



Planning for Climate Change in Overlooked Sectors: A Synthesis of NCAP Activities in Senegal

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1. Introduction

Since the creation of the United Nations Framework Convention on Climate Change (UNFCCC) at the 1992 Rio Summit, increasing attention has been paid to the fact that adaptation to climate change needs to be considered in coordination with what was considered to be the primary motivation of the original treaty, namely international negotiations to reduce global emissions of greenhouse gases. The rising profile of adaptation as part of the climate change dialogue is linked to at least two factors. Firstly, UNFCCC signatory countries from the developing world posited the compelling argument that while they had contributed little to the startling rise in greenhouse gas concentrations in the atmosphere, they were the most vulnerable to its potentially devastating impacts. The second factor emerged from the climate science community. Here the argument was that owing to the long residence time of greenhouse gases in the atmosphere and the fact that current concentration was already altering the global climate, there was little to be done in the near term to avoid climate change impacts.

Taken together these factors militated in favor of creating capacity within the developing world to adapt to negative impacts of a climate that would change because of the past actions of the developed world. Structure was given to conclusion at the 7th Conference of the UNFCCC Parties held in Marrakech, Morocco in 2001 with the approval of Decision 28 pertaining to “Guidelines for the preparation of national adaptation programs of action”, or NAPAs. In parallel with the actions of the UNFCCC, various other actors were becoming active in the climate change adaptation arena, including the Government of the Netherlands which supported the Netherlands Climate Change Studies Assistance Program (NCCSAP), which in 2005 became the Netherlands Climate Assistance Program (NCAP).

The NCCSAP initiative was designed to enable developing countries to implement commitments under the UNFCCC, to create a greater awareness of climate change issues, and to increase the involvement of policy makers, scientists and the general public. The follow on NCAP initiative, launched in 2005, had the following aims:

- Assist participating developing countries to prepare, formulate, implement, and evaluate their policy in relation to climate change.
- Raise awareness of the problem of climate change in developing countries.
- Increase the involvement of policy makers, scientists, and “broad layers” of the population in the climate change debate in developing countries.

- Promote exchange of experiences between developing countries on climate issues.
- Impact the UNFCCC negotiating process through the raising of “burning issues”.
- Coordinate effectively between NCAP and similar international initiatives.

The first objective was intended to signal a new focus on making climate change information relevant to the actual formulation of policy, as opposed to the earlier initiative’s focus on understanding climate change vulnerabilities.

One of the initial challenges was to make this shift towards the policy arena operational and to this end the NCAP implementation team developed a series of 9 indicators against which progress in each of 15 NCAP partnering countries could be measured. One indicator set a specific benchmark that the ‘project has coordinated effectively with the NAPA process and other relevant on-going and/or planned initiatives’. One of the partnering countries, Senegal, placed this indicator squarely at the center of its own NCAP implementation plans. This made sense as Senegal was one of the early advocates for and participants in the NAPA process, and had become a resource to other Francophone countries in western Africa implementing their own NAPA programs. The Senegal implementation team was anxious to use the resources made available under NCAP to extend and deepen its own experience with the NAPA process, and in so doing they moved NAPA implementation in some interesting and unique directions, in particular by addressing economic sectors that had not previously been part of NAPA preparation in other countries. This paper attempts to synthesize some relevant insights from their experience.

2. The Senegal Context

As the farthest west nation on the Continent of Africa, Senegal faces squarely towards the Atlantic Ocean. Indeed the map of Senegal suggests the head of a lion watching out over the water (figure 1), with the Anglophone enclave of The Gambia its slightly open mouth. With a total surface area of 196,190km², Senegal has over 530km of coastline and the vast majority of the population, as demonstrated by the number of cities and the density of the road network, resides in the western third of the country. Towards the hotter interior, population centers lie along rivers that drain the Fouta Djallon Highlands in Guinea, principally in the stream networks of the Senegal and Gambia River systems.



Figure 1: Map of Senegal

Within this geographic setting, Senegal has been one of the most stable countries in Africa, electing a series of democratic governments since its independence from France in 1960. Following a painful economic restructuring in the early 1990s, the economic growth rate has been steady, averaging 5% per year between 1995 and 2007. Still, the per capita GDP in 2007 was only \$1,700 per year. When viewed by sector, the service sector forms 64.4% of the economy, followed by industry (18.9%) and agriculture (16.7%).

These figures belie the fact that 77.5% of the labor pool is engaged in agriculture, many of whom are within the 54% of the population that lives below the poverty line. Three of the five primary exports from Senegal (fish, peanuts, petroleum products, phosphates and cotton) are derived from primary economic sectors.

In light of these geographic and economic realities it came as no surprise that when, soon after the COP7 meeting in Marrakech, Senegal embarked on its effort to develop a NAPA, with attention turning to defining climate change adaptation for the fundamental agriculture, water resources and coastal zone sectors. The next section of the paper describes this early effort starting with the general NAPA guidance and ending with an exploration of Senegal's ultimate recommendations in these three sectors.

3. National Adaptation Programs of Action

The original guidance from the UNFCCC regarding the NAPA development process was, probably by necessity, fairly general. This was after all a completely new initiative that was responding to an emerging, yet not completely understood, component of the international climate change negotiations. This section will trace out the evolution for the NAPA process from that initial guidance through to the initial implementation in Senegal.

a. General NAPA Background

According to Decision 28/CP.7 of the UNFCCC, NAPAs would serve as simplified and direct channels of communication for information relating to the urgent and immediate adaptation needs of the least developed countries. The hope was that formal NAPA documents would describe climate change adaptation strategies that would:

- Be easy to understand;
- Be action-oriented and country-driven; and
- Set clear priorities for urgent and immediate adaptation activities identified by the countries.

Within this broad mandate, countries were given the liberty to define specific criteria for selecting priority adaptation activities with several general categories, including:

- Level of degree of adverse effects of climate change;
- Poverty reduction to enhance adaptive capacity;
- Synergy with other multilateral environmental agreements; and
- Cost-effectiveness.

This last general criterion was important as there was an expectation in Marrakech, if not a commitment, that large greenhouse gas emitting developed countries would financially assist the least developed countries to implement priority adaptation activities. Broad guidance was also given in Decision 28/CP.7 on the areas in which the ultimate selection criteria would be applied in order to identify priority adaptation activities. These included:

- Loss of life and livelihood;
- Human health;
- Food security and agriculture;
- Water availability, quality, and accessibility;
- Essential infrastructure;
- Cultural heritage;
- Biological diversity;
- Land-use management and forestry;
- Other environmental amenities; and
- Coastal zones and associated loss of land.

Here it is interesting to note that the list of potential areas within which priority adaptation activities would be defined relate to the natural environment and primary economic activities based on the country's natural resource base. If human health is interpreted as being part of the natural environment, then only two of the areas, critical infrastructure and cultural heritage, are outside primary natural resource based areas of human activity.

Decision 28/CP.7 also contained some broad procedural guidance that eventually led to the development of what became an eight step process towards the development of a NAPA. The steps were:

- Assemble a NAPA implementation team;
- Define goals;
- Synthesize available vulnerability assessments;
- Conduct a participatory rapid integrated assessment;
- Conduct public consultations;
- Define selection criteria;
- Rank potential adaptation activities; and
- Develop and submit NAPA project papers of selected adaptation activities.

Within the sideboards provided by these steps, it is very interesting to note how each country actually implemented its NAPA process.

b. Implementation Process in Senegal

Soon after the Marrakech COP, Senegal was one of the first countries to benefit from financial support provided by the Global Environment Facility (GEF), receiving a \$195,000 grant to assist in the development of its NAPA. The stated goal of this investment was to assist Senegal in identifying urgent adaptation needs and priorities in the face of its vulnerabilities to climate change. Under this grant, NAPA activities in Senegal were organized into five phases, general organization, sectoral studies, public consultation, prioritization, and project formulation. Within these phases, the NAPA team elaborated the following steps, which echo those presented above:

- Establish a NAPA team;
- Synthesize impact studies, adaptation strategies, past consultations, and the projections of development frameworks already in place;
- Implement a rapid participatory evaluation of actual vulnerabilities and the risk of increasing exposure associated with climate change;
- Consult with the public to identify potential adaptation activities;
- Articulate potential NAPA activities in light of the consultations. Begin the process of selecting prioritization criteria;
- Rank activities and demonstrate their integration within national frameworks and strategic programs; and
- Prepare project documents for selected activities and submit NAPA.

It is interesting to note that while the guidelines for the preparation of national adaptation programs of action are largely silent to the need to organize the development of priority adaptation activities by sector, Senegal, like virtually all of the countries preparing NAPAs, quickly organized NAPA implementation around three primary natural resource based sectors, agriculture, water resources and coastal zone resources. For each of these sectors, consultants were hired to study sectoral vulnerabilities, their causes, and potential trends related to actual climate variability and human pressure in the exposure to the threats underlying these vulnerabilities. For this study, the consultants were instructed to add appropriate technical or policy adaptations that could be evaluated and prioritized during the public consultation step of the NAPA process. The addition of potential adaptations was intended to take into consideration experience related to the potential and limits of these adaptations gained at the local and national levels, and, where appropriate, internationally.

In order to complete this analysis, the NAPA team overlaid the administrative regions of Senegal with a map of the eco-geographic regions of the country (figure 2) to develop a general framework for geographically targeting priority adaptation activities that would emerge from the NAPA process. The groupings that emerged from this analysis are shown in table 1. While these groupings do not represent a perfect mapping of administrative zones into eco-geographic regions, the expectation was that they would serve to distinguish between locally promising adaptation activities. Equipped with the results of the scoping studies on agriculture, water resources, and coastal zones, and the framework for geographically targeting adaptation activities, four separate public consultation events were organized and conducted.

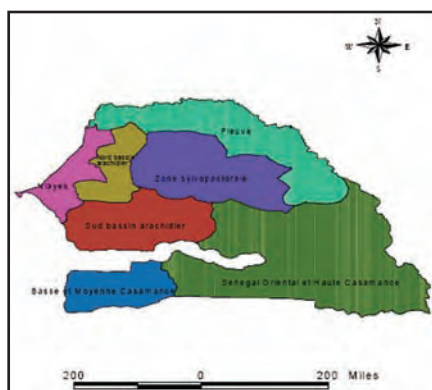


Figure 2: Eco-Geographic Regions of Senegal

Table 1: Distribution of Administrative Regions into Analytical Zones

Northern Region	Region of “Niayes”	Region of Peanut Production	Southern Region
Saint-Louis Matam Louga	Thies Dakar	Fatick Kaolack Diourbel	Tambacounda Kolda Ziguinchor

The public consultation workshops served to bring together representatives of the public sector, local administration, and stakeholders to review the suggested set of adaptation activities provided by the consultants and to develop a set of priorities. Multi-criteria analysis was selected as an appropriate method for ranking the adaptation activities. This decision was made because of the difficulty developing the information needed to carry out cost-benefit analysis, another option suggested in the NAPA guidelines, and because it allows for the ranking process to accommodate

differing, perhaps even conflicting, values and objectives that can emerge from different stakeholders in a particular region.

In each of the four public consultations the following steps were taken to implement the multi-criteria analysis:

- Determine appropriate ranking criteria;
- Set the numeric importance, or weight, associated with each ranking criteria;
- Score each of the potential adaptation activities suggested by the consultants against these criteria according to their expected levels of performance;
- Sort the potential adaptation activities in order to define local priorities.

By implementing this procedure, the NAPA team in Senegal was able to arrive at a series of priority adaptation activities for each of the three chosen sectors in each of the target zones. These are described in table 2. From this list of priority adaptation activities, project papers describing the implementation steps and costs of a limited number of options were developed and submitted to the UNFCCC as the NAPA priority activities in Senegal. These were:

- Agro-forestry promotion
- Rational use of water resources
- Coastal zone protection
- Awareness raising and public education

These adaptation actions were all of a programmatic nature and were presented as general development initiatives rather than a specific project to be realized in specific places in order to reduce specific vulnerabilities to future climate change.

Table 2: Priority Adaptation Activities Identified from Multi-Criteria Analysis

Sector	Northern Region	“Niayes” Region	Peanut Region	Southern Region
Agriculture	Reforestation	Reforestation	Reforestation Enhance soil/ water	Reforestation
Water Resources	Micro-irrigation Rainwater harvesting	Water use efficiency Aquifer recharge		
Coastal Zones	Coastal protection	Coastal protection Mangrove restoration		Coastal protection

This conclusion regarding the scope and tenor of the submitted NAPA project papers is consistent with many of the other NAPA documents submitted to the UNFCCC in the time since the passage of Decision 28/CP.7.

c. Comparison with other NAPAs

A review of other NAPA documents submitted to the UNFCCC suggests that Senegal is not alone in focusing its attention on primary, natural resource based sectors of its economy. Nor is Senegal alone in its definition of fairly broad development programs for these sectors as its priority adapta-

tion activities. The NAPA process as originally conceived would tend to force the outcome in this direction by focusing primarily on strongly natural resource based areas and promoting a national level process to arrive at a series of projects that could be described and submitted to the UNFCCC as potential projects.

4. Filling Gaps in the NAPA Process

In 2006, Senegal initiated activity on NCAP supported activity and made the decision, in keeping with the benchmark that the 'project has coordinated effectively with the NAPA process and other relevant on-going and/or planned initiatives', to formally expand its official NAPA submittal to include priority adaptation activities in non-primary sectors of the Senegalese economy. This represented a significant shift from the sectors targeted in the original NAPA submittal and could provide a template that other countries might be able to follow in expanding their own NAPAs in the future. Here it should be stated that the NAPA coordinating team organized during the initial NAPA process had suggested that the climate change vulnerabilities of key elements of the service sector should also be considered with an eye toward developing adaptation strategies. The NCAP team in Senegal was anxious to use the available resources to respond to this suggestion.

5. New Sectors

The specific elements of the service sector that were identified for closer analysis were the tourism sector and the transport infrastructure sector. Tourism was selected because of its current importance to the Senegalese economy and anticipated expansions contemplated as part of national economic forecasts. The transport infrastructure sector was selected not so much for its direct contribution to the Senegalese economy as for the support function that it provided the entire economy. While consideration of these sectors certainly moved the NAPA analysis beyond the primary production sectors evaluated in the first phase, the challenge was to remain faithful to both the NAPA guidelines, which state that priority adaptation activities should contribute towards poverty reduction, and the NCAP objectives, which also makes specific mention of activities that contribute towards implementing national poverty reduction strategies.

a. Tourism

The tourism sector, which contributes 4.6% of Senegal's GDP is the second leading foreign exchange generator in the country. Over 20,000 international visitors per year come to Senegal, primarily to spend time on the coast that offers many magnificent beaches and many unique and interesting coastal ecosystems. The Senegalese government has identified tourism as a key sector in its recently developed Accelerated Growth Strategy because of the potential it has to create both revenue and employment. Current estimates are that over 100,000 people are employed as a result of the tourism sector, either directly in hotels and restaurants, or in allied occupations such as construction, land-based transport, artisan crafts, guiding, and market gardening. In addition to providing the government with valuable foreign exchange, salaries earned by those working in the tourism industry are a vital part of many family budgets. In 2003, the estimate was that the tourism industry in Senegal generated revenues of approximately \$600 million.

This is clearly not a sector that can be ignored. While it is perhaps one step removed from the natural resource based livelihood strategies pursued by the rural poor who live below the poverty line, it offers a real potential for individuals, particularly young people who can perfect a European language, to move out of vulnerable agricultural livelihoods. It seems logical then that Senegal would target an expanded phase of its NAPA activity on this sector.

i. Identifying Vulnerable Areas

Senegal would very much like to develop its tourism industry outside of the coastal zone. One area of particular interest is the southeast, a region blessed with unique and interesting biodiversity and archeological feature, where higher elevations on the flanks of the Guinean Fouta Djallon Highland contribute to cooler temperatures. It is in this zone that early investment in eco-tourism is occurring. Nonetheless, for the immediate future the Senegalese tourism sector is focused on the narrow band along its expansive Atlantic Coast. Three areas in particular are the focus of current activity and incoming investment. These are the Sine-Saloume Delta, the Petite Cote and the Langue de Barbarie (see map on the right). The primary climate change vulnerabilities in these areas are related to sea level rise and accelerated coastal erosion. Particularly in the Sine-Saloume Delta and along the Petite Cote, mangrove forests where once protected coastal areas are in decline. In all three zones, beaches are eroding and the seafront retreating. Taken together these changes are contributing to dramatic changes in the coastal morphology, such as the breach of an important barrier peninsula at the mouth of a Sine-Saloume Delta shown in figure 4 both before (a) and after (b) the rupture.

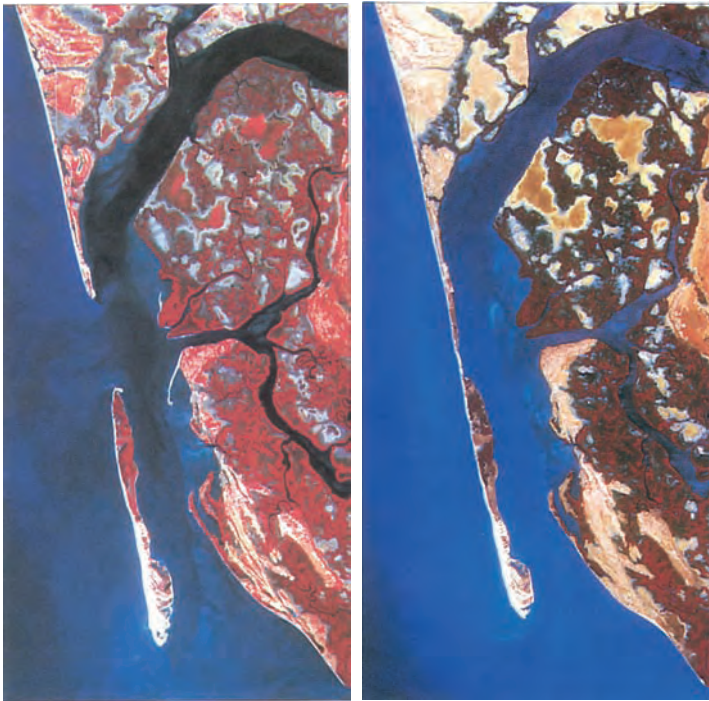


Figure 4: Dramatic Change along the Senegalese Coast Before and After (left to right)

Obviously these dramatic changes pose a real threat to the tourist accommodation that tends to be located extremely close to the seafront in Senegal, and will compromise the beachfront aesthetic that most tourists seek in traveling to Senegal. As part of the NAPA process supported by the NCAP project, an effort was made to characterize all of the possible climate change vulnerabilities posed to the tourism sector in these three locations. These are listed in table 3. The risk to the Senegalese tourist industry is that the combined impact of these threats, which would include compromised properties, narrow beaches, limited drinking water supplies, poor bio-diversity and natural attraction and generally uncomfortable temperatures, could make Senegal increasingly unattractive to tourists seeking a coastal holiday. This could have a devastating impact on this important sector the Senegalese economy.

Table 3: Climate Related Threats to Important Senegalese Tourist Zones

Sine-Saloum Delta	Petite Cote	Langue de Barbarie
<ul style="list-style-type: none"> • Saline intrusion into important fresh water supplies • Loss of biodiversity • Seafront erosion • Soil degradation • Elevated temperatures 	<ul style="list-style-type: none"> • Seafront erosion • Loss of biodiversity • Land subsidence • Loss of beaches • Elevated temperatures 	<ul style="list-style-type: none"> • Loss of bird life • Loss of beaches • Lose of endemic plant forms • Saline intrusion into important fresh water supplies • Seafront erosion • Elevated temperatures

Based on this assessment of vulnerabilities, public consultations were held with key players in the tourism sector in the target region to prioritize responsive adaptation activities.

ii. Defining Adaptations

In keeping with the NAPA process, consultants hired as part of the NCAP project developed a preliminary list of adaptation activities that could be presented during the public consultation process. These fell broadly into three categories. The first related to adaptations related to the management of the coastal zone itself. The second outlined adaptation strategies that could be applied to construction in the coastal zone that occurs to support the tourism sector. The final set of adaptations related to the structure of the sector itself. These are presented in the following lists.

Coastal zone management adaptation strategies proposed for consideration were classed according to a 'protect, adapt, or retreat' topology. These were:

- Construct coastal protection works, paying attention to the fact that these can degrade the natural beauty of the coastal environment;
- Restore natural protection such as mangroves or barrier islands;
- Construct new tourist accommodation and services farther from the seafront; and
- Importation of sand to eroded beaches, which is a temporary solution and can damage the zone from which sand is collected.

In terms of the adaptation strategies appropriate for the construction of buildings to support the tourism sector, the following potential adaptations were proposed:

- Replace concrete based construction, with high aggregate demands typically met by mining local beaches and dunes, with more traditional building materials;
- Construct all new buildings farther from the seafront;
- Require that the financial instruments used to secure construction funds of new construction directly on the seafront must mature over a shorter time frame consistent with the threat posed by coastal zone erosion; and
- Increase insurance premiums on new construction positioned directly on the seafront and ensure they mature over a shorter time frame consistent with the threat posed by coastal zone erosion.

In terms of proposed adaptation activities in the tourism sector itself, the following concepts were provided for public consultation:

- Develop new marketing strategies to increase interest in new tourism products offered in the interior of the country;

- Create an inter-ministerial panel to resolve problems confronting the tourism sector in the areas of health, water supply, and public works; and
- Encourage direct investment by players in the tourism sector in the protection of critical coastal zone ecosystems which are a central part of the tourist experience in Senegal.

It is interesting to note that these adaptations have a more targeted character than the more general development adaptations proposed for the agriculture, water resource, and coastal zone sectors in the first NAPA submission. The reasons for this difference and its implication for developing an adaptation plan of action are explored later in the paper.

iii. Defining projects

At the end of the public consultation process with key players in the tourism industry, a set of general policy adaptations were prioritized, along with specific actions to be taken in the three target zones. Policy adaptations were:

- Define a zone of maritime public domain, within which new construction and aggregate mining will be strictly prohibited;
- Require the preparation of Environmental Impact Reports for all new construction in the coastal zone; and
- Promote eco-tourism, particularly targeted at interior regions of the country.

Physical adaptation activities that emerged with priorities from the consultation process included the following actions:

- *Petite Cote*: Jetties constructed perpendicular to critical beaches to discourage further erosion and promote new beach deposition.
- *Sine-Saloum Delta*: Initiation of a mangrove rehabilitation project.
- *Sine-Saloum Delta and Langue de Barbarie*: Rainwater harvesting and solar brackish water desalination projects to relieve stress on potable water supplies associated with the tourism sector.

It is interesting to note here that the public consultation process generated priority adaptation activities that were even more targeted and specific than those elaborated by the NCAP team working on the NAPA supplement.

b. Transport Infrastructure

The established road network and transport fleet in Senegal plays a critical role in supporting the Senegalese economy. Estimates are that 10% of the country's GDP is generated via the road based transport of people and goods. This is not surprising given that 90% of internal displacements and 90% of shipped merchandise are moved by road in Senegal. Rail and air transportation and shipping links either do not service large areas of the country or are cost prohibitive to large portions of the population. The level of development of the transport infrastructure, shown in figure 5, is a critical factor in the efficient functioning of the diverse components of the national economy. Transport infrastructure is both itself an important economic sector and a critical element in most others. Primary production activities such as agriculture, fishing, and wood products are particularly dependent on the network for moving the goods produced in rural areas to distant markets.

A survey of traffic patterns conducted in 1996 provides a good picture of the structure of the Senegalese transport infrastructure sector. For private vehicles the primary zones of traffic emission are Dakar, Thiès, Kaolack and Diourbel. For commercial vehicles the primary zones of traffic emission are Dakar, Thiès, Kaolack and Saint Louis. Since the time of that survey, the number of trips has grown at an average national rate of over 1% per year, although traffic along roads in the western region of the country has grown at over twice that rate. Clearly the reliance on this road

network is growing, primarily in the zone where the system itself is most threatened by potentially negative impacts of climate change, including sea level rise, floodplain inundation at the mouths of flooded rivers and temperature rise in this more temperate coastal region of the country.



Figure 5: The Senegalese Road Network (primary Routes Nationales in red)

i. Identifying Vulnerable Areas

Climate scenarios suggest that in the future Senegal will be warmer and may experience increases in the intensity of storm events, particularly in the northern portion of the country. In this context the current state of the road network in Senegal is concerning, particularly when combined with the anticipated rise in sea level.

Currently the end of each rainy season is witness to the progressive decline in the quality of the road network as evident in the number of pot holes, cracks, and ruts which are exacerbated by later use. With a lack of maintenance these disruptions to the road surface can begin to degrade the road bed as well. It is also observed that poorly placed and sized roadway drainage systems can lead to the actual splitting of road surfaces during storms. The quality of paving materials, which is often sub-standard, can also leave roads susceptible to degradation during time of high temperature. Full flooding of roads is also a common phenomenon in low lying and coastal areas during the rainy season.

In terms of flooding two particularly vulnerable areas are the link between Saint-Louis and Bakel along the Senegal River where shifting sand disrupts the ability to install and manage a functional drainage system, leading to regular flooding and occasional road damage during storm events. In the Dakar region low lying roads are regularly damaged when heavy rains coincide with high tides and strong storm surges. Of particular concern is Route National 1 that links the capital to the rest of the country as an exit from the Cap Vert Peninsula and the Western Cornish Road that runs along the Atlantic seafloor. Roads in the city of Saint-Louis itself are also prone to flooding when the Senegal River floods, the tides are high and the storm surges are strong. In light of the importance of these two urban centers, there are large efforts to define adaptation activities focused on these regions.

ii. Defining Adaptations

Based on the assessment of the vulnerability of the road network linked to potential changes in climate, combined with consideration of where disruptions to roads would have the largest nega-

tive impact on the national transport infrastructure system, a series of potential adaptation activities were developed in preparation for public consultation with key players in the sector. These included:

- The construction of new roadways around flood prone areas;
- The construction of suspended roads;
- Improvements to road drainage systems;
- Improvements in the quality of asphalt used to pave roads;
- The establishment of a regular road maintenance program to be implemented following each rainy season;
- Consolidation and reinforcement of road beds on seafront roads;
- The construction of seawalls and coastal zone protection measures; and
- A land use policy to shift population centers out of flood prone areas.

These adaptation activities were presented to key actors in the sector who then followed standard NAPA project prioritization methods to identify priority actions for which project papers were prepared and submitted to the UNFCCC.

iii. Defining Projects

At the end of the public consultation process the following adaptation activities emerged as priorities in order of their rank. The following activities were deemed appropriate in both the case of Dakar and the case of Saint-Louis:

- Regular roadway maintenance after each rainy season;
- Improvements to road drainage systems;
- Construction of new roads around flood prone areas;
- Improvement in the quality of asphalt; and
- Consolidation and reinforcement of road beds on seafront roads.

As in the case of priority adaptation actions for the tourism sector, those actions identified for the transport infrastructure sector have a more targeted character than the more general development adaptations proposed for the agriculture, water resource, and coastal zone sectors in the first NAPA submission.

6. Lessons for Other Overlooked Sectors

The example of work carried out in Senegal under the NCAP project to expand the country's NAPA submissions beyond the initial primary sectors of agriculture, water resources and coast zone management raises both some interesting questions and highlights some potential advantages of such effort. It is perhaps easier to begin with the potential advantages.

Firstly, as opposed to efforts to develop priority adaptation activities in the primary production sectors, which tend to occur to subsistence levels across wide areas of a country such as Senegal, components of the service sector, such as tourism, tend to be concentrated in more limited geographic areas. In the case of Senegal, it was possible for a national level consultative process to identify three critical zones of the tourism sector that were also vulnerable to climate change risk. Based on this calculation the Sine-Saloum Delta, the Petite Cote and the Langue de Barbarie quickly became the focus of analysis. Once this geographic focus was made, it was possible to develop more specific adaptation measures than can be the case when attempting to define adaptation activities for the entire agriculture sector in Senegal. This appears to be the case even when the country is divided into four regions as was done in the initial NAPA submission from Senegal.

It was perhaps even easier to focus the analysis dealing with transport infrastructure. Here the data suggested that the largest concentration of commercially related road traffic, vital to the efficient

functioning of the overall economy, was in the regions around Dakar and Saint-Louis. That the roads in these areas are already experiencing problems linked to climatic phenomenon served to further motivate the choice to focus on these zones. As clear problems already exist, problems that can plausibly be assumed to become exacerbated under future climate change; it is relatively straight forward to define adaptation activities. The challenge comes in the development of the prioritized ranking.

Having identified priority adaptation activities for economic activity taking place outside the primary production sectors, it also seems easier to imagine implementing them should funding become available, over a distributed program to promote reforestation or rainwater harvesting across widely distributed communities and production zones. One can even imagine how to calculate the economic benefit of such adaptation activities using fairly standard analytical techniques. For example, estimates of the reduction in the number of days a road is closed thanks to an adaptation activity, use available statistics to sum up the number of trips that would have otherwise not been possible and multiply by some factor representing the value of the goods being transported.

Nonetheless, the greater ease with which a NAPA plan might be developed and implemented in a non-primary production sector does not change the fact that the NAPA program, and the NCAP project which supported the expansion of the NAPA process in Senegal, clearly focus on adaptations that can increase the adaptive capacity of poor people to withstand the negative impacts of climate change. It is here that the questions arise.

- Is it possible to justify climate change adaptation activities in non-primary production sectors by assuming that there will be a trickle down improvement for the poorest and most vulnerable members of society?
- Will the development of a submission to the UNFCCC of more concrete NAPA adaptation activities for non-primary production sectors disadvantage activities developed for the primary production sector when it comes to funding?
- Conversely, will investment in NAPA adaptation activities targeted at primary production sectors disadvantage activities designed for service sectors that could eventually create opportunities for people to move out of what are likely to be increasingly vulnerable primary production sectors under future climate regimes?

These are hard questions and NCAP activity in Senegal has brought them to the forefront. While this paper is not in a position to take them on directly, they do suggest some thoughts on useful recommendations for other countries that would like to expand their own NAPA submittals to the UNFCCC beyond their own primary production sectors.

7. Recommendations and Conclusions

The most helpful realization for grappling with the vexing questions seems to be that as of yet no funding mechanism is in place to implement the long lists of priority adaptation activities that have been filed with the UNFCCC as part of the NAPA process. While it appears that the climate change adaptation dialogue is gaining momentum and that it will be a central part of the Post-Kyoto negotiations scheduled for Copenhagen in 2009, there is still no stable funding mechanism for adaptation activities in the least developed countries.

In this context it seems prudent for countries to develop NAPA priority adaptation activities for non-primary production sectors as there is no way of knowing what project selection criteria will be applied. If the criteria favor discrete activities that can be completed in limited windows of time, it may be a good idea to have some road reconstruction projects on file along with the project to scale up community based rainwater harvesting technology to a regional or national scale. If the criteria require direct investment in the current activities of the poor, then a country will be pleased

to have a national reforestation initiative on file along with a proposal to restore a beach in a critical tourist region. In the absence of clear guidance as to which sorts of projects will be funded from an eventual global adaptation fund, it makes sense to develop a wide range of projects.

More fundamentally, however, moving the NAPA process beyond the primary production sectors forces the issue of what sort of economy a country would like to develop out into the open, and challenges policy makers to assess which economy is the most resilient to climate change. This is a conversation that has no end, no point of definitive certainty. Instead it is a conversation that once engaged will facilitate and open a productive dialogue about how we are to confront humanity's central challenge for the 21st century. The NCAP team in Senegal should be commended for their efforts to initiate this conversation.