group on Earth Observations (Multiple U.S. Government Agencies)
Earth observations provide critical input for understanding the Earth system—its weather, climate, oceans, land, geology, natural resources, ecosystems, and natural and human-induced hazards. This input is crucial to achieving sustainable development. Recognizing the importance of international cooperation in this area, the United States hosted the First Earth Observation Summit in July 2003. Attended by 33 nations, the European Commission, and five U.S. Cabinet Secretaries, the Summit generated international support to form an intergovernmental Group on Earth Observations (GEO) and create a comprehensive Global Earth Observation System of Systems (GEOSS). This ambitious undertaking involves coordinating disparate Earth observation systems across the world in order to improve our ability to address critical environmental, economic, and societal concerns, with capacity building in developing countries a key component. GEOSS enables better service to society through more coordinated observations, better data management, increased data sharing and timely applications. The Group on Earth Observations (GEO) has grown to 74 member governments and the European Commission and 51 participating organizations. Examples of cooperative international activities under GEO that support adaptation to climate change include:

- SERVIR: An Earth Observation, Monitoring, and Visualization System
- GEONETCast: A Global Environmental Information Delivery System
- Standards-based, All-Hazards, All-Media Public Warning
- The North American Drought Monitor
- USGEO Program to Improve Air Quality Forecasts and Decision Support for Respiratory Health

Support for the GEO Secretariat for FY2007 was $588,500, plus 1 full-time seconded staff. The monetary investment in supporting a modest GEO Secretariat pales in contrast with the significant investment the United States makes in research and operational Earth observations (such as those listed in the above bullets and described in further detail below). In turn, GEO allows the United States to leverage its Earth observation investments by gaining access to world-wide systems and data. The unique aspect of the GEOSS effort is integrating the existing assets and investments in global Earth observations to provide accessible and usable information to all.

SERVIR and SERVIR extension (NASA, USAID)
NASA and USAID are developing tools that apply space-based assets to development assistance. SERVIR is a U.S. led high-tech regional satellite visualization and monitoring system for Central America that supports decision-making in the areas of climate change adaptation, environmental management, and early warning for disasters, among others, providing historical data, information on current environmental and weather conditions, forecasts and future scenarios. In operation since 2005, SERVIR consists of a regional hub in Central America and a suite of web-based tools, providing access to information products in a variety of formats and tailored to the range of decision makers, from scientists to the general public. Products available via SERVIR include high resolution climate change scenario database, climate change maps indicating impacts on Central America's biodiversity, a fire/smoke mapping and warning system, red tide alerts, and weather alerts. The SERVIR regional hub has enabled the training and capacity building of hundreds of Central American scientists, technicians, and government employees. Based on the successful SERVIR program, the U.S. Government is developing regional hubs in Africa and beyond to apply remotely sensed information to help track and combat wildfire, improve land use and agricultural practices, and help local officials respond faster to natural disasters. The first expansion of SERVIR is in East Africa where a hub is being established at the Regional Centre for Mapping of Resources for Development in Nairobi, Kenya. This SERVIR expansion to East Africa will link available data streams to new applications, develop tools, and build local human and institutional capacity to use this information. Funding: USAID $1.254M for FY07, $924.5K for FY08; NASA -Mesoamerica $1,021K in FY07 and $897K in FY08, Africa $439K in FY08.

GEONETCast Americas (NOAA)
The United States is building capacity to use Earth observations in developing countries through support for systems that deliver environmental information, such as GEONETCast. NOAA is providing a regional GEONETCast node broadcasting environmental data to users in North, Central and South America and the Caribbean. GEONETCast is a near real-time, global, environmental information delivery system by which all types of observations and application products from GEOSS are transmitted to users through communication satellites, using a multicast, access-controlled, broadband capability. An initial technical capability was demonstrated in 2006, and near-global GEONETCast coverage was realized in 2007.

Expansion of GEONETCast into the Americas is a major step forward in making GEOSS a reality by providing an alternative means of distributing data and information about the Earth's

changing environment to users, particularly those in developing countries, at reasonable cost to both providers and users. Furthermore, it could expand data access by broadcasting the information of complementary delivery systems and thereby extending the reach of those systems. Funding: $500K in FY08.

State of the Climate Report (NOAA)
Each year NOAA and the World Meteorological Organization (WMO), along with more than 225 scientists from over 40 countries, transform observations collected from the global array of observing systems into information that enables nations to track the state of the Earth's climate variations and changes. This information is accessible in the Annual "State of the Climate" Report. The Report combines historical data with current observations of GCOS Essential Climate Variables to place today's climate in historical context and provides information on trends and changes that affect societies and the environment.

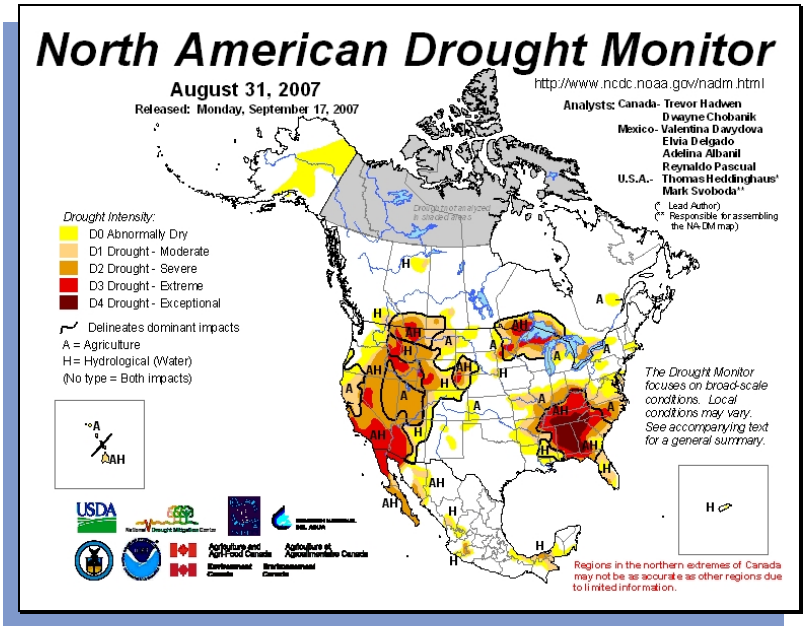
While many observing and analysis systems are unique to countries or regions of the world, through this effort the information from each system is openly shared. This sharing of information has proven essential to transitioning data to operational use and filling critical gaps in current knowledge about the state of the global climate system. Because the report focuses on the Earth system as a whole, spatial and temporal gaps in data coverage are more easily identified as well as deficiencies in operational systems that provide access to those data. With a focus on integrating observing system data to useful and accessible information, the State of the Climate Report serves as a hallmark achievement of GEOSS efforts to use integrated global Earth observations to monitor and enhance the understanding of climate variability and change. It also serves as an avenue for providing information that decision makers can use to better understand changing environmental factors that affect human health and well being, and positions decision makers to anticipate and manage future risks associated with climate variation and change. Funding: $600K annually.

Water Security for Society and the Biosphere (NOAA, USDA)
Recognizing the need to improve capacities to respond to the growing threat of drought, the U.S., Mexico, and Canada, through the North American Drought Monitor (NADM) program, have demonstrated how the open exchange of data and information across borders—and the transfer of scientific expertise and data management principles between countries—can enhance the national capacity to deliver drought information on a regular basis. They provide information on drought impacts and local conditions, which are not available from traditional observing systems (Figure 7). Close coordination among government leaders and scientists in each country—and efforts to identify critical gaps in existing programs and in establishing methods for addressing deficiencies—have been key to the success of the North American effort. Mexican scientists and government representatives have received training through this effort to contribute to the technical aspects of NADM and are an integral part of the technical team that creates it.

NADM trains interested foreign country nationals in drought mapping and prediction. NADM trained scientists at Beijing Climate Center, resulting in the creation of weekly drought maps for China based on the NADM template. Advances in drought monitoring, planning, and response

are also being demonstrated by the U.S. through the establishment of a National Integrated Drought Information System (NIDIS). These two programs (NADM and NIDIS) are providing a pathway for the development of a global drought early warning system that can synergistically develop products, data, and information that span drought in all its dimensions. Funding for NADM: NOAA ~$200-$400K /yr since 2002; USDA ~$15-20K/yr since 2002.

Figure 7: North American Drought Monitor.



RANET Program (NOAA, USAID)
USAID and NOAA are working with a range of humanitarian and meteorological organizations to provide useful weather and climate information to rural communities. The RANET program (Radio and Internet for the Communication of Hydro-Meteorological and Climate-Related Information for Development) uses reserve capacity on the WorldSpace digital satellite system to transmit forecasts, bulletins, imagery, seasonal assessments, and data to remote areas. The goal of the program is to provide environmental information that assists governments and populations in coping with hydro-meteorological hazards and environmental fluctuations. The program provides vulnerable communities with access to hydro-meteorological information, which in turn strengthens day-to-day decision-making to reduce vulnerability to potential hazards. RANET also supports the formation of community groups and associations that are instrumental in disseminating information and extending the network to new communities. Since its inception in 2000, RANET has expanded to 16 African countries, with ongoing pilot activities in Asia and the Pacific. The program operates in Africa, South and Southeast Asia, and the Western Pacific. Funding: FY07 and FYO8, $619,925 (two-year total). Average annual direct funding ranges from $400 -$700K per year. The program also receives significant in-kinds in the form of satellite broadcast capacity and personnel time of foreign weather services. USAID/OFDA is the primary funder of RANET, with contributions from other donors made on a project-by-project basis. RANET began in 1998.

Regional Integrated Science and Assessment Program (NOAA)
Building on existing regional efforts in climate science and services, the U.S. funded Pacific Islands Regional Integrated Science and Assessment (Pacific RISA) program works with Pacific Island communities to develop integrated climate risk management in key sectors such as water resource management, coastal resources, agriculture, disaster management, and public health. While this program focuses on U.S. Pacific Islands, the Pacific RISA shares climate products and conducts workshops with Samoa and Fiji. Funding: 2002-2008, total $1M. A new call for proposals is out for 2009-2014.

Inter-Governmental Authority on Development Climate Prediction and Application Center (USAID)
Together with the WMO, the Inter-Governmental Authority on Development Climate Prediction and Application Center (ICPAC) has implemented seasonal climate prediction systems in several regions in ten Horn of Africa countries. In targeted countries, the project has improved climate monitoring, prediction, and applications, for early warning for weather-related hazards. Funding: FY07 $200,000 and FY08 $200,000.

Climate Forecast Applications (USAID)
As a follow up to the Extreme Climate Events program implemented by the Asian Disaster Preparedness Center (ADPC), in 1998, this project strengthens the national capabilities of Indonesia, the Philippines, and Timor-Leste to manage and reduce the impacts of climate fluctuations through targeted demonstration projects and community participation. The project makes climate forecasting information available to farmers and local communities, and helps them utilize the data for planting and other decision making purposes. Funding: FY07 $250,000; FY08 $79,413.

Hydrometeorological Technical Assistance (USAID, NOAA)
Through an interagency agreement funded by USAID/OFDA, NOAA provides access to weather, climate, and hydrometeorology experts and information to build the capacity of national, international, and regional response bodies in reducing vulnerability to extreme hydrometeorological events. Funding: FY07 $830,075; FY08 $1,000,000.

Climate and Disease Transmission (CDC)
Through programs that support training in field epidemiology, sustainable management, and decision making, the U.S. Department of Health and Human Services' Centers for Disease Control and Prevention (CDC) and the National Institutes of Health (NIH) assist countries around the world to build strong, effective, sustainable health programs and increase their capacity to improve public health systems on a local, regional, and national level. CDC's Division of Vector-Borne Infectious Diseases is currently collaborating on studies to outline adaptation measures for vector-borne infectious diseases that may be affected by climate change. Its Guatemala field station is studying the impact that adverse climatological events, such as El Niño and Hurricane Gilbert, have had on the transmission dynamics of malaria and other

diseases. These catastrophic events result in tremendous changes that can simultaneously create new vector habitat, reduce the levels of sanitation, and overwhelm the ability of public health systems to respond.

ACTIVITIES INDIRECTLY SUPPORTING ADAPTATION (NON-FOREST)[28]

A number of U.S. Government activities constitute good adaptation practice and contribute to enhanced climate resilience in developing countries, but were not implemented expressly for the purpose of addressing climate change. These activities are being evaluated for their applicability as climate adaptation responses and will be applied more broadly as appropriate. Funding information is not provided for all the activities in this section, as it was not possible to separate out an adaptation-specific funding component and would have been misleading relative to direct funding of adaptation activities. Any funding amounts listed are for the program as a whole and should not be taken to indicate funding specific to adaptation.

The Consultative Group on International Agricultural Research (USAID)
USAID is a major donor to the Consultative Group on International Agriculture Research (the CG system), which is developing heat and drought tolerant varieties of cereal crops and improving natural resource management and soil protection in agriculture ecosystems through conservation agriculture and agroforestry. Examples include:

- Drought tolerant maize and rice through biotechnology and breeding. Such technologies hold enormous promise for achieving economic growth and insulation from shocks (e.g., droughts, floods) in developing countries in South Asia and Africa.
- Mitigating impacts of agriculture on tropical forests & biodiversity: 13% of the CG supports biodiversity, providing alternatives to clearing tropical forests.
- Achieving transformation in high-population Middle East countries through drought and salinity tolerant crops and more strategic management of land and water resources in countries such as Sudan, Syria, Iraq, Pakistan, Afghanistan and Yemen.

Developing World Genomics Projects (NSF)
Climate simulations find that temperature increases and enhanced variation in other climatic features (e.g., rainfall amount and distribution) are likely to impact negatively the yields of major staple crops, with marked regional variation. Having the local technological feasibility to adapt and breed crop varieties for these changed conditions is one part of an adaptive strategy to ensure food security. Since 2004, research supported by the Plant Genome Research Program (PGRP) is enabling a better basic understanding of processes such as drought tolerance, salinity tolerance, and pathogen resistance on a genome-wide level for crops that are staples in developing countries, like sorghum, rice, and maize. The long-term goal of the program is a greater and sustained engagement with developing countries in plant genomics and

[28] Forest and non-forest activities are separated in this report because of differences in the underlying purposes of these projects. The non-forest projects are development projects that contribute to climate resilience. Many of the forest projects are intended to help sequester carbon, but also contribute to adaptation and resilience.

biotechnology research. The focus is on local research problems and application of tools from research models to local crops. To date, over 16 collaborative projects have been supported, involving institutions in Bolivia, Brazil, Columbia, India, Indonesia, Madagascar, Mexico, Nepal, Nigeria, Peru, Sri Lanka, and the Philippines. Research topics included rice disease resistance, potato disease resistance, rice breeding, *Brassica* oils, apomixis, plant stress, maize transformation, legume genome maps, improvement of coffee varieties, sugar cane and maize cell walls, tea disease resistance, biological nitrogen fixation in sugarcane, and nitrogen use efficiency in maize.

Global Conservation Program (USAID)

The Global Conservation Program is supporting the development and application of nature-based strategies to adapt to climate change in four large marine ecoregions – the Meso-American Reef in Central America; Wakatobi National Park and Raja Ampat in Indonesia; and Kimbe Bay in Papua New Guinea. Climate change poses a major threat to tropical marine ecosystems by increasing sea temperatures, sea level, storm intensity, and the acidity of the ocean. Nature-based adaptation strategies can help people and communities deal with climate change impacts by protecting natural systems and the benefits they provide – shoreline protection, erosion control, as well as food from fisheries, jobs and income.

Capacity Building for Flash Floods Management and Sustainable Development in the Himalayas (USAID)

The IPCC Fourth Assessment[29] states that climate change-related melting of glaciers could seriously affect half a billion people in the Himalaya-Hindu Kush region and a quarter of a billion people in China who depend on glacial melt for their water supplies. USAID/OFDA has supported technical assessments and forums for decision-makers and technical personnel from the Himalaya-Hindu Kush region to strengthen capacities on flash flood management, promote collaboration, and develop regional approaches to flood management, flood early warning systems, and broader transboundary water issues. These forums convey information about climate impacts as well as strategies and lessons about how to effectively cope with climate change, and thus are part of our strategy for impacting policy development and implementation in these countries. A regional organization based in Nepal, the International Center for Integrated Mountain Development hosts the forums, which include participants from Afghanistan, Bangladesh, Bhutan, Burma, China, India, Nepal, and Pakistan. Funding: FY07 $125,000.

Flood Early Warning Systems (USAID)

USAID/OFDA has engaged in flood early warning systems in a number of regions and countries; changing precipitation patterns and increased extreme events are recognized as significant climate change impacts in developing countries. For example, in January 2003, USAID/OFDA and the Mekong River Commission, an inter-governmental river basin organization based in

[29] Working Group II Contribution to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. *Climate Change: Impacts, Adaptation, and Vulnerability*, 2007.

Laos, began an innovative demonstration project to strengthen warnings to communities most at risk to floods. The five-year program developed appropriate flood information to enable the most vulnerable communities in Cambodia to effectively prepare for floods. In Mozambique USAID/OFDA has contributed to the Mozambique Integrated Information Network for Decision-Making (MIND) project, part of USAID's FEWS NET. The MIND FEWSNET system indicates storm severity (based on wind speed) and the expected amount of time until storm landfall. MIND has strengthened early warning systems for cyclones and flooding and helped improve disaster management and contingency planning in the Limpopo River Basin. The project includes flood risk mapping, community flood education, planning and preparedness, and establishment of RANET stations to inform communities about storm risk in highly vulnerable remote locations. Funding: FY07 $102,257.

Flood Proofing for Households in the Mekong Delta, Vietnam (USAID)
USAID/OFDA is supporting the flood proofing of homes in the poorest flood-prone villages in the Mekong Delta. In collaboration with the Government of Vietnam's Ministry of Agriculture and Rural Development, the program is also training officials and the affected populations on the use of flood mapping to reduce loss of life, economic consequences, and disruption of livelihoods. The program is implementing river flood alert systems and a television and radio flood disaster warning system in three provinces and at the national level. USAID/OFDA provided $180,250 to support the flood proofing of homes in the poorest flood-prone villages in the Mekong Delta from September 2005 through March 2008. This was a follow-on program to the USAID/OFDA-funded U.N. Development Program (UNDP) initiative to implement a comprehensive flood preparedness program in seven provinces of central Vietnam from June 2000 through December 2004. A coastal storm early warning system implemented by the Government of Vietnam with support from USAID/OFDA and UNDP helped mitigate the impact of storms such as Typhoon Damrey in September 2005, and Typhoon Durian in December 2006. Since FY 2001, USAID/OFDA funding for flood and storm preparedness in Vietnam, including flood early warning, coastal storm early warning, and flood proofing of households totals $2,834,250.

Asia Flood Network (USAID, DOI/USGS, NOAA)
The Asia Flood Network (AFN) aims to strengthen the climate, weather, and hydrological forecasting capacity of regional and national hydro-meteorological institutions with the goal of reducing the vulnerability of at-risk communities. USAID/OFDA, NOAA, and the U.S. Geological Survey (USGS) are jointly implementing AFN in the Mekong river basin in Cambodia, China, Laos, Thailand, and Vietnam as well as in the Ganges-Brahmaputra–Megna river basin in Afghanistan, Bangladesh, Bhutan, Burma, China, India, Nepal, and Pakistan. Funding: FY07 $500,000 and FY08 $250,000.

Globally Applicable Methods for Characterization of Flood Hazards (DOI/USGS)
The U.N. Environment Programme and the USGS, in coordination with the U.N. Development Programme's Global Risk Identification Programme and regional and national entities, are implementing this program, which aims to increase the effectiveness of flood preparedness and

flood mitigation activities. Using globally available geographic and hydrometeorological data sets for river basins, the project will develop techniques and tools to permit characterization of flood hazards worldwide. Funding: FY07 $150,000; FY08 $150,678.

Development of Hurricane Hazard Maps for the Caribbean (USAID)
Development of accurate baseline data related to climate and environmental conditions is critical to understanding the extent to which climate is changing. Without understanding the present in the context of historical norms it is impossible to plan appropriate adaptation activities. In FY 2007, USAID/OFDA supported the Pan American Health Organization (PAHO) to develop wind hazard maps for the Caribbean basin, including all of the islands of the Caribbean and the Caribbean coastlines of South and Central America. The program will incorporate over 20 years of the region's data to improve the quality of currently available wind hazard information. The proposed maps will enable wind hazard experts, government authorities, and the engineering and architectural communities to obtain better wind hazard guidance for structural design of new hospitals and other relevant facilities. Funding: FY07 $126,560.

Program for Hydrometeorological Risk Mitigation in Asian Cities (USAID)
The IPCC Fourth Assessment[30] reports that amplification in storm-surge heights, along with high reported rates of recent sea level rise, could result in an enhanced risk of coastal disasters along the coastal regions of East, South and South-East Asian countries. Implemented by the Asian Disaster Preparedness Center (ADPC), this program promotes hydrometeorological disaster preparedness through demonstration projects to improve community preparedness and reduce vulnerability to climate sensitive disasters in six highly vulnerable secondary urban centers in Bangladesh, Pakistan, the Philippines, Sri Lanka, Vietnam, and Indonesia. Funding: FY07 $855,285.

Drought Preparedness (USAID)
Climate variability in the form of drought significantly impacts developing countries. These impacts are projected to be exacerbated by climate change. USAID/OFDA has implemented drought preparedness programs in a number of drought-prone areas. For example, the NGO CARE is implementing drought preparedness activities in Cambodia, Vietnam, and Timor-Leste. Also, NGO partner Catholic Relief Services is implementing a three-year project to improve resilience to drought among communities in Rajasthan, India, and Sindh, Pakistan. In partnership with International Relief and Development, USAID/OFDA is strengthening food security through a community-based drought mitigation program in Shiselweni and Lubombo districts in Swaziland. These programs promote community-based drought preparedness planning while also developing expertise in effective low-cost and innovative drought mitigation and preparedness technologies, such as promoting water harvesting and water storage practices and techniques, agroforestry, water conservation, and dry season cultivation. Through the program, vulnerable communities will be better able to harvest and store rainwater for domestic

[30] Working Group II Contribution to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. *Climate Change: Impacts, Adaptation, and Vulnerability*, 2007.

and agricultural use, adopt water-efficient agricultural practices, improve land-use techniques for agriculture and livestock, and better engage with local government and other actors. Funding: FY07 $1,099,963.

Regional Cooperation in Climate Change Research (NSF)
NSF is involved in several regional cooperative projects. An outstanding example is the collaboration between the Inter-American Institute for Global Change Research (IAI) and the National Science Foundation (NSF), where investments are being made in ongoing adaptation activities supported by ten networks of scientists in Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Jamaica, Mexico, Paraguay, Peru, the Dominican Republic, and Uruguay. These projects range from activities linking biophysical and human factors to predict trends, assess impacts, and support viable land-use strategies for the future in the Rio de la Plata Basin; documenting, understanding and projecting changes in the hydrological cycle in the American Cordillera; coastal scenarios that include the spatial and temporal variability of Caribbean hurricanes; the use of climate diagnostics and cyclone prediction for adaptive water resources management under climatic uncertainty in western North America; and the development of a decision-support system for soybean farmers in the Rio Grande do Sul/Paraguay region, among others. The investment is highly leveraged, and has stimulated participation from local governments, cooperatives, and agribusiness.

Land Cover Change and Biodiversity in Africa (DOS/USGS, USAID)
The DOI's USGS is completing projects that integrate remote sensing to assess land cover and land use change with biogeochemical modeling to quantify carbon status and evaluate both climate mitigation and adaptation options. This activity, funded by USAID, is focused on the Sahel and some countries, especially Senegal and Ghana, in West Africa and incorporates local capacity building. A related project has completed a land cover change project for the Sahel with country reports for management and policy guidance in both French and English soon to be released. In cooperation with host country partners, USGS has used remote sensing and site validation to describe some exemplary village level interventions to improve economic livelihoods and likely carbon sequestration. The work has resulted in products for several major watersheds, utilizing data from the NASA Shuttle Radar Topography Mission (SRTM) at resolution of 30m, a Rapid Land Cover Mapper (RLCM), and a capability to secure time series of remotely sensed images. New project activities will assist the monitoring of resources, including areas for forest protection and management, in transboundary areas. Training in the new tools and products will be provided to regional centers.

Reef Manager's Guide to Coral Bleaching (NOAA)
"A Reef Manager's Guide to Coral Bleaching" illustrates the critical role that managers have in maximizing the resilience of coral reefs to bleaching induced by increasing sea surface temperatures. The guide represents collaboration between managers and researchers and was created in partnership with the International Union for the Conservation of Nature (IUCN) and the Australian Government Great Barrier Reef Marine Park Authority. The guide promotes management practices that build resilience to a number of local stresses (pollution,

sedimentation, destructive fishing) to keep coral communities healthy and thus more resilient to climate change (http://www.coris.noaa.gov/activities/reef_managers_guide/).

Capacity Building for Environmental Data Sources and Infrastructure (DOI/USGS)
The DOI (USGS) is initiating a major capacity building program with CAF (Corporación Andina de Fomento or the Andean Development Corporation) and most countries of South America. This project assists the CAF develop regionally consistent environmental data sources and infrastructure to facilitate national and continental development. The funding supports the DOI (USGS) special expertise in spatial data standards and remote sensing applications and is implemented through two agencies in each country, the mapping agency and the environmental organization. Participants will work both at EROS and at their institutions and implement consistent data standards, Internet map serving capabilities, and new data sources, e.g., SRTM 30m derivative products. An initial organizational workshop was held in late '07, and full implementation is now underway.

Understanding Health Effects of Climate Change (NIH)
The issue of global health and global climate change concerns a large number of Institutes and Centers at the NIH by nature of the potential effect upon many health areas. The NIH supports hundreds of research projects in the U.S. and around the world that aim to understand the basic science underlying health effects of climate change, including skin cancers, retinal disease, infectious diseases, lung disorders, heat stress, cardiovascular disease, mental health, child health, allergies, and trauma, among others.

Health Research Capacity Building in Developing Countries (NIH)
The Fogarty International Center (FIC), the international component of the NIH, addresses global health challenges through innovative and collaborative research and training programs and supports and advances the NIH mission through international partnerships. FIC's recently-released strategic plan (FY2008-2012) emphasizes that climate change poses new challenges to global health. FIC's programmatic efforts in building scientific capacity may help to contribute to the research base necessary to understand and prepare for the health effects of climate change.

Predicting Disease Dynamics (NIH and NSF)
Through a long-standing partnership with the National Science Foundation (NSF) in the Ecology of Infectious Diseases program (EID), the NIH's Fogarty International Center (FIC), National Institute on General Medical Sciences (NIGMS), National Institute on Environmental Health Sciences (NIEHS), and National Institute on Allergy and Infectious Diseases (NIAID) support field and computational research to understand and predict disease dynamics in relation to environmental changes, including climate. The NIH's Fogarty Center, through its internal research program in Epidemiology and Population Studies (DIEPS) also conducts an extensive computational modeling efforts designed to predict infection and disease in malaria, influenza and waterborne diseases in relation to climate and other influences.

National Health Accounts (USAID)
Research suggests that climate change could have a variety of impacts on human health, for instance by changing the frequency and distribution of disease vectors. Tracking financial information will help countries understand the extent to which the health sector in different countries is directing funds towards climate change based concerns. In partnership with the World Health Organization (WHO) and the World Bank, the U.S. Agency for International Development (USAID) created and introduced a tool for comprehensively mapping public and private funding sources and how funds are used for health sector activities. This approach, known as national health accounts (NHAs), is being applied in more than 65 developing countries to strengthen national health policy and decision-making processes.

Drinking water and sanitation services (USAID)
Safe and reliable access to drinking water and sanitation services are critical to developing country health. Water supplies are also highly sensitive to climate variability. USAID is developing guidance on technologies and techniques for managing water supplies as climate changes. Many water program managers and implementers recognize that their work is closely tied to adapting to climate variability and change.

DRAGON Project – Mekong Delta (DOI/USGS)
Jointly proposed by the United States and Vietnam, the DRAGON (Delta Research and Global Observation Network) Institute would be a virtual institute studying the Mekong Delta. It is planned to be established in the Fall of 2008 as the first of its kind. The DRAGON Project seeks to build a platform for data integration and information dissemination and a community of scientists who would develop ecological models that can project changes in deltas, coasts, and rivers that may result from climate change, engineering projects, and other human activities. The lead cooperators will be the Department of the Interior's US Geological Survey and Can Tho University in Vietnam. Planned for FY 2009.

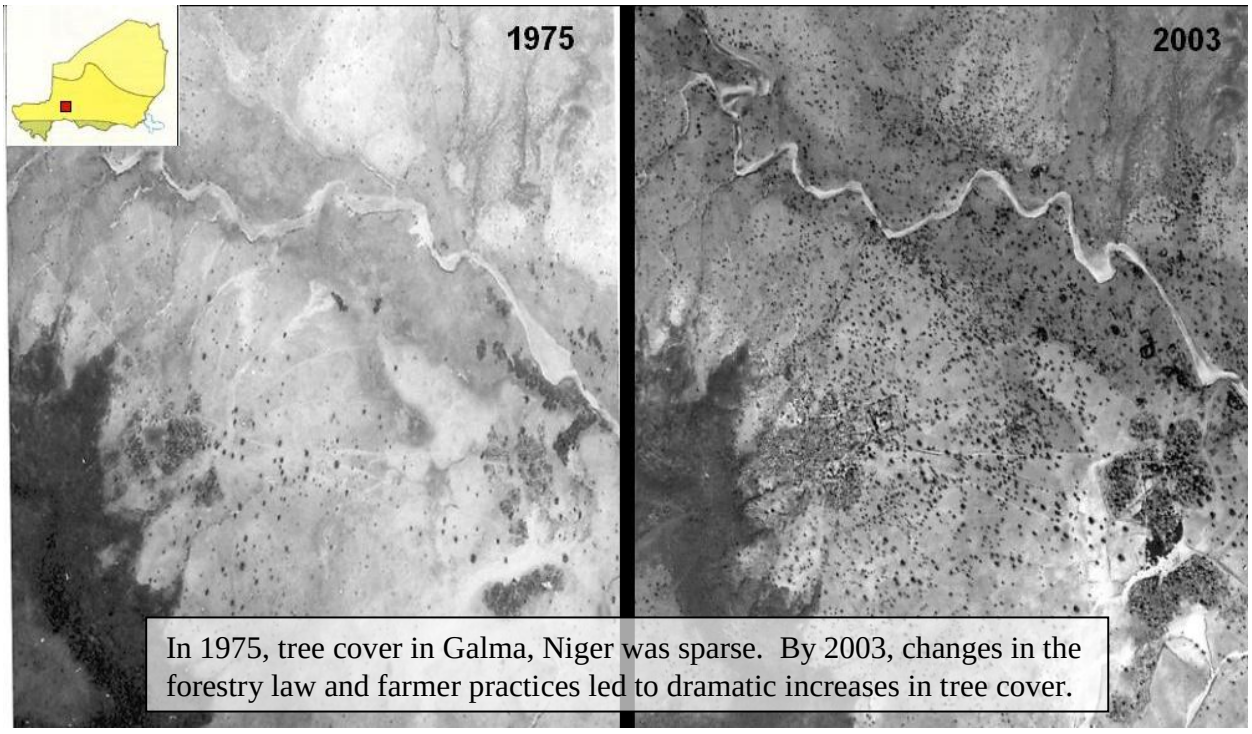
ACTIVITIES INDIRECTLY SUPPORTING ADAPTATION (FOREST-RELATED)

Well-managed forests provide climate mitigation and carbon sequestration benefits, as well as resources to communities and natural services that help reduce the impacts of, and enhance resilience to, climate change. For example, sustainable forest management facilitates communities' resilience to changing temperature and precipitation regimes – providing buffers against flooding and helping to maintain water table levels. The U.S. Government supports a number of international initiatives and programs to promote the conservation and sustainable management of existing forests, as well as to increase forest cover and enhance the health of forest ecosystems. A number of U.S. international forest initiatives offer co-benefits for both climate change mitigation and adaptation. Examples of U.S. Government forest activities that can have adaptation benefits are provided below.

Assessment of Mangrove Systems (DOI/USGS, NASA)
The DOI (USGS) has completed and published an assessment of the pre- and post-tsunami state of mangrove systems in Asia, which will also inform climate-related efforts. USGS, with support from NASA, is now embarking on a Global Assessment of Mangrove Forests. This assessment will include assessments of their ecosystem services, economic valuation, change analysis, and potential carbon status.

Farmer Managed Natural Regeneration (USAID)
Through a series of successive projects, USAID has led efforts in Niger to change the forestry code and encourage farmers to allow trees to grow up on their land. Three to six million ha of tree cover have been added in the past 30 years. In addition to sequestering carbon, the effort has resulted in better soil condition, water infiltration, reduced wind damage, and more resilient livelihoods. New businesses have arisen around the availability of wood and fodder for animals. Women have particularly benefited from the effort, gaining access to and rehabilitating infertile land, and starting small businesses for fattening animals (using seed pods from the trees for feed) and selling wood and food products.

Figure 8: Changes to tree cover in Galma, Niger, 1975-2003 (aerial photographs).



Technical Assistance to Address Deforestation and Forest Degradation (USDA/USFS, USAID)
Under its International Programs, the U.S. Forest Service is currently collaborating with other governments, nongovernmental organizations and the private sector on climate change and avoided deforestation through policy engagement and technical cooperation. By slowing deforestation rates, curbing land degradation, increasing carbon storage, and using forests as an

alternative and sustainable energy source, greenhouse gas emissions can be mitigated and reduced. The Forest Service works with a number of countries on these issues, including Brazil, Indonesia, Liberia, Mexico, and Peru.

Tropical Forest Conservation Act (DOS, Treasury, USAID)
The Tropical Forest Conservation Act (TFCA) was enacted in 1998 to offer eligible developing countries options to relieve certain official debt owed to the United States, while at the same time generating funds to support local tropical forest conservation activities. As of July 2008, TFCA debt-for-nature programs are being implemented in Bangladesh, Belize, Botswana, Colombia, Costa Rica, El Salvador, Guatemala, Jamaica, Panama (two programs), Paraguay, Peru, and the Philippines. These 13 programs will together generate more than $163 million to conserve tropical forests over the life of the programs. Additional funds will be generated through returns on investments and matching funds.[31]

Congo Basin Forest Partnership (USAID, DOS, DOI/FWS, USDA/FS)
The Congo Basin Forest Partnership (CBFP), which includes more than 35 governments, international organizations, private sector and civil society representatives, is working to strengthen the sustainable management of the world's second largest tropical forest. The partnership promotes economic development, poverty alleviation, and improved local governance through natural resource management across 13 landscapes in six Central African countries. The United States has invested more than $82 million from 2002-2007 in a wide range of programs that support sustainable forest management, development of alternative livelihoods for forest-dependent communities, control of illegal logging and wildlife poaching, governance, and capacity building for natural resource conservation. Secretary Powell and other partners launched the CBFP at the World Summit on Sustainable Development in Johannesburg in 2002. If successful over the long-term, CBFP programs could have significant climate benefits through conservation of the forest biomass.

Initiative for Conservation in the Andean Amazon (USAID)
The Initiative for Conservation in the Andean Amazon (ICAA) is a 5-year program (2006-2011), supported by USAID and partner funds, that brings together the efforts of 20 public and private organizations working in the Amazon regions of Bolivia, Colombia, Ecuador, and Peru. ICAA's goal is to build constituencies that promote the sustainable use and conservation of biodiversity and environmental services of the region. In promoting a regional vision of conservation that is able to address the growing array of challenges and threats to biodiversity, ICAA focuses in particular on supporting the management of indigenous territories and strengthening indigenous organizations for enhanced conservation and development. ICAA builds on and complements the successful current portfolio of conservation efforts supported by USAID in the region by the bilateral Mission programs in Brazil, Bolivia, Colombia, Ecuador and Peru.

[31] For more information, see 2007 Annual Report to Congress on Operation of the Enterprise for the Americas Initiative and the Tropical Forest Conservation Act, August 2008.

SECTION IV: PLANNING AND EXPANSION OF INTERNATIONAL ADAPTATION EFFORTS (FY09 Foreign Assistance Act Budget Request)

Much of U.S. development assistance contributes to enhancing resilience to climate variability and change in some form. In addition, a number of agency programs are oriented in this direction. While the U.S. has spent approximately $14 million/yr on efforts directly focused on enhancing climate change adaptation needs, a far larger amount of funding supports activities to enhance resilience within a broader development context. Such activities also contribute to enhancing adaptation to climate change.

On May 31, 2007, the President announced a series of measures designed to enhance U.S. cooperation with other countries on climate change. He reaffirmed the U.S. commitment to work with all Parties to the UN Framework Convention on Climate Change, and highlighted three issues of broad interest in the UN, especially among developing countries: 1) adaptation to the effects of climate change; 2) efforts to reduce and avoid deforestation in tropical countries; and 3) technology transfer.

As part of this focus, the President's FY09 Foreign Assistance budget request includes $64 million for climate change-related bilateral, regional and multilateral initiatives on adaptation and sustainable forest management and reforestation to be integrated into our existing development and diplomatic efforts in developing countries. This strategic approach focuses on integrated activities that address high visibility issues and needs for immediate action on the ground. Activities with partner countries support climate change policies and programs that seek to effectively link the interconnected issues of forests, agriculture, land use, water management, health, and economic growth. Activities also focus on addressing adaptation needs in some of the most vulnerable countries and populations, building on ongoing development activities. Table 3 provides a notional, country allocation of the funds requested, based on preliminary analysis of current needs and priorities. This allocation is subject to further review, taking into account changing conditions in partner countries and actual appropriations. Missions were given discretion to determine their prioritization of adaptation and forest management activities.

The long term success of U.S. development programs will depend upon how climate change is considered in planning and implementation. The United States will continue to work with nations to adapt to impacts of climate change, strengthen resilience, disseminate tools and methodologies to improve vulnerability and adaptation assessments, and integrate adaptation into development. By incorporating, or "mainstreaming", climate change into existing priority programs, development programs become more robust, especially when viewed in the long term.

In addition, the United States supports programs on adaptation through our engagement in the UNFCCC, in particular under the Nairobi Work Programme on Climate Change Impacts, Vulnerability, and Adaptation to Climate Change. Discussions about how best to enhance adaptation activities under the UNFCCC are underway and set to conclude in 2009. The United States is actively engaged in those discussions, with the primary objective being to ensure that our efforts build on existing activities and leverage the work of programs and institutions already engaged in enhancing resilience to climate variability and climate change.

Table 3: Notional Allocation of FY09 Foreign Assistance Act Climate Change Adaptation/Forest Budget Request ($ in thousands).

Country/Operating Unit	DA[32]	ESF[33]	Total
Bolivia	500		500
Brazil	4,000		4,000
Cambodia	1,200		1,200
Caribbean Regional	3,000		3,000
Central America Regional	500		500
East Africa Regional	2,500		2,500
EGAT	4,400		4,400
El Salvador	500		500
Ethiopia	2,000		2,000
Ghana	1,500		1,500
Guatemala	500		500
Guinea	2,000		2,000
Honduras	500		500
Indonesia	5,000		5,000
Jamaica	500		500
Kenya	500		500
Mali	2,100		2,100
Mozambique	1,000		1,000
Nicaragua	500		500
Paraguay	2,000		2,000
Peru	4,000		4,000
Philippines	3,000		3,000
RDMA	7,500		7,500
Senegal	2,200		2,200
Southern Africa Regional	2,500		2,500
Sudan		1,400	1,400
Tanzania	1,000		1,000
USAID LAC	200		200
West Africa Regional	2,500		2,500
World Bank Forest Carbon Partnership		5,000	5,000
Total Funding	**57,600**	**6,400**	**64,000**

[32] Development Assistance.
[33] Economic Support Funds.