ACKNOWLEDGEMENTS

The capstone team would like to greatly thank the individuals who have guided and supported us throughout the Spring 2012 semester and who have shared their valuable knowledge and expertise. We would like to firstly thank the SIPA faculty advisors, Professor Shiv Someshwar and Kye Baroang, for their guidance and their effort to bring the best out of each product (Impact Assessment Framework, Impact Assessment Paper and final Concept Paper). We would also like to greatly thank members of the Booz Allen Hamilton Climate Change Community of Practice team for their continuous advice and for always challenging us to produce quality work: Allen Shapiro, Christine Mataya, Troy Kofroth, Kendra Sand and Katie Wu.

We have also conducted interviews with experts from different sectors and institutions and would like to thank the following individuals who have contributed to the paper: Dr. Idah Z. Pswarayi-Riddihough, Dr. Casey Brown, and Ms. Jennifer Wang from the World Bank (IBRD), Mr. Vladimir Stenek, Mr. Alan Miller, Ms. Aditi Maheshwari, Mr. Russell Sturm, Ms. Noleen Dube, and Ms. Quyen Thuc Nguyen from the International Finance Corporation, Mr. Peter Trick, Ms. Maya Buchanan, Ms. Nicole Cosmann, Mr. Rafael Olivieri, Ms. Kris Inman, Ms. Lekshmy Sankar, Ms. Janelle Okorie, Ms. Michelle Sieff, Mr. Aaron Jones, Mr. Chinedum Nwaneri, Ms. Halley Aelion, Ms. Kathy Medici and Ms. Emilee Ritchie from Booz Allen Hamilton, Ms. Jenny Frankel-Reed, Dr. Edward Carr, Ms. Tegan Blaine, and Ms. Cynthia Brady from USAID. As well as Ms. Sarah Davidson, Ms. Kristen Patterson and Mr. Chris Zganjar from The Nature Conservancy.

We would lastly like to express our appreciation to SIPA’s Office of Curriculum and Faculty Affairs, with special thanks to Ms. Suzanne Hollmann and Josephine Vu for their continuous support.
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A) EXECUTIVE SUMMARY

The Niger Delta is an area of strategic importance to Nigeria because of its vast oil deposits. It is a densely inhabited region containing 20% of Nigeria’s population, and while royalties from the extractive industry in the Delta contribute to 85% of government revenue, half the population lives on less than USD1 per day. The majority of the population works in subsistence agriculture and relies on the local environment for livelihood and environmental goods and services. The Delta is fraught with ethnic, religious, linguistic, and historic social tensions. Federal, state, and local governments have limited reach in providing social services such as schooling, health care, and infrastructure. Further complicating matters, regional economic growth is projected to lag behind rapid population growth, and densely populated areas and strong urbanization trends are already straining existing infrastructure and environmental capacity. The presence of large-scale petroleum extraction also brings environmental degradation and has precipitated social and political unrest.

In November 2011, Nigeria began creating the policy and institutional infrastructure to deal with climate change adaptation, mostly concentrated at the federal level, including a national plan, the ‘Climate Change Policy and Response Strategy’, which provides a roadmap for smaller regional and local governments and NGOs. These and other policies and structures acknowledge the need for adaptation policy to be folded into general development efforts. However, while these institutions create useful potential implementation structures for adaptation policy and platforms for stakeholder coordination, they are underutilized. Constraints to implementing adaptation policies include high levels of corruption, lack of institutional capacity and capable regulatory agencies, limited state-presence and an unstable security environment, and the compounding effects created by the aforementioned developmental issues.

Current climate change adaptation policy ranges in its scope from sector-to-sector, but is implemented ineffectually. With regards to food security, there have been many initiatives to enhance security; however, most have had disappointing results and focus on increasing food production/availability without regarding climate change impacts. In the area of water security, organizations within the Delta have begun preliminary risk assessments on climate change, while at the national level, initiatives have focused on increasing potable water access. Current efforts to promote energy security have focused on diversifying energy sources and strengthening electrical infrastructure, but these policies have been very limited in scope and do not adequately address the challenges presented by forecasted climate change.

Climate change adaptation policy works most successfully when undertaken in a holistic fashion. Policies should be harmonized under national planning, coordinated among federal agencies, state governments, NGOs, and local civil society organizations. Essentially, successful policies would marry top-down government-led policies with bottom-up community-led efforts. Integrating climate change adaptation policies within broader economic development is an effective way to increase climate resilience and to build adaptive capacity and resilience.

Policy Recommendations: This report makes the following recommendations for climate change adaptation policy in the Niger Delta. These recommendations aim to enhance regional development in the Delta, reduce the vulnerability of communities, and augment regional stability, while confronting climate change. In Section F, below, the report discusses the potential roles of the United States Agency for International Development (USAID), the International Bank for Reconstruction and Development (IBRD) and the International Finance Corporation (IFC) in achieving these policy ends within the region. The report does not specifically prioritize recommendations, but rather recommends how these individual agencies should evaluate their existing capacity and strategic planning, as well as perform on-the-ground needs assessments and stakeholder discussions, to determine optimal prioritization and implementation strategies. An illustrative sequencing time-line for implementation of each of the recommendations is also provided in Section F.

1. Develop a climate services system to provide climate information to players along the agricultural value chains, combined with training of farmers to adopt strategies in response to climate information.

2. Expand viable financial risk mitigation tools for farmers, especially through insurance linked to weather-related events.
3. Increase the resilience of agricultural input delivery systems to adapt to climate change and variability, both for short-term farm level management and for long-term planning, and promote sustainable agriculture to reduce dependence on input systems.

4. Invest in climate and agriculture research and capacity for agricultural applications.

5. Consolidate an Integrated Water Resources Management (IWRM) approach for the Basin and the Delta, which incorporates likely climate change impacts.

6. Build climate resiliency in infrastructure investments for water access, treatment, storage and flood control.

7. Tighten and enact policies to prevent, reduce and restore water sources in the Delta from oil pollution and other factors.

8. Strengthen Nigeria’s capacity to provide accurate baseline hydrological data and transfer knowledge about climate change variables to local communities.

9. Strengthen Nigeria’s water and environmental institutions and their communication, with special regard to coordinating bodies such as the National Integrated Water Resources Management Commission (NIWRMC).

10. To address the challenge of providing energy to rural areas, promote decentralized renewable energy projects, including solar energy and small-scale hydropower.

11. Prioritize the transition from flaring natural gas to capturing and selling it into the domestic market in order to stimulate the local economy and promote domestic natural gas usage at both the industrial and household levels.

12. Pursue environmental impact studies and modify large-scale hydropower projects to minimize negative impacts while increasing capacity and robustness to withstand projected impacts of climate change.

13. Improve inter-agency coordination of climate information services, and build capacity for information sharing and dissemination.

14. Increase community awareness of climate change impacts and participation in adaptation planning and implementation.
B) INTRODUCTION

The following report issues policy recommendations for climate change adaptation in the Niger Delta region of Nigeria. Recommendations focus on enhancing food, water, and energy security in light of anticipated climate change impacts and current policy gaps, and have been developed to inform and complement the work of the US Agency for International Development (USAID), the International Bank for Reconstruction and Development (IBRD), and the International Finance Corporation (IFC). After providing a brief background, this report addresses the institutional context of climate change adaptation and development policy in the Delta, and Nigeria more broadly, followed by a detailed discussion of policy gaps and recommendations to enhance food security, water security, energy security, and the institutional environment required to support effective climate adaptation planning and policy implementation. This discussion is prompted by a previously completed assessment of likely climate change impacts in the Niger Delta. The final section focuses on implementation, with a discussion of key policy priorities and recommendations for each of the three sub-client organizations. Ultimately, this report facilitates the provision of concrete actions based on carefully assessed impacts and researched solutions.

1. The Niger Delta

The Niger Delta is of great strategic importance to Nigeria, but its potential is compromised by a number of developmental and environmental challenges. Spanning nine states and 112,110 km², the Niger Delta is home to about 20% of Nigeria’s population and provides the source of the majority of Federal revenues through its oil resources (NDRDMP 50). In addition to oil, agriculture is the Delta’s primary economic activity, providing the greatest source of employment, with smallholder crop farmers with land holdings of less than one hectare dominating agricultural activity. Although it is home to multinational oil firms and high income earning foreign nationals, the Niger Delta is poor; nearly half of the employed population earns less than USD 32 per month (NDRDMP 68). Furthermore, the Niger Delta is burdened with a lack of livelihood opportunities, social conflict, and persistent environmental degradation resulting from oil extraction.

2. Historical and Projected Climate Change in the Delta

Nigeria’s climate is in flux and projections indicate that observed changes will continue at least through 2030 (BNRCC, NASPA i). Changes in Nigeria’s climate include an increase in average temperatures, sea level rise, and variation of rainfall patterns trending towards increased extreme rainfall events. Delta-specific data indicates a trend of late onset and early cessation of the rainy season (Obioh and Fagbenle 10). In recent decades, instances of heavy rainfall leading to flooding have become more commonplace (Ogba and Utang 2). Sea level rise combined with land subsidence will result in a higher rate of relative sea level rise in the Delta, risking inundation of a significant proportion of the Delta’s land (French 234). These changes increase the risk of flooding, a serious concern for an urbanizing Delta (Ogba and Utang, 2008 4).

3. Assessed Climate Change Impacts

The three focal areas assessed in this paper are of vital importance not only because of the threats posed by climate change, but because they already lack stability, which itself provides opportunities for positive change. Agricultural practices will be challenged by changes such as a decrease in rainfall predictability, while potentially benefitting from increased spells of heavy rainfall (outside of flood events) and improvements in technology. Water security, already lacking in the Delta, will be threatened by climate change induced factors, such as sea level rise, salt water intrusion, and increased flooding. Energy security is a basic issue in the Delta due to lack of access and problematic, wasteful practices like gas flaring. Addressing energy security in the face of a changing climate will necessitate a creative approach that diversifies energy streams to both expand access and bolster greenhouse gas mitigation efforts. Expected climate change impacts may provide the government, international actors, and civil society with the necessary impetus to strengthen socio-economic fundamentals in these areas, which in turn will build climate resilience. The recommendations provided here offer direction and insight into opportunities to build adaptive capacity while promoting sustainable economic development.
4. Climate Change and Society in the Delta

Nigeria is viewed internationally as a highly corrupt nation and faces a projected population increase of over 45 million people by 2020 (Transparency International Web; NDRDMP 56). These factors, combined with threats posed by climate change and lagging economic development, will place new pressures on precious shared resources. The amalgamation of these complexities creates a population that is especially vulnerable and worthy of international attention and support. There is still time to build resilience by equipping the population with the capacity to manage both predicted and unpredicted changes in climate, much of which can be done within the purview of developmental policy. The following paper explores this situation in detail, in light of likely climate change impacts, and provides a policy program for a more resilient and dynamic future.

C) NATIONAL INSTITUTIONAL AND POLICY CONTEXT

1. Climate Change Adaptation Policy: Key Governmental Actors, Institutions and Programs

(a) Environmental Policy: Environmental and developmental policy in the Niger Delta is governed at its highest level by the Federal Government of Nigeria. Environmental policy is undertaken by the Federal Ministry of Environment (FME). Within the FME, the Government set up a Special Climate Change Unit (SCCU) in 2006. The SCCU provides technical analysis and policy advice to the Federal Government on climate change issues and dynamics in Nigeria, and works with NGOs and international organizations to develop responses to climate change – chiefly regarding greenhouse gas mitigation. In 2010, the National Assembly created a national Climate Change Commission, which, once properly established, is designed to facilitate coordination for adaptation policy and strategy among a number of Federal-level Ministries. Several other Federal Government agencies are involved in climate change adaptation issues, or at least in the consideration of these, including the Nigerian Meteorological Agency (NIMET), the National Emergency Management Authority and the National Planning Commission (NPC) (BNRCC, NASPA 25-26). At the state level, environmental policy capacity is much less developed, less clearly articulated and less well-organized. It should be noted that the Constitution of Nigeria mandates that all revenues from the extractive industry be paid to the Federal Government – revenues that make up close to 85 percent of Federal Government budgets – meaning that state governments remain highly revenue constrained, with only about 25 percent of oil-related revenues flowing back to the states in total (Oladipo 89).

(b) Development Policy: Policy responses to climate change in the Niger Delta should occur in the context of developmental policy. The Federal Government’s current economic growth plan, launched in 2010, Nigeria Vision 20:2020, Economic Transformation Blueprint explicitly recognizes that climate change has the potential for, “damaging and [causing] irrecoverable effects on infrastructure, food production and water supplies, in addition to precipitating natural resource conflicts” (NPC, Vision 2020 Economic Transformation 31). The implementation strategy in this document includes “[reducing] the impact of climate change on socio-economic development processes” as one of nine objectives for conserving the environment (NPC, Vision 2020 Economic Transformation 172). There is some consideration, therefore, of the interrelationships between climate change adaptation and sustainable development, although implementation of adaptation policy through developmental goals has been lacking. This development plan is managed jointly by the Federal Ministry of Finance and the NPC.

In the Niger Delta, the Niger Delta Development Commission (NDDC) was established in 2000 as a partnership between Federal and State governments, key NGOs active in the Delta and international oil companies (IOCs) to foster development in the region (Ojukwu-Ogba 138). While the NDDC brings together a broad coalition of public and private interests and stakeholders, and receives extensive funding from IOCs in particular, it currently has no significant role in climate change adaptation. However, it represents a vehicle through which adaptation policy might be developed and implemented.

(c) Climate Change and Development in the Niger Basin: Climate change adaptation policy in the Niger Delta necessarily takes place in the context of policy and environmental dynamics occurring within the Niger River Basin as a whole. The Niger Basin Authority (NBA) is an intergovernmental organization representing the nine countries which make up the Niger Basin. The NBA has developed a Strategic Development Action Plan (SDAP) to promote growth and sustainable development in the region as a whole. Currently, the NBA is working with the IBRD to discuss the implications of climate change for the SDAP, and to identify ways to make the plan more climate resilient. As an important part of the Niger Basin, the outcomes of this process are likely to affect adaptation policy and outcomes in the Niger Delta itself (Pswarayi-Riddihough, Interview 2012).
2. Current Adaptation Actions and Policy

(a) Climate Change Adaptation Policy – Federal Government Measures: Given the pressing issues regarding climate change impacts in Nigeria, the Federal Government has put in place a ‘Climate Change Policy and Response Strategy’ (CCPRS) with the aim of building national social and economic resilience to climate change and fostering a low-carbon development path. The policy includes objectives related to climate change adaptation, mitigation, climate science and technology, public awareness, private sector participation, and strengthening national institutions and mechanisms to achieve these ends. At this stage, however, the CCPRS is yet to be properly funded, resourced or implemented, and it is highly uncertain whether its ambitious goals will be met in a timely fashion (BNRCC, NASPA 26).4

In addition to specific climate change-related policies, Nigeria has several environmental and sectoral policies and plans in place where climate change adaptation policies might apply, or through which they might be launched. Examples of such policies include, the National Policy on Environment, Nigeria’s Agricultural Policy, the Drought Preparedness Plan, the National Water Policy, the National Forest Policy, and the National Health Policy (BNRCC, NASPA 26). However, policies, strategies, and plans such as these are not currently being used to enable and support climate change adaptation. Indeed, according to the National Adaptation Strategy and Plan of Action (NASPA, see below for further details) document, in many cases, objectives and targets embedded in national policy documents tacitly assume that climate conditions will remain as they are today (BNRCC, NASPA 26).

(b) International Organizations and NGOs: International organizations (United Nations agencies, Global Environmental Facility Implementing Agencies, Bilateral and Multilateral Development Banks, Donors, etc.) have a large presence in the Niger Delta and are significantly involved in work to enhance sustainable development in the region. They are not, however, specifically involved in work to enhance adaptive capacity on a significant scale, although a large number of projects being conducted have the collateral benefit of enhancing climate resilience (84 international aid projects in Nigeria had an adaptation component in 2008 (no figures for the Niger Delta)) (Moran 20).

An array of NGOs and civil society organizations are also involved in increasing adaptive capacity in the region, either through on-the-ground programs or through assistance in the adaptation policy development process. The Canadian-based NGO Building Nigeria’s Response to Climate Change (BNRCC), for example, has launched a number of adaptation programs in Nigeria, including capacity and awareness building projects in the Niger Delta (BNRCC, Adaptation Projects Web). BNRCC has also been instrumental in developing adaptation strategies for Nigeria in the recent past, chiefly through its NASPA report, released in late 2011. This comprehensive document, commissioned by the FME, sets out a detailed and in-depth program of adaptation policy across sectors to climate-proof the Nigerian economy and to build resilience in communities. The NASPA, however, remains a plan. It is unfunded and yet to be implemented, and it is uncertain how successfully this might occur over time. Nevertheless, the comprehensiveness of this document makes it a good starting point for discussions of adaptation policy implementation in the Niger Delta and in Nigeria as a whole.

The following table summarizes the various state, national and international actors currently involved in supporting environmental, development and adaptation policy formulation and discussion for the Niger Delta. The summary, while not exhaustive, includes actors previously mentioned in this Section C, as well as some that will be highlighted in the forthcoming focal area analysis.

Table 1: Mapping of actors in environmental development and adaptation

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<thead>
<tr>
<th>Environmental Policies</th>
<th>Development Policies</th>
<th>Adaptation Policies</th>
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<td>International</td>
<td></td>
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<tr>
<td>- Global Environment Facility</td>
<td>- International Finance Corporation</td>
<td>- Building Nigeria’s Response to Climate Change</td>
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<tr>
<td>- United Nations Framework Convention on Climate Change</td>
<td>- International Bank for Reconstruction and Development</td>
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<tr>
<td></td>
<td>- United Nations (UNDP, UNICEF, UNIDO)</td>
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<td>- U.S. Agency for International Development</td>
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<td>- Niger Basin Authority</td>
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Policy development and program implementation to enhance Nigeria’s resilience to climate change takes place within a challenging institutional and political environment. Four key challenges to this process are described below.\(^6\)

(a) Corruption and Governance: There is considerable literature dealing with the negative effects on economic and political development as a result of large natural resource revenues generated in developing countries – the so-called “resource curse” (see, e.g., Sala-i-Martin, 2003). Nigeria is often cited as a prime example of the resource curse (Sala-i-Martin 3). Despite yearly oil sector royalties and revenues approaching USD26 billion, poverty remains rife; especially in rural areas such as the Niger Delta, with close to 75\% of people living on incomes of below USD1 per day (UNDP, Web 2012). Continued lack of development in the context of great resource wealth is largely the result of both direct and indirect misappropriation of oil sector revenues over time – a fact that is magnified by weak regulation and public oversight. Indeed, institutional capacity and development remains very poor, with government ministries lacking human capacity and credibility, and regulatory agencies lacking the ability, willingness and mandate to effectively execute their functions (Oladipo 89). Technical capacity to develop and implement complex and broad-ranging adaptation policy is currently limited within Federal Ministries and even more so at the state level (BAH, Interview 2012). With a limited resource base, there is also very narrow scope for investment in personnel, training and equipment (Oladipo 88). This is a major issue, which impedes both the determination of adaptation policy and its concrete implementation within communities.

(b) Revenues: While the Federal Government receives significant revenues in the form of royalties from oil production (making up about 85\% of total budgetary revenue), Nigeria remains a relatively poor country by global standards, with a total government budget of USD31 billion (2012), a Human Development Index of 0.58 out of 1.0 (2010), GDP per capita of just over USD1000 per year, and a very limited tax base outside of the oil sector (UNDP, Nigeria Country Profile Web). Indeed, Nigeria’s per capita income figure is highly skewed given the concentrations of wealth among government officials and the oil sector elite. Given these constraints, the Federal Government has quite limited capacity to address the breadth of developmental challenges in the country. As a result, strict prioritization of public programs and policies is required and many competing needs cannot be met. To a large extent, adaptation policy (in its purest form) suffers from a lack of prioritization.

(c) Reach of the State: The combination of the aforementioned two factors means that the reach of the Nigerian State to its constituents is often very limited, most markedly in rural areas such as much of the Niger Delta. In rural areas, the State is
often simply absent in the day-to-day lives of individuals – with insufficient resources and institutional capacity for programs to concretely affect socio-economic outcomes in communities. Over time, a key impact of this has been a basic undermining of the working relationship between governments and communities, and an increasing lack of government credibility among the population. This increasingly fraught relationship between constituents and the political class only works to enhance existing limitations within Nigeria’s institutions, governance practices and political influence (BAH, Interview 2012).

(d) Regional Security: The Niger Delta has a long and complex history of unrest and sporadic violence resulting from identity and economic issues stemming from a legacy of colonial imperialism, the distribution of oil revenues, socio-economic disparities and environmental concerns. This unrest disrupts communities, regularly interrupts oil exports, diverts resources towards enhancing security in the Delta at the expense of other developmental priorities and contributes to an uncertain investment and business climate. As such, just as adaptation policy must be integrated within broader development policy, security-related concerns should be mainstreamed within climate adaptation measures, and adaptation policy responses should seek to address the underlying issues that can trigger violent conflict, including migration, access to infrastructure and services, and competition over resources.

D) FOCAL AREA ANALYSIS: ENHANCING FOOD, WATER AND ENERGY SECURITY THROUGH ADAPTATION POLICY

Despite the aforementioned constraints, the pressing challenges posed by climate change require a concerted adaptation policy response from governments, working with international aid partners, NGOs, civil society and the private sector to enhance climate resilience in the Niger Delta. The climate change Impact Assessment for the Niger Delta demonstrates the clear threats that climate change poses for food, water and energy security in the region, as well as potential opportunities resulting from climatic changes over time. There is much that can be done to immediately begin the process of enhancing climate resilience in the Delta in each of the three focal areas. The following three sections (D1-3) examine ways that food security, water security and energy security might be augmented through adaptation policy. Section E then looks at cross-cutting issues that affect adaptation policy broadly, distilling recommendations that spill over across focal areas.

Given inevitably incomplete information regarding the precise priorities and resources of Nigerian Government agencies and of international organizations, this report does not attempt to concretely prioritize certain potential interventions to enhance adaptive capacity over others. Methodologically, the key gaps in current adaptation policy in the Delta were identified based on an understanding of likely climate change impacts over time in the Delta, and policy solutions to address each of these gaps have been made. This report does, however, provide an illustrative sequencing timeline for implementation of each of the recommendations contained here, as set out in Section F, below.

D1. FOOD SECURITY

(a) Threats and Opportunities for Food Security

Climate change in the Niger Delta poses a number of threats for food security, some of which may be managed or turned into opportunities. The projected increase in rainfall variability in the Delta will make optimal planting times difficult to predict, threatening agricultural productivity (Uyigue 21). However, harvesting the projected rainfall increases could result in increased crop productivity. The predicted initial increases in temperature through the first half of the century are likely to improve yields. Fish productivity is at risk from climate impacts on mangroves and fisheries. Finally, insufficient infrastructure, technological capacity, market access, and institutional capacity currently exacerbate climate change threats to food security in the Delta.

(b) Current efforts to adapt to climate change-related food security impacts

Dr. Asimiea, from the University of Port Harcourt, asserts “there are no specific climate change adaptation efforts related to food security in the Niger Delta now” (E-Mail). Looking forward, the NASPA suggests that the focus on adaptation interventions in regard to food security should lie in the savannah zones, particularly the Sahel, and not the Delta (BNRCC National Adaptation Strategy 36). The most comprehensive development initiative for the Niger Delta, the Niger Delta Regional Development Master Plan (NDRDMP), does not explicitly incorporate policy recommendations with regard to
adaptive capacity; however, it does recognize agriculture and aquaculture as one of its focus areas (Web). The NBA, in turn, centers on water and hydroelectric resources (NBA Web).

In addition to the World Bank Group’s (WBG) work in the larger Niger Basin, IBRD and USAID undertake projects on food security in Nigeria, but not focused on the Niger Delta. IBRD runs a Commercial Agriculture Development Project targeted on improving market access in selected value chains with a geographic scope covering all Nigeria (WBG, Commercial Agriculture Development Web). USAID explicitly focuses on the non-Delta states of Bauchi and Sokoto (USAID, Expanded Access Web).

Although adaptation interventions to climate change in the Niger Delta are mostly lacking, Nigeria has attempted food security interventions on a national level. In a comprehensive analysis, the International Food Policy Research Institute (IFPRI) identified the National Food and Nutrition Policy and National Plan of Action for Food and Nutrition as two of the key policy strategies for improving food security. These initiatives to improve food security, however, have mostly been unsuccessful. IFPRI claims that the faulty and/or non-implementation of these strategies is to blame for food insecurity and malnutrition in rural Nigeria. Further, IFPRI claims that the lack of capacity at Nigeria’s institutions impedes the implementation of food security strategies (Akinyele 42 & 64).

(c) Policy Gaps and Recommended Policies

Policy Recommendation 1: Develop a climate services system to provide climate information to players along the agricultural value chain, combined with training of farmers to adopt strategies in response to climate information.

Information about current and changing weather and climate conditions is often unavailable to end users in the Niger Delta, especially at the grass-roots level. Smallholder farmers and other agricultural players are, for the most part, missing important information on intra-seasonal climate and weather conditions and variability, as well as longer-term trends relevant to their decision-making. The ultimate goal of climate services in food security is to allow actors in the agricultural value chains to better manage risks from climate change and variability. Such a system should include (i) the collection of climate data, (ii) the analysis of data to create context-specific climate information, (iii) the dissemination of data to end users, and (iv) the training of end users to use climate information to develop adaptation strategies (Hewitson 5).

NIMET, for example, should improve its capacity in the Delta to collect and analyze localized weather and climate data. The data analysis should keep in mind the diverse needs of all relevant stakeholders, from end users, such as farmers, businesses, government and civil society organizations, to universities, research institutes and NIMET. This way the data providers will be informed about the requirements of the data users, and data providers can negotiate with data users on how relevant information can be provided most effectively. The dissemination of data to farmers should utilize modern communication technologies as well as existing organizational structures – especially mobile phones, but also the Internet and radio transmission services.

Lastly, users need to be provided the necessary skills and knowledge to apply the climate information they receive. For smallholder farmers, for example, this knowledge transfer can be added to conventional extension services. Training could cover how to vary fertilizer application under different weather forecast scenarios, adjusting planting and harvesting cycles, and informing the farmer about available seed varieties, which perform better in extreme weather conditions.

Policy Recommendation 2: Expand viable financial risk mitigation tools for farmers, especially through insurance linked to weather-related events.

Even if farmers had better information about weather events and the appropriate skills to utilize the information to adopt adaptation strategies, there exist many risks they will not be able to mitigate by themselves. Extended periods of drought or extreme flooding can, of course, severely impact productivity and income levels.

There are several possible financial risk mitigation tools for farmers. Insurance policies linked to an index measuring weather related impacts on productivity – sometimes called weather-index insurance – are an innovation to potentially increase the
provision of risk mitigation tools for farmers. Conventional agriculture insurance is currently only provided by the Nigeria Agricultural Insurance Corporation (NAIC) (International Center for Nigerian Law Web) as commercial insurance companies have exited the agricultural sector over time due to unattractive business opportunities. First, government subsidies for agricultural insurance should also be made available for insurance policies sold by private insurers, where it is available for NAIC. Second, because of the difficulties in scaling up conventional agriculture insurance, weather-index insurance could be promoted. It could be introduced in the Niger Delta through a pilot involving NAIC, NIMET and an international intermediary with experience in weather-index insurance, such as the Syngenta Foundation or Swiss Re. The pilot could be started in a specific state that expresses high interest and is prepared to contribute to investments in set-up costs. The insurance provider could enter into a contract with a farmer-based organization (FBO) or cooperatives, focused around a specific crop such as cassava.

**Policy Recommendation 3:** Increase the resilience of agricultural input delivery systems to adapt to climate change and variability, both for short-term farm level management and for long term planning, and promote sustainable agriculture to reduce dependence on input systems.

The adoption of agricultural inputs, such as fertilizers, agrochemicals and improved seeds has thus far been low in the Niger Delta (NDRDMP 76). In response, the NDRDMP incorporates planned actions to improve the input delivery system and the International Fertilizer Development Company launched the Nigeria Fertilizer Voucher Program (NDRDMP 130; IFDC Web).

These programs to improve input uptake of smallholder farmers should incorporate mechanisms to improve the resilience of the delivery system. Increased variability in precipitation patterns and temperature will lead to increased variability in start dates and lengths of growing seasons. All players along the input value chain need to be provided with timely climate information to adjust their delivery systems (using climate services as described in Policy Recommendation 1). Public interventions, such as fertilizer subsidies, also need to become more flexible to allow for anticipatory policy and decision-making. Also, long term planning, such as roads for input delivery, or the location of seed companies and research centers, need to be more resilient to climate dynamics. Furthermore, seed varieties that are especially resilient to climate change (e.g. varieties resistant to extreme weather events such as flooding and higher temperatures or fast germinating seeds) need to be promoted and the capacity of the production of improved seed varieties need to be strengthened.

Additionally, sustainable agricultural practices should be promoted to reduce the dependence of smallholder farmers on an insufficiently functioning input delivery system. Sustainable agricultural practices should, for example, include no-till farming, soil amendment, wind breaks, crop rotation, structures to prevent runoff, and involve addressing other issues discussed elsewhere (e.g., water, flood and storage, and water pollution).

Where necessary, the agriculture input system should be strengthened overall to improve sustainable input uptake of smallholder farmers, taking into account the potential negative environmental impacts of overuse of chemical fertilizer. Past initiatives have often not been successful and innovative models, such as loan guarantee funds to improve access to credit, should be expanded. Improved uptake of inputs would lead to higher yields and higher incomes for smallholders, which in turn increases their adaptive capacity to negative impacts of climate change.

**Policy Recommendation 4:** Invest in climate research and capacity for agriculture applications.

Addressing the compromised capacity of decision-makers, policy researchers, and policy developers across Nigeria, as well as in the Delta specifically, would support food security initiatives in the face of changing climate conditions and institutional arrangements. Many decision-makers in Nigeria lack the information to assess climate and food security risk and to monitor program outcomes, especially given the dearth of localized data. As a result, decision-making, prioritization and ultimately, adequate resource allocation to food security at the local level is weak (Akineyele 51 & 55). Furthermore, a lack of strong institutional arrangements and continuity in approach by successive governments result in unclear roles and accountabilities and, as such, poor program coordination (Akineyele 51 & 55).

There are a few institutions, such as the Institute for Agricultural Research and Development, the University of Port Harcourt, and the Federal University of Agriculture Umudike, that are engaged in studies regarding climate resilience as it applies to
agriculture (Asimiea E-Mail). However, further enhancing the limited skills and capacity of institutions in the Delta to analyze climate change, adaptation and food security information in a local context will support sustainable policies and justify prioritization and resource allocation to food security. Building up viable and locally relevant datasets will support critical assessment, analysis and monitoring of food security. Improving program implementation will initiate a virtuous cycle that prioritizes effective food security initiatives through improved resource allocation.

Finally, investing in and/or promoting knowledge sharing, practical research and social collaboration across government and civil society will support collaboration at all levels (BNRCC 36). Specifically, investments should be made in agricultural Centers of Excellence at the local and state ministry level, to support workforce development in agriculture, environmental protection, climate change adaptation, food security, finance, and other critical areas of competence. Additionally, investing in the capacity of local universities to support these research areas will not only lend a trusted and unbiased voice to the decision-making process, but also give consistency to the dialogue that changing governments cannot provide. Agriculture and climate change institutes should be installed or enhanced at universities in the Delta, such as the Michael Okpara University of Agriculture in Abia State (Akinyele 66). Given limited resources, collaboration and sharing lessons learned between institutions should be actively encouraged (BNRCC 37).

D2. WATER SECURITY

(a) Threats and Opportunities for Water Security

The Niger Delta faces a particular set of water security threats. Only a small percentage of the region has access to safe drinking water, and water security is significantly compromised by pollution and contamination from oil extraction (Omoweh 2). In addition, Nigeria’s water infrastructure suffers from poor operation, management and maintenance, and a lack of capacity in various national agencies to fully incorporate climate change and water insecurity into their policy priorities is of concern (UNDP, Niger Delta Human Development Report 9).

One of the major climate change-related threats to already-compromised water security is expected sea level rise in coastal areas (SLR). SLR and repeated ocean surges will increase floods and seawater intrusion into freshwater sources (Ogba and Utang 8). The increased salinity of surface and groundwater will threaten the availability and quality of drinking water (Ayodele 114). In addition, there is a very high competition for water usage among different sectors, such as irrigation in agriculture and hydropower energy generation. The most striking opportunity out of existing challenges arises from projected higher total annual rainfall and heavy precipitation, which will increase total water supply. If stored and managed effectively, this could work to enhance water security.

(b) Current efforts to adapt to climate change related water security impacts

Climate change adaptation in the water sector is a new concept in both the Niger Basin and within the Nigerian government. The concept has yet to penetrate the Niger Delta’s regional and local institutions. At the Niger Basin level, the WBG and the NBA are currently leading a climate risk assessment to identify risks and opportunities of hydrological changes caused by climate change. This effort will lead to the introduction of climate risk management in the implementation of the Development Action Plan for the Basin (Pswarayi-Riddihough, Interview 2012).

At the national level, water policy, which is led by the Federal Ministry of Water Resources (FMWR), has historically focused on improving access to water and sanitation. However, the FMWR has recently expanded its mission to areas that promote the conservation of fresh water ecosystems. Another effort to strengthen water resources management and climate change concepts within Nigeria’s water policy is the creation of a National Integrated Water Resources Management Commission (NIWRMC). Several data-gathering projects led by the National Hydrological Services Agency (NHSA) show the increasing importance of hydrological data for water management.

While the NASPA proposes very specific policy objectives of adaptation in the water sector, including programs to survey groundwater water quality and quantity, an analysis of the NDRDMP shows that at the Niger Delta and state levels, water
policy still focuses on expanding the supply of water and sanitation. Likewise, State Water Boards, in charge of operating and controlling water supply systems, still need to incorporate climate change variables within their operations.

The successful implementation of climate change adaptation within water policies will influence the extent to which water security is improved in the Niger Delta. However, several initiatives to improve water security have not had the desired effect (WaterAid, Web).

(c) Policy Gaps and Recommended Policies

In general, the most relevant gap in current water policy is the failure to include climate change considerations in all frameworks that affect water in the Niger Delta. Investment plans and inter-institutional cooperation initiatives have yet to incorporate climate change as a major factor influencing current and future water sector development.

**Policy Recommendation 5: Consolidate an Integrated Water Resources Management approach for the Basin and the Delta, which incorporates likely climate change impacts.**

The scope of water policy at the Basin and National levels is broadening to incorporate a perspective of Integrated Water Resources Management (IWRM). However, the programs implemented with this perspective have not incorporated climate change considerations. Using climate change scenarios to develop water resource management capacity and to protect key watershed areas will improve the Delta’s resiliency to the impacts of climate change.

The Niger Delta Basin Development Authority (NBDA) can require climate change scenarios to be incorporated in estimating and managing the impacts of upstream hydropower dams on the Delta. For example, scenarios of future rainfall patterns can complement the impact analyses of dams on the Delta’s water quality and quantity, in the face of changing water demands and the need to maintain environmental flows (Slootweg 2). Likewise, the NBDA can incorporate climate change projections in hydrological data to help the decision-making process regarding the allocation of water resources among different users. The projected impacts of climate change may require restructuring the allocation criteria to minimize conflicts between extractive industries, energy, agriculture and domestic users (Goulden 2). Coordination between the NBDA, the NIWRMC, NIMET, HNSA and local universities such as University of Port Harcourt is required to ensure the proper scale and quality of the data.

Finally, IWRM must consider the implementation of plans to protect key watershed areas to strengthen the resiliency of the Niger Delta ecosystems to climate change. The FME can implement remote sensing and GIS to identify hotspots in the Niger Delta’s ecosystems, and design plans, with the participation of NBDA, local governments and communities, to protect degraded mangrove and swamps forest areas (Twumasi 8). These activities can be implemented using mechanisms such as payment for environmental services, in schemes similar to The Nature Conservancy Water Funds in Latin America (TNC Web).

**Policy Recommendation 6: Build climate resiliency in infrastructure investments in water access, treatment, storage and flood control.**

Current infrastructure plans to improve water security in the Delta lack climate resiliency. Water security can be threatened if infrastructure is damaged by flooding and saltwater intrusion. Investments in storage may be underused if they do not consider changes in rainfall patterns. Climate-resilient infrastructure is likely to last for longer periods and maximize the benefits in terms of higher quality and quantity of drinking water. Storage systems that consider changing precipitation are more reliable in providing water for communities.

The Niger Delta’s State Water Boards and the NBDA must assess the need to construct structures to protect water uptake installations from flooding and saltwater intrusion. Water Boards need to abstain from building treatment plants and major pipes in areas that are subject to flooding and storm surges (NDRDMP 132). Local governments and communities need to assess if low-scale dams and water storage systems are suited to respond to changing rainfall patterns (Afouda 8). Future plans to increase water storage should build on community techniques for rainwater harvesting.
Policy Recommendation 7: Tighten and enact policies to prevent, reduce and restore water sources in the Delta from oil pollution and other factors.

Most surface waters in the Niger Delta have been degraded through pollution and contamination from oil activities (Ogba and Utang 6). Pollution continues to occur from lack of wastewater treatment, gas flaring, canalization and oil spills among other contaminating factors (UNDP, Niger Delta Human Development 76 & 78 & 87). Tightening and strengthening laws and standards and ensuring compliance by polluting actors are essential to increase climate change resiliency.

The FME administers and enforces environmental laws in Nigeria (GLG 273 Web). The FME has published several guidelines for the administration of the Federal Environmental Protection Agency Act and Environmental Impact Assessment Act. These are seen in the literature as the most serious attempts to protect the environment. However, the laws in the acts do not adequately address the environmental problems in the Niger Delta area (Idaba 63). For example, the laws created gaps that have been exploited by oil companies to the disadvantage of the Niger Delta environment (Idaba 64). They do not cover activities such as indiscriminate logging, environmentally unfriendly agricultural practices, the use of dangerous chemicals for fishing and more. Also, the laws only prescribe a considerably small fine for oil-companies. This makes it easier to pay the fine rather than to clean up the sites (Idaba 63). In addition, existing laws prescribe that cases against oil companies can only be heard in Federal Courts, which are out of reach for most rural communities (UNDP, Niger Delta Human Development 81).

It is essential that the provisions of the laws do not weaken enforcement. It is important to improve the existing laws and ensure stricter language, determining larger fines for the actors and creating greater penalties for violations. If the laws are not comprehensive, it will create gaps and the polluting actors will find ways to exploit them. The laws should not be isolated, but included into other development strategies. Consequently, it is important to enhance the capacity of the FME, by ensuring greater investment in data collection technology and staff that is able to identify pollution sites. Greater enforcement can be assured by strengthening monitoring mechanisms and cleanup systems. Raising awareness of issues regarding pollution and enhancing knowledge of the connections between climate change and pollution will be necessary to build resilience in this area.

Policy Recommendation 8: Strengthen Nigeria’s capacity to provide accurate baseline hydrological data and transfer knowledge about climate change variables to local communities.

The production of hydrological data currently lacks a forward-looking approach with respect to climate change impacts and changing socioeconomic factors. For example, current efforts of hydrological mapping led by the NHSA do not specifically target climate change variables. This provides inadequate baseline information needed for successful adaptation. On the other hand, there is no effective coordination between the agencies that participate in the process of producing and monitoring hydrological data (NHSA Web). The lack of capacity to collect baseline data is also seen through the few functioning hydrological stations in Nigeria, which are needed to inform communities and increase climate resiliency.

It is not only important to be capable of producing the necessary hydrological information, but also to effectively communicate the collected data to end-users at the community level, which will help increase awareness and knowledge (BAH, Interview 2012). In order for the NHSA to effectively do so, hydrological stations that gather data need to be increased and the existing ones improved. Financing projects that analyze the effects of climate change on water users is important to understand how to decrease vulnerability. In addition, local staff have to be trained to understand and disseminate information. Once climate change-related information is gathered, local stakeholders such as community-based NGOs, churches or universities can be involved for distribution, raising awareness, and building resiliency. In particular, the involvement of mothers and women needs to be stressed, as they are crucial for adaptation (BAH, Interview 2012). Greater coordination with national actors such as NIMET and NBDA as well as international actors such as the World Meteorological Organization, International Association of Hydro-geologists or other UN agencies will help to facilitate this process.

Policy Recommendation 9: Strengthen Nigeria’s water and environmental institutions and their communication, with special regard to coordinating bodies such as the NIWRMC.
Many agencies that are responsible for enforcing environmental and water laws in Nigeria lack the capacity, autonomy and transparency to effectively implement and enforce policies or allocate resources. This deficiency affects the potential for climate change adaptation in Nigeria and the Delta. Furthermore, actors that directly aim to build coordination and inclusion of climate change in water and environmental policy were established only a few years ago and are in need of training and financing. The importance of coordination not only lies in the development of a sound climate policy, it will also help in understanding the collateral benefits of climate change adaptation (IFC, Interview 2012).

One form of coordination is through the NIWRMC. This commission is highly important to ensure and create synergies among all stakeholders that use water, yet it needs adequate funding, skilled personnel and training. It is important to include representatives from the community and officials from the Niger Delta in the Commission, since the region is strategic to the country’s natural resources and economic activity. There should be a constant dialogue between the NIWRMC and actors such as the Special Climate Change Unit within the FME. These agencies should undertake joint studies to understand the inter-linkages between water and climate change, and to increase public awareness (FME, Special Climate Web). By doing so, water resource management will be constantly linked to the threats and opportunities of climate change. Different actors within various levels, such as the FMWR, the NBDA, and the State Water Boards in the Delta need to be in constant dialogue through continuous roundtables and potentially forming a coalition, so that these actors understand climate change and are able through this knowledge to allocate enough time and resources towards effective adaptation.

D3. ENERGY SECURITY

(a) Climate Change Threats and Opportunities in Energy Security

Due to the combination of robust population growth, developmental challenges, predicted shortcomings from large-scale hydropower, and decreasing access to traditional biomass fuel, the Niger Delta must diversify energy consumption to adapt to forecasted climate change effects. These factors are compounded by the lack of diversity in, and vulnerability of, Nigeria’s current sources of energy. Adaptation will likely entail a greater emphasis on natural gas usage, hydropower, and new sources of small-scale electricity generation such as micro-solar and hydropower. Diversification of the local energy mix will concretely increase adaptive capacity.

Due to issues in electricity generation, efficiency, distribution, and pricing, Nigeria is only able to meet about 50% of its demand for power. Natural gas is an increasingly valuable fuel with rapidly growing demand in international markets and significant domestic potential. However, Nigeria remains one of the top two countries engaged in flaring natural gas (Oni and Oyewo 24). The majority of flaring occurs in the Delta, which is the source of more than 90% of Nigeria’s total petroleum exports (Akpabio and Akpan 1). Transitioning from flaring to the capture and use of natural gas presents a significant opportunity to enhance energy security, build local industry, and reduce the effects of climate change. Developing decentralized renewable energy (DRE) and natural gas for household use has the potential to reduce dependence on biomass. Rapid deforestation and exponential population growth mean that biomass availability is quickly decreasing, requiring Delta residents to find alternative fuel sources.

The forecasted intensification of severe weather events resulting from climate change presents an additional threat to Nigerian energy security. Nigeria’s current electrical and industrial infrastructure lacks resilience and has become increasingly vulnerable and less reliable due to lack of maintenance and increased pressure from a growing population. The WBG estimates the annual aggregate social cost of infrastructure inadequacy to be 3.7% of Nigeria’s GDP (Foster 26). With increased severe weather events expected to occur in the Delta as a result of climate change and without increased spending on infrastructure development, the existing energy infrastructure will become increasingly vulnerable to weather events. Potential outcomes could include damage to the electrical grid, or supply chain disruptions in petroleum extraction supply, which also disrupt the government’s primary revenue stream.

(b) Current efforts to adapt to climate change-related energy security impacts

Nigeria has a Renewable Energy Master Plan that looks to promote solar energy on a large scale (Obioh and Fagbenle 1031). Although the Federal Government has expressed an interest in developing small-scale renewables to supplement the grid, as
envisaged through the National Integrated Power Project, it has yet to make significant progress in support of these goals (Okoronkwo Web). In 2008, USAID launched a project that invests in clean energy in Nigeria, with the stated purpose of a reduction in carbon emissions, while also supporting the Nigerian Energy and Climate Change Project, through which it backed “new entrants in local renewable generation” (Fulfilling Our Commitment 10). The NDDC is training young Delta residents in maintenance and repair of solar systems (NDDC). The WBG, United National Development Programme (UNDP), and UNICEF are supporting solar power installation projects (Obioh and Fagbenle 28).

The improvement of energy efficiency can magnify the impacts of renewable energy projects, thereby facilitating sustainable development. The use of older equipment in Nigeria is a significant source of energy loss (Uyigue 25). Recognizing this, in 2009 the UNDP Nigeria Country Office and the Global Environment Facility (GEF) launched the GEF Energy Efficiency Project. This project seeks to improve energy efficiency in end-use equipment, such as air conditioners (UNDP, Promoting Energy Efficiency 8). Most emphasis has been on increasing the power supply; Nigeria’s chronic power shortages have resulted in high levels of transmission loss. The NPC’s ‘Vision 2020’ aims to reduce this transmission loss from 40% to less than 20% by 2013 (NPC, Vision 2020 Sector Plans 83). Apart from these efforts and outside of the inefficiency of extractive energy projects due to illegal siphoning operations, there has been very little discussion of energy efficiency projects in most official plans such as the NDDC Master Plan. 46

The United Nations Industrial Development Organisation (UNIDO) has six small-scale hydropower pilot projects in Nigeria, in which it is attempting to build local capacity, promote technology transfer, and provide mechanical training. The current focus in Nigeria has been on providing lighting for rural communities, but electricity produced would ideally also be used for income-generating economic activity with the eventual goal of increasing local income levels and stimulating the development of small and medium enterprises (UNIDO Web). A more robust local economy would improve quality of life, decrease economic vulnerability and provide greater employment opportunities. As well as reducing dependence on increasingly scarce biomass, these effects would go far into creating a population less vulnerable to the negative effects of climate change. In addition to renewable energy development, international players, such as the WBG and USAID, are involved in mitigation activities in Nigeria and the Delta, with an emphasis on the reduction of flaring. 47

Nigeria’s main large-scale hydropower plants currently produce approximately 40% of its electricity; although changes in rainfall patterns in recent years and poor maintenance has resulted in a considerable plant output reduction (HCWAEA 3; Sirte 5). The WBG has signed on with nine Niger Basin countries, including Nigeria, to rehabilitate the Kainji Hydro Power Plant in the Niger Basin, which it is estimated will generate an additional 240 MW of power for the Nigerian grid. Past studies of dams for the Niger River have demonstrated that water management practices in partner countries can have negative impacts on the downstream communities in the Delta, including more severe flooding during seasonal rains, in a less predictable pattern (due to flooding following the opening of dams upstream rather than following a heavy rainfall) (Olukanbi Web). Additionally, other studies have demonstrated the negative social and economic effects of hydro plants on the Niger River on communities in central Nigeria (Usman Web). Both positive and negative effects were most acutely felt in income-generating fields, while the existing social net was demonstrated to fall short in terms of mitigating negative effects. Additionally, the strategic and social infrastructure was found to be lacking to the degree that all the potential benefits of the plants were not realized.

(c) Policy Gaps and Recommended Policies

**Policy Recommendation 10:** In order to address the challenge of providing energy to rural areas and diversifying current energy sources, promote decentralized renewable energy projects, including solar energy and small-scale hydropower.

DRE development has the potential to bridge the electrification deficit for rural communities in the Niger Delta. By providing locally generated electricity to rural communities, DRE can provide an alternative to biomass, contributing to poverty alleviation as well as to climate change mitigation efforts (Venema 877). Impediments to implementation include the relatively high cost of solar panels and the technical nature of their upkeep. Additional challenges may be posed by a less predictable solar profile resulting from climate change (Obioh and Fagbenle 2 & 28).
USAID is providing funding and assistance to solar electrification projects, such as that in the Jigawa State (Omisore Web). On the ground, local partners can continue to play a vital role in installing and maintaining solar panels. For example, the NDDC is actively training youth in the maintenance and repair of solar systems in the Delta (NDDC Web).

Small-scale hydropower offers a relatively affordable DRE option that suits the characteristics the Delta (i.e., a largely rural population without extensive existing infrastructure). The Federal Government recently announced that it will begin to generate power from 200 micro- and mini-dams scattered across the country, many of which are uncompleted or abandoned (Alohan Web). In order to address the repair and management of the micro-dams, the government is calling for assistance from private partners. The government should partner with communities on the ground to train local people in operations, maintenance, and repair. Such partnerships would create employment and foster local ownership, which would contribute to the long-term sustainability of these projects and investments. It is imperative that these hydro projects be constructed under high standards and specifications for resiliency and site selection (in conjunction with updated 10, 20, and 50- year floodplain mapping efforts); climate change projections in the Niger Delta forecast more intense storms, increased rainfall variability, and rising storm surges (Obio and Fagbenle 18). The decentralization and diversification of the Delta's energy sector would create redundancies in energy infrastructure and reduce the risk of major system disruptions and economic shock that would likely result from increased severe weather patterns. DRE development should be complemented by energy efficiency projects, in order to ensure that the power generated is not wasted.

**Policy Recommendation 11:** Prioritize the transition from flaring natural gas to capturing and selling it into the domestic market. This will stimulate the local economy and promote domestic natural gas usage at both the industrial and household levels.

Harnessing natural gas through the cessation of flaring is vital to adaptation efforts. Resilience to climate change in the Niger Delta will be significantly improved via diversification of energy sources. To date, the financial incentives to promote industrial and domestic consumption of natural gas have not succeeded in eliminating gas flaring at petroleum extraction sites (Oni and Oyewo 27). While great potential exists for efficient consumption of natural gas by industrial and private consumers, a myriad of issues prevent the uptake of gas as a primary energy source. These include a lack of: 1) gas supply infrastructure (reservoirs for storage and pipelines for transmission); 2) a clear regulatory framework for gas production, distribution, and pricing; and 3) financial incentives to aid in the development of a gas infrastructure (Ukpohor 2). The government of Nigeria is challenged by the conflicting need to make gas affordable for domestic usage and to create price incentives for investment in infrastructure for storage and distribution.

The Federal Government is increasingly looking to encourage private sector investment in natural gas-based industries, such as fertilizer and petrochemicals (Economides 137). This will likely require forms of government support, such as subsidies or tax breaks, for potential investors. The legal and regulatory framework governing infrastructure development in the Niger Delta is lacking, and encourages corruption and resource misappropriation (Onyeukwu 4). Optimizing pricing requires the establishment of a competitive and structurally transparent domestic market for natural gas (Economides 137). To ensure domestic demand, governments should initially seek to subsidize natural gas prices to guarantee that they remain below prices of competing energy sources. Over time, gradually reducing the subsidy by raising the domestic price to the level will contribute to long-term market sustainability. Provision of energy subsidies in the developing world is both an art and a science, and must be approached, monitored, and managed with a long-term view in mind. Both IBRD and IFC have significant experience in this domain; their advice and counsel would surely be welcome by the Federal Government.

**Policy Recommendation 12:** Pursue environmental impact studies and modify large-scale hydropower projects to minimize negative consequences while increasing capacity and robustness of infrastructure to serve population needs and withstand projected impacts of climate change.

While smaller, off-the-grid hydro projects are promising to bring power sources to the Delta’s large rural population, the sheer volume of demand for electricity prompted by the growing local population requires a larger solution. Large-scale hydropower projects offer promise, but implementation should be optimized in the following ways to serve the needs of the population while adapting to projected climate change. The full social, economic, and environmental impact of planned dam projects have yet to be fully explored in the context of the Delta, and the government has yet to implement the social safety net
and economic infrastructure to mitigate the negative effects downstream while creating local capacity to adapt and harness the full benefits of projects.

Partners involved in planning future and continuing current large-scale hydropower projects should complete comprehensive assessments of the down-stream impacts of damming the Niger River. Projected higher temperatures would increase evaporation rates, the cumulative effects of which would compound water constraints downstream for agriculture, industrial, and private use. Damming would likely make water bodies more shallow, which would, in turn, increase sediment accumulation issues. Infrastructure partners and the government should ensure they understand forecasted impacts and that they create the local capacity to adapt to social, economic, and environmental changes (e.g. find alternate forms of employment for farmers who would lose land through enacting local content laws and creating a power-maintenance workforce). Partners in large-scale projects should also increase local capacity to take full advantage of the benefits, such as ensuring that population centers have a robust grid to capture and distribute the electricity generated. Climate change projections suggest that likely increases in rainfall variability and extreme weather events would test the resilience of energy infrastructure. Projected increases in extreme weather events require the government to enact higher construction standards to ensure the resiliency of the infrastructure and to ensure the security of service delivery.

The Kainji Hydro Power Plant rehabilitation project has great potential to address Nigeria’s chronically insufficient power production capabilities without producing greenhouse gas emissions (Niger Basin Water Resources Web). Currently, however, it seems that impact assessments as currently formulated have not explored the forecasted effects of climate change and adaptation needs. Partners in the project should form partnerships with universities to pursue these studies and to undertake research to identify ways to mitigate potential impacts. Although rainfall is projected to remain relatively constant in the Delta, the projected decrease in rainfall in northern Nigeria, as well as changes to the Niger River downstream due to physical alternations to the proposed dam, will inevitably have implications for populations living in the Delta.

E) CROSS-CUTTING ISSUES

1. Institutional Approaches to Development and Climate Adaptation Policy

Building resilience to climate change requires a dynamic understanding of the linkages between climate impacts and development policies. As the International Human Dimensions Program on Global Environmental Change notes, the interaction of multiple stresses occurring at various scales often reduces adaptive capacity to cope with climate change impacts. Thus, “vulnerability is exacerbated by existing developmental challenges such as poverty, complex governance issues, weak institutions, limited access to capital and markets, infrastructure and technology, ecosystem degradation, disasters, and conflicts” (IHDP 1). As such, mainstreaming climate change adaptation policy within the context of broader economic development policies and programs is an effective way to increase climate resilience and build adaptive capacity.

As discussed in Section C, climate change adaptation policy in the Niger Delta and Nigeria more broadly has been largely ineffective due to a lack of initiative, weak government capacity, poor coordination, lack of information, and corruption. To successfully implement the food, water, and energy security policy recommendations discussed above, all levels of Nigerian government and international, civil society, and private sector partners must seek to create an enabling institutional environment to ensure that climate adaptation efforts are mainstreamed within broader development policy.

A number of institutional approaches have been identified as best practices in supporting climate change adaptation. The IBRD utilizes a “T-model” in its work on climate change adaptation planning throughout the Niger Basin. The “T-model” combines a broader supra-national perspective on risks and impacts, with an analysis of specific, in-depth local needs and challenges in identifying appropriate policy responses (Pswarayi-Riddihough, Interview 2012). Understanding local threats and impacts within a broader regional context enables a more effective coordination of responses across scales and jurisdictions. Likewise, sectoral responses should be coordinated across ministries and government agencies to ensure that policy responses do not operate in isolation, but are mutually reinforcing. Therefore, coordinating agencies, such as the Ministry of Finance or Ministry of Planning should facilitate adaptation efforts across government agencies, while implementing agencies, such as the Ministry of Environment, should be empowered to address specific needs and enact specific policy measures (Pswarayi-Riddihough, Interview 2012). Towards this end, the successful implementation of climate change adaptation
policies requires identifying synergies among competing and conflicting interests, both within government and across community, NGO, private sector, and donor stakeholders (BAH, Interview 2012). Such an approach necessitates the integration of top-down government-led policies with bottom-up, community-led efforts, characterized by robust communication (BAH, Interview 2012). For this reason, USAID emphasizes the role of engagement and participation in the adaptation process, and the establishment of venues and mechanisms for participation that enable government, civil society, and private sector stakeholders to develop agreement on climate risks and priorities (USAID, Interview 2012). To ultimately succeed, climate change adaptation policies in the Niger Delta require enhanced governance capacity, and institutions that are flexible and responsive to dynamic, multi-faceted risks and opportunities (USAID, Interview 2012).

2. Enabling Development Priorities

Keeping these best practices in mind, several development-related initiatives must be undertaken to support broader economic development in Nigeria and the Niger Delta, and hence build overall adaptive capacity within the region.

(a) Tax Reform & Public Financial Management: Nigeria faces well-documented challenges related to oil wealth, development, and public financial management. According to a World Bank report, the Nigerian government has achieved very low levels of capital accumulation despite high oil rents (WBG, Where is the Wealth of Nations 53). As USAID’s 2010-13 Nigeria partnership strategy notes, “the lack of transparency, accountability, and fiscal responsibility in the management of government revenues at all levels has set economic development back by decades” (USAID, Nigeria Strategy 1).

In recent years, the Federal Government has initiated reforms to improve the management of its oil wealth, using a conservative reference price for oil as the basis for budget projections and public spending to insulate government spending from oil price volatility shocks and to enable some oil revenue to be channeled into savings (WBG, Nigeria: Financial Sector Web). These reforms should be continued and expanded. To ensure that oil revenues are better utilized, and that the benefits of Nigeria’s oil wealth redress the negative impacts exerted on the Delta, the Nigerian Government should institute tax reforms to enable greater transfer of public spending from federal to state and local governments. In particular, state and local level governments should be given greater discretionary spending authority to address specific local needs and challenges related to climate change adaptation. As part of this process, state and local governments should develop greater capacity for budgeting and public financial management to better match spending decisions and service delivery to local needs. By increasing their control over and capacity for spending decisions, state and local governments can better respond to development needs within the Niger Delta, while increasing accountability, transparency, and overall government approval with Delta residents.

(b) Private Sector Development: Public and private sector investments in agriculture, technology, and infrastructure projects such as aquaculture, storage and processing facilities, and transportation has been limited in the Delta. Without an enabling environment existing for such investments, the private sector will tend to underinvest. As a result, farmers in the Delta will remain limited in their ability to scale up food production, minimize post-harvest losses, and add value to agricultural and fisheries products – all critical components of harnessing market benefits and improving food security.

Removing key risks and adapting traditional business models to support climate adaptive and value-added technologies and processes will help to encourage private investment and stimulate the necessary structures and linkages for market access. The resulting participation in food markets will increase access to more nutritional food options and decrease reliance on subsistence farming. It will also allow the Delta to further develop its fisheries sector, meeting untapped demand for fish in the rest of the country.

One of the primary business environment constraints in Nigeria is access to financing (FAO 2). Private sector finance may be attracted in greater volume in a number of ways. The Nigerian Government currently offers tax incentives and tariff reductions for private investment in infrastructure, processing, and agricultural equipment (FAO 13). Supplementing these with reduced-risk loan guarantees on private sector investments would encourage investment in sectors and technologies without a track record of significant private investment. Public Private Partnerships (PPPs) also attract private investment, with the public sector addressing small hurdles, thereby leveraging private investment. Support with purchasing agreements can also facilitate market linkages for smallholders. Carbon credits from the international carbon market could be harnessed, providing
an income stream for investment in sustainable soil management, for example (IFC, Climate Business 26). Finally, microfinance organizations can provide farmers with greater access to improved inputs and technologies for production, processing, storage, and marketing, helping to boost adaptive capacity (USAID, Nigeria Strategy 9-10).

(c) Urban Planning and Adaptation: Urban areas play a critical role in economic development, serving as market centers and hubs in the provision of infrastructure and services. With concentrated human populations, urban areas are also at heightened risk from natural disasters and climate-induced shocks. Therefore, local governments have an important role to play in climate adaptation planning and policy implementation, but “require a supportive institutional, regulatory and financial framework from higher levels of government and from international agencies” (Satterthwaite 3). By building the capacity of local governments and improving overall urban planning in the Niger Delta, the Nigerian government can ensure that cities and urban areas continue to support regional economic development while minimizing the disruptive impacts of climate change.

Building off of NASPA, federal, state, and local governments should seek to enhance climate adaptation efforts in urban areas, partnering with civil society and private sector actors where appropriate to support vulnerable communities and increase infrastructure resilience. In particular, federal, state and local governments should strengthen land use, zoning, and building code regulations and enforcement to minimize development in vulnerable, high-risk areas and increase the resilience of buildings. Likewise, NGOs and civil society groups should assist with training and education programs developing community-based vulnerability assessments and adaptation plans, while the private sector should develop climate-sensitive business practices, including use of resilient construction materials and the development of insurance and financial incentive schemes (BNRCC, NASPA 46).

3. Cross-Cutting Policy Recommendations

Given the importance of governance and coordinated institutional approaches to climate change adaptation, the following section identifies two cross-cutting policy recommendations needed to improve Nigeria’s institutional environment and support effective climate change adaptation in the Niger Delta.

**Policy Recommendation 13: Improve inter-agency coordination of climate information services, and build capacity for information sharing and dissemination.**

The lack of availability of accurate data and information on climate change impacts in the Niger Delta is a major barrier to developing climate adaptation plans. As discussed in the food and water security sections above (Sections D1 & D2), the Nigerian government needs to develop new climate information services, and improve upon existing services where they already exist. Improving Nigeria’s food- and water-related climate information services is an important first objective in improving institutional capacity for climate change adaptation. However, these focal area policy recommendations should not be implemented in isolation, but should be coordinated to better integrate climate services across government agencies and disseminate climate information to relevant stakeholders. By coordinating across agencies, such as NIMET for meteorological services and the FMWR for hydrological information, the Nigerian government can provide better climate information to stakeholders, while building institutional capacity in its climate monitoring and data collection practices.

**Policy Recommendation 14: Increase community awareness of climate change impacts and participation in adaptation planning and implementation.**

It is very difficult to adapt to climate change without first understanding its impacts. Therefore, understanding the threats posed by climate change is a critical first step in strengthening climate resilience in the Niger Delta region. Likewise, community-level engagement and buy-in is critical to the success of development policy. As such, effective climate change adaptation policy, linked to broader economic development policy, necessitates meaningful public participation and engagement in the planning and implementation processes. The Federal Government, along with civil society partners, should provide greater public information on the impacts of climate change, and should actively engage the public in climate change risk assessment and adaptation planning efforts.
F) RECOMMENDATIONS BY SUB-CLIENT

The final Section of this report examines the ways that the recommendations for adaptation policy in the Niger Delta made throughout may be adopted and divided among sub-clients – USAID, IBRD and IFC – based on their organizational capacities, comparative advantages and foci. Each of the fourteen recommendations made above have been divided into one of three over-arching themes: Capacity Building, Infrastructure and Investment, which are defined in each respective thematic section. Of course, many, if not most, of the recommendations discussed in this report have aspects of capacity building, infrastructure and investment within them – meaning the sub-division within thematic categories is not perfectly delineated. Nevertheless, this sub-division allows for individual policies to be considered as part of a larger thematic whole that might be considered in a connective fashion. Each sub-client organization will likely approach the policies contained within thematic areas with similar although slightly nuanced foci, expertise and intentions, which are discussed by sub-client within each sub-category. The recommendations contained under each sub-category are listed by number at the beginning of each section.

It is expected that certain of these recommendations, after internal discussion and clearance by the particular sub-clients, would be integrated in some prioritized manner within the existing 3-5 year climate change adaptation programs at USAID, IBRD and IFC with respect to the Niger Basin in particular and West Africa in general.

Also, regarding the World Bank Group, synergies between IBRD Public Policy and Technical Assistance Units with IFC Private Sector Investment and Advisory Services functions would obviously help to promote the various recommendations cited below. Moreover, there is a pre-existing, albeit small, amount of joint project cooperation, staffing and funding between IBRD, IFC and USAID. In the case of the Niger Delta, furthering such cooperative efforts, leveraged by a deliberate outreach to civil society and private sector energy firms, would go a long way in achieving effective, incentivized, and cost-beneficial results vis-à-vis the recommendations presented in this paper. These potential synergies between organizations are outlined in more detail below for each of the thematic sub-categories.

1. Capacity Building

This paper proposes several policy recommendations, listed below, aiming to build the capacity of Nigeria and the Niger Delta to adapt to climate change. In general, consolidating integrated approaches to natural resources management that coordinate food, water and energy policies will improve efficiency of development policy to respond to climate challenges. Coordination in climate information management and promotion of climate and agricultural research will build institutional capacity to monitor climate variables. Raising community awareness will improve the adoption of climate change adaptation programs. Finally, improving the capacity of environmental institutions to implement policies and enforce laws will reduce existing environmental stresses that exacerbate climate change challenges. The sub-clients of this study have an important role to play in the implementation of these policies.

4. Invest in climate and agriculture research and capacity for agricultural applications.
7. Tighten and enact policies to prevent, reduce and restore water sources in the Delta from oil pollution.
9. Strengthen Nigeria’s water and environmental institutions and inter-agency coordination.
13. Improve inter-agency coordination of climate information services, and build capacity for information sharing.

(a) USAID: The Agency’s mission in Nigeria to strengthen social stability through improved social services and streamlined governance is consistent with the goal to build capacity for climate change adaptation. In particular, the program to promote Advocacy Awareness and Civic Empowerment (ADVANCE) could undertake workshops and community engagement with partner organizations to improve the communities’ knowledge and awareness (see Policy Recommendation 15) of climate change impacts in the Delta (USAID, Advance Web). The Program can also train civil society organizations’ members in environmental policy best practices, in order to increase their capacity to advocate for policy reforms to tighten pollution standards and monitoring mechanisms (see Policy Recommendation 7). Looking forward, USAID could give technical assistance to the NIWRMC in addressing conflict derived from natural resources
management in the face of climate change (see Policy Recommendation 5). Finally, USAID can work with Niger Delta’s universities to promote climate and agricultural research (see Policy Recommendation 4).

(b) IFC: The IFC’s role in strengthening the Niger Delta’s institutional and community capacity to adapt to climate change is somewhat less relevant than USAID. However, based on its experience in assessing climate risks in private sector projects in other regions of Africa, the IFC can help strengthen the coordination between public and private actors in managing climate change information and raising awareness at the national and Delta level (IFC, Climate Business Web). It can also play a significant role in clearly outlining climate threats in the Niger Delta to the private sector, thereby encouraging timely investment in adaptive capacity (see Policy Recommendations 14 and 15).

(c) IBRD: The IBRD’s objective to assist the Niger Delta states in improving resource management can be realized with interventions that build capacity for climate change adaptation (WBG, World Bank Poised Web). Particularly, the IBRD can expand its advisory services and training on IWRM and climate risk assessment to the Delta’s institutions including the NBDA, the NDC and local authorities (see Policy Recommendation 5). Similarly, the IBRD can provide technical assistance to the FME to strengthen the legal framework for water pollution control. In addition, the IBRD can provide funding to improve data collection capacity to identify pollution sites (see Policy Recommendation 7). Finally, as a step to building awareness among institutions and communities in Nigeria and the Delta, the IBRD should encourage the Pilot Program for Climate Resilience (PPCR) in Nigeria. The negotiations around PPCR will help bolster inter-agency coordination around climate change and development policy (see Policy Recommendations 14 and 15).

(d) Synergies: There is great potential for synergies between the IBRD and USAID that can build the capacity of Nigeria and the Delta to adapt to climate change. For example, these two agencies can work together to promote inter-agency coordination of climate information management. While the IBRD can focus on helping the Nigerian government design a platform of inter-agency coordination, USAID can train government officials on how to use such platforms in their daily operations. Similarly, USAID and IBRD can put together a workshop to discuss the reforms that current legislation on water pollution needs and the actions required to strengthen the FME’s capacity to enforce laws in this respect. Regarding awareness, IBRD and USAID can jointly finance the design of a climate change awareness campaign that targets both government institutions and community organizations. Finally, IBRD and USAID can coordinate their actions to increase Nigeria’s agricultural research capacity in order to avoid duplicities as well as to cover possible gaps.

There is also potential for synergies between IBRD and IFC, particularly to help promote the incorporation of climate change scenarios into integrated water resources management. For example, a joint effort between the IBRD and IFC can lead to the design of an integrated framework to assess climate change risks in the Niger Basin that consider both public and the private stakeholders.

2. Infrastructure Development

Policy recommendations within this category suggest enhancing the capacity of current infrastructure to respond to climate change challenges, and developing new infrastructure that helps reduce exacerbating factors such as the electrification deficit in the Niger Delta. Developing infrastructure entails finding the financial resources and constructing the technical alliances between the public and private sectors that have the support of the communities involved. The key recommendations contained in this report relating to infrastructure development are the following:

6. Build climate resiliency in infrastructure investments in water access, treatment, storage and flood control.
10. Promote decentralized renewable energy projects, including solar energy and small-scale hydropower.
12. Pursue environmental impact studies on, and modify large-scale hydropower projects.

(a) USAID: Nigeria has been among USAID’s top countries in receipt of funding for water supply, sanitation, and hygiene (WSSH). While portions of the funding for WSSH projects are allocated to educating the public about sanitary practices, one of the pillars of WSSH is “access to appropriate hardware and supplies.” At a community level this entails access to water storage and distribution supplies and sewers (USAID, Safeguarding 10). USAID could increase adaptive capacity of local populations when investing in water infrastructure hardware by taking changing rainfall patterns into account (see
Policy Recommendation 6). USAID’s involvement in the energy sector in Nigeria has dealt with promoting the use of renewable energy sources, such as solar and small-scale hydropower. The organization is looking into the possibility of providing risk guarantees to local banks to support private investment in clean energy projects (USAID, Testimony Web), and current efforts to promote DRE in Nigeria could be expanded to highly vulnerable communities in the Delta (see Policy Recommendation 11).

(b) **IFC**: The IFC has supported a number of important PPP infrastructure projects in Nigeria. In 2009, for example, IFC held a water sector seminar to educate government officials of key countries (including Nigeria) about the value of PPPs in water infrastructure development (IFC, IFC Public Private 5). In 2011, IFC announced that it would provide advisory services for a PPP to construct a hospital in the Cross River States, and that it would look into funding the construction of a second Niger bridge (IFC, IFC Announces Web). IFC’s financial backing has the potential to markedly bolster private investment. Hydropower is the largest component of IFC’s renewable energy portfolio. IFC began investing in hydropower in 1991, often assuming construction risk that banks were unwilling to take on. Furthermore, IFC draws on its experience in the field to advise on the best environmental and social practices for hydropower projects (IFC, Hydro Web).

(c) **IBRD**: Over the past 25 years, the IBRD has invested 1.4USD billion in water projects in Nigeria (WBG, New Project Web). Efforts have focused on rehabilitation of existing infrastructure, such as water treatment plants and the expansion of service. In addition, the IBRD/International Development Association (IDA) is funding the rehabilitation of the Kainji Hydro Power Plant as part of the Niger Basin Water Resources Development and Sustainable Ecosystems Management Program (WBG, Kainji Hydropower). Rehabilitating water and hydropower infrastructure will improve resilience. IBRD should increasingly take climate change predictions into account when funding future infrastructure projects in these areas, which will be vital to ensure their sustainability and effectiveness (Policy Recommendations 6 and 11). The IBRD is also working with the NBA to climate-proof the NBA’s Strategic Development Action Plan and to ensure climate risks are considered within this regional economic Masterplan.

(d) **Synergies**: IBRD’s expertise in water infrastructure rehabilitation could enhance the capacity of USAID’s WSSH program by facilitating the rehabilitation and climate-sensitive retrofitting of defunct infrastructure, rather than the purchase of new hardware. IFC is in a unique position to draw on its extensive experience in the area of hydropower development to provide IBRD with advice regarding the general environmental impact of the Kainji Plant in light of climate change projections, and recommend ways in which to account for adaptation needs (see Policy Recommendation 13). IFC and USAID could provide advice regarding the stimulation of private sector investment in DRE. Specifically, the implementation of DRE in rural areas will require significant investment in infrastructure, such as solar panels. Perhaps IFC could provide financial backing for domestic investors in the solar industry and rely upon USAID’s on-the-ground experience to ensure that community DRE programs are implemented successfully.

3. **Investment in Adaptive Capacity**

For the purposes of this section, ‘investment’ is taken to mean the allocation of resources by government, international donors and other actors to the creation of markets, systems and frameworks that work to enhance the resilience of communities in the Niger Delta to climate change. The policy recommendations referring to investments of this kind by governments and international organizations are listed below:

1. Develop a climate services system to provide climate information to agricultural value chain players.
2. Expand viable financial risk mitigation tools for farmers, especially through weather-index insurance.
3. Increase the resilience of agricultural input delivery systems to adapt to climate change and variability.
8. Strengthen Nigeria’s capacity to produce and disseminate hydrological and meteorological information.
11. Prioritize the transition from flaring natural gas to capturing and selling it into the domestic market.

(a) **USAID**: Given the specific organizational mandate of USAID (in Nigeria and elsewhere, see above), this agency is very well placed to assist in the creation of systems and markets that enhance climate resilience in the Delta, both by providing funding for potential projects designed, for example, to establish climate services systems and competence, and by providing the technical advice and expertise to successfully launch such systems. Projects to establish climate services
and to enhance meteorological and hydrological information (Policy Recommendations 1 and 8) are very much interrelated, and USAID could productively assist in the achievement of these policy goals. For example, USAID is currently assisting Middle East and North African countries in water information management, with a focus on enhancing data regarding water flows and assets (USAID, Fact Sheet Web). A similar program in the Niger Delta would greatly augment water security and enhance climate resilience in the region. USAID might also become involved in advice and funding for community-level programs aimed at enhancing the uptake of agricultural inputs, such as short-germination seeds, which has thus far been lackluster (see Policy Recommendation 3).

(b) **IFC:** The IFC has a valuable role to play in climate adaptation by harnessing and encouraging the private-sector to make investments in adaptive capacity over time through its loan/equity products or loan guarantees. The IFC is already involved in the promotion and development of weather-index insurance in the developing world broadly (IFC, Global Index Web). Expanding the reach of such market development programs to the Niger Delta through partnerships with local insurers and commercial banks will greatly enhance climate resilience in the agricultural sector. Finally, the IFC can play a productive role in encouraging the private-sector to invest in natural gas distribution and supply infrastructure.

(c) **IBRD:** With the ability to provide large-scale finance to governments for key developmental projects, the IBRD has very well developed capacity to assist in the achievement of key investments that promote growth, reduce poverty and enhance adaptive capacity. It also is a valuable source of technical advice on market creation and regulatory optimization. In the Niger Delta, the IBRD is already working with governments to promote the phase down of natural gas flaring under the Global Gas Flaring Reduction PPP (WBG, Global Gas Web) (see Policy Recommendation 11). It was also instrumental in the construction of the West Africa Gas Pipeline, which connects Nigerian gas supplies to markets in other West African nations (WBG, West African Gas Web). Energy sector investments of this type could be extended to develop local gas distribution systems, thereby enhancing gas-based industry, domestic gas consumption and energy security. The IBRD is also well-placed to provide advice to Nigerian government on the creation of strong, well-regulated natural gas markets that simultaneously allow market access for poor communities. Finally, the IBRD might consider assisting the development of agricultural infrastructure, such as storage and transportation systems, which can enhance food security and reduce the vulnerability of food production to climatic shocks (see Policy Recommendation 3).

(d) **Synergies:** There is significant opportunity to achieve synergies between organizations in the area of investment in adaptive capacity. For example, in Policy Recommendations 1 and 8, each of the organizations can work together, leveraging their respective experience and expertise, to help establish climate services systems and meteorological and hydrological systems – with USAID using on-the-ground networks and expertise in implementation, and IBRD providing technical advice in system development. In the area of natural gas market development, too, IBRD has a clear role to play in assisting with market development and gas pricing, while the IFC can work to simultaneously promote private sector investment within the natural gas industry.

4. **Policy Mapping**

The following table summarizes policy recommendations according to their relevance to each sub-client. High relevant policies are shown by a full ‘ball’, medium relevance policies by a half ball and low relevance policies by an empty ball. Policy recommendations that are not applicable to a sub-client are designated Not Applicable (N/A). It is important to note that these designations are illustrative. Nonetheless, this table is intended to assist clients in recognizing policy priorities, and can be used to identify partnership opportunities on policies and projects that are of high relevance to each organization.
Table 2: Policy Recommendation Relevance to sub-clients

<table>
<thead>
<tr>
<th>Goal</th>
<th>Recommendation</th>
<th>USAID</th>
<th>IFC</th>
<th>IBRD</th>
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<tbody>
<tr>
<td>Capacity Building</td>
<td>4: Research and capacity for agricultural applications</td>
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<td></td>
<td>5: Integrated Water Resources Management (IWRM)</td>
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<td></td>
<td>7: Restore water sources; prevent and reduce oil pollution</td>
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<td></td>
<td>9: Strengthen water and environmental institutions and inter-agency coordination</td>
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<td></td>
<td>13: Coordination of climate information services</td>
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<td></td>
<td>14: Community awareness and participation in adaptation policy</td>
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<tr>
<td>Infrastructure</td>
<td>6: Climate resiliency in water access, treatment, storage and flood control</td>
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<tr>
<td>Development</td>
<td>10: Decentralized renewable energy</td>
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<td></td>
<td>12: Environmental impact studies on large-scale hydropower projects</td>
<td>N/A</td>
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<tr>
<td>Investment in</td>
<td>1: Develop climate services system</td>
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<tr>
<td>Adaptive Capacity</td>
<td>2: Financial risk mitigation tools for farmers</td>
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<tr>
<td></td>
<td>3: Increase resiliency of agricultural input delivery systems</td>
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<td></td>
<td>8: Produce and disseminate hydrological and meteorological information</td>
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<td></td>
<td>11: Capture &amp; sell natural gas</td>
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<table>
<thead>
<tr>
<th>Key</th>
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<td>• = High Priority</td>
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<td>○ = Medium Priority</td>
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<tr>
<td>○ = Low Priority</td>
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<tr>
<td>N/A = Not Applicable</td>
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</tbody>
</table>

5. Next Steps

The purpose of this report is to present policy recommendations that will help to enhance regional development in the Delta, reduce the vulnerability of local communities, and create conditions for regional stability while building resilience to climate change. Having presented these recommendations, the next step for the agencies discussed here is to prioritize the recommendations as they see the need for them. The prioritization of interventions has, broadly, three largely concurrent components. Firstly, interventions should be assessed on a cost-benefit basis – with projects examined for their importance, their cost, and their likely return in terms of developmental and adaptive outcomes in the region. In order to examine costs and benefits, sub-clients should develop or adopt metrics to measure project importance, cost, and return. These metrics will aid in ascertaining where needs are greatest and where agencies are able to invest resources to have the most significant impact, while aiding in the project planning and development process. Secondly, and simultaneously, projects should be assessed for their fit with agencies’ own capacities, experience, partnerships (existing and potential) and overall objectives with regards to the Delta, as well as their relationship to medium-term strategic organizational plans. Thirdly, clients should undertake a process of policy sequencing – assessing whether projects should be implemented in the short-term (1-3 years), medium term (4-6 years), and long-term (6 or more years). A short-term time frame would suggest that a certain project is a precondition for other interventions and addresses an immediate and currently existing need. Medium-term projects, on the other hand, are contingent upon short-term projects having been implemented, while long-term projects require infrastructure and structural capacity (human, instructional and systemic) to be developed over time before they are undertaken.

By way of conclusion, this report provides an illustrative sequencing of recommendations, as follows (see endnotes for the sequencing rationale for each Policy Recommendation).

Short-term (within 1-3 years):
1. Develop a climate services system to provide climate information to agricultural value chain players.
7. Tighten and enact policies to prevent, reduce and restore water sources in the Delta from oil pollution.
8. Strengthen Nigeria’s capacity to produce baseline hydrological information and transfer knowledge.
9. Strengthen Nigeria’s water and environmental institutions and inter-agency coordination.
12. Pursue environmental impact studies on, and modify large-scale hydropower projects.
13. Improve inter-agency coordination of climate information services, and build capacity for information sharing.
Medium-term (within 4-6 years):
2. Expand viable financial risk mitigation tools for farmers, especially through weather-index insurance.
4. Invest in climate and agriculture research and capacity for agricultural applications.
10. Promote decentralized renewable energy projects, including solar energy and small-scale hydropower.
11. Prioritize the transition from flaring natural gas to capturing and selling it into the domestic market.

Long-term (more than 6 years):
3. Increase the resilience of agricultural input delivery systems to adapt to climate change and variability.
6. Build climate resiliency in infrastructure investments in water access, treatment, storage and flood control.
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The input delivery system consists of agro-dealers, extension services to smallholders, seed and fertilizer companies and wholesalers, transportation services and infrastructure, and storage facilities.

IBRD and IFC fall within the World Bank Group umbrella.

Nigeria is also developing a Strategic Framework for Voluntary Nationally Appropriate Mitigation Action, as a step towards meeting national obligations under the United Nations Framework Convention on Climate Change (UNFCCC) which contains reference to the need for greater climate resilience, although also provides little guidance on means to achieve this (BNRCC, NASPA 25-26).

One example of this is UNIDO’s Small Hydro Nigeria project — which aims to increase rural electrification through a pilot program and capacity building for the deployment of micro-hydro in the Niger Delta — a project that has overlapping development, mitigation and adaptation foci (UNIDO Web).

In Transparency International’s 2011 ‘Corruption Perceptions Index’, Nigeria received a score of 2.4 out of ten, making the country ‘Highly Corrupt’ in this organization’s assessment, and placing it in the lowest 5 per cent of countries examined for public sector accountability and transparency (Transparency International Web). In the Institute of Economics and Peace’s 2011 International Peace Index, which measures rule of law and state responsiveness among other factors, Nigeria was ranked 142 out of 157 countries, placing it behind nations such as Zimbabwe and Chad in this survey (IEP Web). In the World Bank’s exhaustive 2010 Worldwide Governance Indicators, Nigeria received a score of -1.2 for ‘Government Effectiveness’ out of a range of -2.5 to 2.5, again placing it in the bottom 5 per cent of countries examined (WBG Web).

Adaptation policies for food security often focus on arid and semi-arid regions primarily for two reasons. First, these regions are often the ones experiencing the greatest stress on food security already today and second, the expectation is that decrease in rainfall and increase in the variability of precipitation patterns will disproportionately affect these regions.

The master plan suggests improvements in the skill set of farmers and fishermen and storage capacities. The plan also suggests diversification away from agriculture to other industries, such as community services, engineering and construction, and tourism as a path for current farmers and fishermen to improve their livelihoods (NDRDMP 130).

WBG’s work with the NBA in developing a strategic action plan only analyzed climate change impacts on irrigated agriculture in the Basin (the Niger Basin refers to the area surrounding the Niger River, encompasses 1,500,000 km² and 110 million people in 9 countries) at this stage. Rainfed agriculture, which is by far the dominant form of agriculture in the Delta, will be analyzed in the next phase (Brown 2 & 33).

USAID’s project most closely related to food security aims to expand access to services for agricultural enterprises by investing in development of management skills and access to credit (Expanded Access Web).

Additionally, the Nigerian government has established presidential initiatives to increase the production of individual crops and livestock (Akinyele 42). To increase the provision of financial services to farmers the government established the Bank of Agriculture (Bank of Agriculture Web) and NAIC, the Nigerian Agricultural Insurance Corporation (International Center for Nigerian Law Web). Both institutions, however, have only limited outreach and have not been able to significantly affect agriculture lending and insurance coverage, according to interviews conducted with the Central Bank of Nigeria in January 2011.

Such as agro-dealers, warehouse operators, traders or processors.

Because climate change adaptation must start at the truly local level to be effective, providing local agricultural players with the information and knowledge to make informed decisions is a key aspect of adaptation strategies.

Currently there are only 12 weather stations in all nine states of the Delta, averaging just one weather station per approximately 10,000 km². There are also gaps in data history (Anuforom 47-48). NIMET should invest in building additional weather stations and ensure reliable and consistent collection of weather data.

The information provided should include downscaled intra-seasonal (e.g., weekly) and seasonal forecasts, as well as longer term climate scenarios. The information produced will not only be relevant for the agricultural sector but will have significant spill-over effects to water and energy security, as well as other sectors.

For example, NIMET could partner with cell phone providers such as MTN or Cellular, who have strong penetration in the region, to set up a subscription based SMS service. Also, existing civil society organizations, such as farmer based organizations, churches and local NGOs should be engaged in disseminating climate information to their constituencies. It will be important that these services also provide feedback opportunities, so that end users can communicate to the data provider what information they find especially useful and what information services they are missing. Additionally, local governments and disaster management organizations should use the information to establish and improve early warning systems for the urban and rural population.

The required training will depend on the sector, as well as sophistication level of the end user.

For this, the extension agents need to be trained in climate change adaptation strategies. The agents can then provide a holistic service to the farmer to improve their agricultural practices taking into consideration climate variability and change.

E.g., thereby allowing the farmer to profit from especially good seasons by investing more in fertilizer to improve yields.

E.g., to base their plot preparation and cultivation on weather forecasts rather than calendar dates.
Cross Rivers State; University of Port Harcourt in Rivers State; University of Technology, Akure in Ondo State; University of Technology, Owerri in Imo State; University of Benin in Edo State; University of Calabar in Cross Rivers State; University of Uyo in Akwa Ibom State.

21 They can be savings, access to credit, derivatives such us crop futures or insurance policies.
22 Weather-index insurance is insurance that makes "indemnity payments based on values obtained from an index that serves as a proxy for losses rather than upon the individual losses of each policyholder. The underlying index is based upon an objective measure (for example, rainfall, wind speed, or temperature) that exhibits a strong correlation with the variable of interest (for example, crop yields or default rates)". These characteristics can make weather-index insurance superior to traditional peril and multiple peril crop insurance that is often characterized by high administration costs and moral hazard, as well as adverse selection (USAID, Index Insurance 13 & 9).
23 On the one hand, insurance against weather-related risks can incentivize farmers to invest more in inputs and agricultural production overall, on the other hand it can be a tool for banks to de-risk agricultural value chains and extend more credit and loans to the agricultural sector.
24 While the federal government subsidizes insurance premiums by 50%, this subsidy is only available to NAIC, according to representatives of major Nigerian insurance corporations at workshop in Abuja in February 2011. NAIC in return only covers approximately 500,000 policyholders across all of Nigeria, a significant under provision, according to interviews conducted with representatives from NAIC in January 2012. Hence, there exists significant demand for increased insurance coverage in the agricultural sector.
25 Across Sub-Saharan Africa there have been successful pilot programs in weather-index insurance. For example, pilots in Malawi, Kenya, Ethiopia and Tanzania have been successfully implemented. In Ethiopia the domestic Nyala Insurance Company partnered with the Lume Adama Farmers' Cooperative Union to increase farmer awareness, and with the World Bank and the World Food Program to acquire technical expertise and transfer knowledge from pilot programs outside of Ethiopia. However, significant challenges to scaling-up remain and need to be addressed when implementing weather-index insurance in the Niger Delta (WFP and IFAD Potential for Scale 3& 34 & 35 & 41).
26 This way it is cheaper and easier for the insurer to reach a large number of smallholder farmers. The FBO can then collect insurance premiums from the farmers and help in the disbursement of funds if a relevant threshold (e.g., rainfall above a certain amount in a given amount of days) is exceeded. The set up of the required infrastructure should be closely coordinated with the larger effort to develop climate services (as discussed in recommended policy 1). The insurance company, which creates a business model around the use of climate services, on the one hand profits from public investments in infrastructure and on the other hand can pay for climate services once they are up and running and therefore covering part of the operating expenses of climate services infrastructure.
27 The input delivery system consists of agro-dealers, extension services to smallholders, seed and fertilizer companies and wholesalers, transportation services and infrastructure, and storage facilities.
28 Inhibiting factors to improve input uptake include the lack of access to credit and the low capacity of the input delivery system, with inadequate and late supply of seeds and fertilizer (Akyniele 16). Only 2% of total lending of banks goes to the agriculture sector in Nigeria, which constitutes about 60% of employment and 40% of GDP (Central Bank of Nigeria 1).
29 If, for example, the rainy season is projected to start a couple of weeks earlier in a given year, fertilizer producers need to adjust production cycles, transportation services need to adjust the timing of when to provide capacity for fertilizer and seed delivery, agro-dealers need to order inputs from wholesalers earlier and fill up their storage rooms to increase inventory, and farmers need to prepare their land earlier and apply to loans earlier if they buy inputs through credit.
30 For example, because of the increased need for climate resilient seed varieties there needs to be more localized seed production and research capacity. Potentially this increased need differs by ecological zones and due to climate change local needs might change over time.
31 Elements of the Alliance for a Green Revolution in Africa's (AGRA) Programme for Africa's Seeds Systems (PASS) should be expanded to the Delta. PASS provides support in developing crop varieties adapted to local environments and "support private African seed companies and farmer cooperatives to produce, distribute and market improved seed" (Web).
32 For example, the Nigerian Incentive-Based Risk Sharing System for Agriculture Lending (NIRSAL). NIRSAL is an innovative concept by the Central Bank of Nigeria to improve access to credit for smallholder farmers. It includes a risk sharing facility through which the Central Bank provides loan guarantees to commercial banks when they lend to agriculture (Central Bank of Nigeria 1). Similar initiatives have been successful in other African countries, for example in Kenya, where AGRA partnered with Equity Bank in increasing lending to agriculture through loan guarantees (AGRA Kenya Web). Another possibility is land tenure reform. The 1978 Land Use Act confers proprietary rights to the state so that local governments have authority over all rural land. The process to gain statutory occupancy rights or customary rights from the state is lengthy, cumbersome and expensive. As such, land rights are typically transferred in the informal market, rather than through official channels, further entrenching weak tenure (FAO, Foreign Agricultural Investment 11). Also agro-dealers need to be strengthened. A program similar to AGRA’s Agro-dealer Network Development Program should be implemented in the Delta (AGRA Tanzania Web). Thereby agro-dealers receive business training and upon certification have easier access to credit. This will strengthen their capacity and outreach to supply fertilizer and improved seeds to smallholder farmers. With improved access to inputs smallholder farmers also need to receive better extension services to train them in how to most effectively and efficiently adopt those inputs.
33 For example, studies on the resistance of local crop varieties to pests and, seed multiplication.
34 Other universities in the Delta that could benefit from this investment include: University of Port Harcourt in Rivers State; University of Technology, Akure in Ondo State; University of Technology, Owerri in Imo State; University of Benin in Edo State; University of Calabar in Cross Rivers State; University of Uyo in Akwa Ibom State.
Only 20 per cent to 24 per cent of rural communities and 45 per cent to 50 per cent of urban communities in the Niger Delta have access to safe drinking water.

Surface water has a variety of uses. In the agricultural sector it is used for irrigation, palm procession, lumbering and for subsistence fishing. The domestic sector uses water mainly for drinking, whereas the industrial sector for transportation and commerce purpose. The energy sector is a great user of the water resources in the region through hydro-dams. Finally, water is used for socio-cultural purposes such as fishing festival and recreational purpose; and for disposal of sewage and general waste.

Remote Sensing is a technique to analyze with satellite images the evolution of land areas. GIS allows geo-referencing the areas in maps and allows the analysis of natural and socio-economic information.

The Water Funds are financial mechanisms that gather resources from water users including water utilities, industries and the general public to fund the conservation of key lands that filter and regulate water supply. Some Water Funds pay communities-wide reforestation projects; other Funds pay farmers and ranchers who protect riverside forests (TNC Web).

Accordingly, section 20 prescribes penalties for the discharge of hazardous substances into the environment. Subsection 2 of section 20 prescribes N100,000 fine (approx. 635 USD) or 10 years imprisonment for an individual offender, while subsection 3 stipulates a fine not exceeding N500,000 (approx.3180 USD) and “an additional fine of N10,000 for everyday the offence subsists” for corporate offenders.

The Commission’s goal is to essentially regulate and control the rights by all persons to develop and use water resources shared by more than one state. Basically, it is to rationalize and streamline the current indiscriminate development, use, diversion of, and regulation of water affecting more than one state.

Recognizing Nigeria’s vulnerabilities and the need to develop adaptation strategies to cope with the impacts, some of the activities of the Unit thus far include: Prepared and submitted the Nigeria’s First National Communication under the UNFCCC which requires Parties to update it with information regarding greenhouse gas emission, mitigating options, vulnerability assessments and concrete adaptation measures to the impacts of climate change. Also information on other issues, such as institutional framework for research and systematic observations, scenario development and national efforts at integrating climate change into the Nigeria sustainable development are to form major contents of the National Communication.

Nigeria’s main hydropower plants along the Niger River constitute 40% of the country’s electricity generating capacity but have only produced at 30% (with limited new capacity additions) as a result of observed changes in climate over the last fifteen years (HCWAEA 3).

Approximately 60% of Nigerian’s are not connected to the grid, while the remaining 40% are subject to frequent interruptions in service. 35% of rural populations have access to electricity, and electrification programs for this group are challenging because of limited willingness to pay for on-grid power supply (Omisoro Web). In the Delta, 75% of the population lives in rural areas; nationally 50% of the population is rural. (United Nations DESA Web).

Gas is a byproduct of oil extraction, and the process of flaring gas is employed to burn off the gas, thereby separating it from the oil.

The use of biomass represents approximately 81% of Nigeria’s total energy consumption (US EIA Web).

This may be a result of the acute shortage of energy within the Delta allowing for very efficient usage on the consumer end, or the general effort to create a more positive investment environment in the Delta and in Nigeria.

The WBG is involved in energy-sector programs in Nigeria, including the Nigeria National Energy Carbon Development Project and The Global Gas Flaring Reduction Public Private Partnership (GGFR-PPP), while USAID has been providing technical assistance to reduce natural gas flaring. The GGFR-PPP works with the Federal Government to lessen, and eventually eliminate, the practice of flaring in order to reduce GHG emissions. However, the success of this program is dependent on the existence of increased capacity for managing natural gas that is collected instead of flared. Nigeria is eligible for Clean Development Mechanism funding, which may be used to this end (Carbon Credit Development 6-7).

Ending the practice of flaring will reduce of GHG emissions.

The goal of this subsidy is to incentivize the capture and distribution of gas in domestic markets.

This does have a fiscal cost, however, and industry will need to be confident in the timetable of the phase-down of the subsidy in order to be willing to invest.

The tax-deductible portion of investments in infrastructure is 20%. Investing in processing secures a 5-year tax-free period. Importing agro-equipment is only penalized with a 1% duty (FAO 13).

For example, a public sector player could invest in a local agricultural storage facility or processing facility while the private sector player commits to purchasing the aggregated smallholder supply from the facility. Not only does the infrastructure reduce post-harvest losses, the PPP arrangement effectively initiates a new market linkage.

ADVANCE is a program that aims to build the capacity of civil society organizations to advocate for policy reforms (USAID Nigeria Web).

IFC has so far conducted two climate risk studies in Sub-Saharan Africa: One in agribusiness for the Ghana Oil Palm Development Company (GOPDC), and one in hydropower for the KGL HP project in the Kafue basin in Zambia (IFC Climate Business, Web 2012).

The World Bank has supported other countries like Vietnam to improve institutional capacity for water pollution control (World Bank, Vietnam Web).