Climate change adaptation and mitigation in agriculture
Status & Trends in Ghana

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Priti Narasimhan

Source: EPA presentation

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A. Overview

Ghana has been a success story in Sub Saharan Africa with people living below the poverty line decreasing from 51% in 1991-92 to 28% in 2006, hunger reduced by three-quarters between 1990 and 2004 and its status as the only country in Africa to reduce its global hunger index by more than 50%[1]. This has been possible on the back of real GDP growth of 5.8% annually between 2003 and 2008[2] and in large part due to strong agricultural GDP growth that averaged 4.5% from 1997-2008.[3] Agriculture remains the backbone of the economy contributing to 38% of the GDP, accounting for 75% of export earnings and contributing over 90% of food needs of the country.[4]

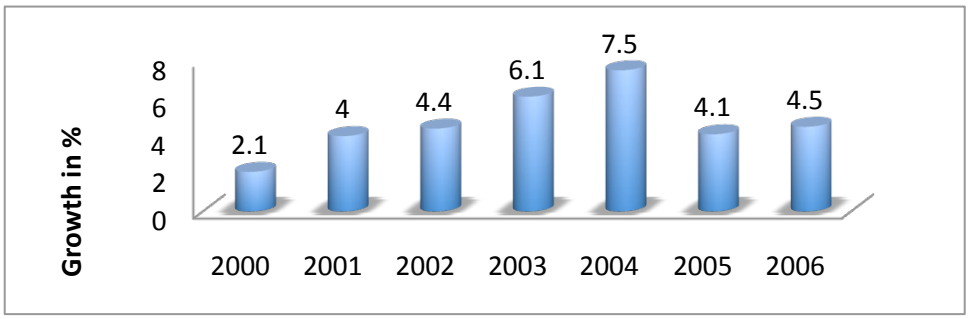

Figure 1: Growth Performance of the Agricultural Sector, 2000-2006

Source: Budget Statement and Economic Policy of the Government of Ghana (Annual Series).

However many grim realities face the country. More than 18% of Ghanaian children under five are underweight[5]. Further, high levels of income inequality exist across regions and have increased over the years as indicated by a WFP Comprehensive Food Security and Vulnerability Analysis (2009) which indicates that 34% of the population in Upper West is food insecure, 15% in Upper East and 10% in the Northern Region as against 2% in Greater Accra and 1% in Western Region. The north –south divide in the country is exemplified than by the fact that while 17.2% of the population lives in the North, this region accounts for 53.7% of the entire country living in extreme poverty. [6]

[1] Juma Calestous, The new harvest Agricultural innovation in Africa, Oxford university Press, 2011(Page 16)
[2] Laura Wurtenberger, Ingo Bunzeck, Xander von Tilburg, Initiatives related to climate change in Ghana-Towards coordinating efforts,Climate and Development Knowledge Network, April 2011 (Page 9)
[3] Project appraisal document-World Bank,Sustainable land and water management project,nov 2010(page 1)
[4] Project appraisal document-World Bank,Sustainable land and water management project,nov 2010(page 1)
[5] MEST, Ghana goes for green growth-National engagement on climate change Discussion document,Govt of Ghana, Nov 2010
[6] Project appraisal document-World Bank,Sustainable land and water management project,nov 2010(page 2)

Climate Change adaptation and Food security

One of the primary reasons for increased vulnerabilities in the North is the climate (lower rainfall and predisposition to floods and drought) and it is increasingly evident that the impacts of climate change on these agriculture dependent populations is further going to exacerbate the food insecurity and poverty situation. Climate change scenarios constructed at a national scale over a long term for six eco-climatic zones of Ghana indicate that over the past 30 years, temperature has increased by 1°C and further increases to the tune of 1.7 °C to 2.04 °C by 2030 (with average temperatures rising as high as 41 °C) are likely in the northern Savannah regions.[7] The models also reveal an uncertainty with regard to rainfall, which could increase or decrease. These impacts are likely highest in the agricultural due to the climate dependency of this sector.

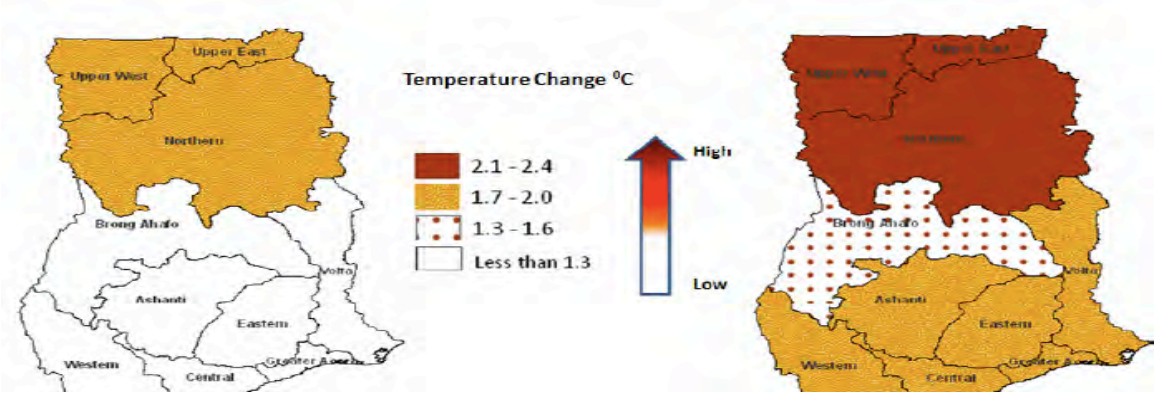

Figure 2: Temperature changes in Ghana in 2030 and 2050
Source: Economics of Adaptation to Climate Change – draft for consultation (World Bank, 2010:

Ghana recognizes these economic and social costs associated with climate change to smallholder farmers and in the National climate change policy framework Discussion document published by MEST in 2010, mentions "impact on agriculture, with reduced yields leading to more poverty and food insecurity, and the loss of national revenue from cash crops such as cocoa" as one of the primary concerns of impacts of climate change. "Impact on women, who are particularly vulnerable to the impact of climate change, given their higher levels of poverty and their responsibilities for household water, food and fuel" is another primary concern outlined reflecting the reality that 70% of

[7] EPA, Ghana second national communication to the UNFCCC draft, March 2011 (Page 20)

subsistence crops[8] is produced by women while they face inequities in the form of lack of access to land, formal financial services and collateral.

Climate Change is also mainstreamed into national development policy and featured explicitly in the "Ghana Shared Growth Development Agenda" as a key focus area and some of the adaptation strategies in agriculture that are outlined are: Minimize climate change impacts on socio-economic development through agricultural diversification; enhance national capacity to adapt to climate change through improved land use management.

A first order draft of the national climate change adaptation strategy has been finalized by EPA (the operational coordinating body for climate change in Ghana) in which ten priority areas have been identified using "the Akropong Approach": a cross-sectoral impact planning and analysis methodological tool. Agriculture related activities out of the 10 identified were: "Minimizing Climate Change impacts on socio-economic development through agricultural diversification" and "Enhance national capacity to adapt to Climate Change through improved land use management". These options are not currently being implemented as any specific project yet.

While a significant amount of progress has been made in focusing policy on the needs of adapting smallholder farmers to climate change, there have been several shortcomings:

1. Low reliability of climate models: The conclusions of climate models vary significantly therefore creating a high level of uncertainty about impacts of climate change.
2. Low participation levels of farmers: For the adaptation strategy, farmers were not involved as stakeholders in deciding the priorities.
3. Low access to information: Very few people outside the immediate climate change policy circles in the Government know anything of what is going on.
4. Low coordination: At present climate is not addressed in any of the six policy

8 MEST, Ghana goes for green growth-National engagement on climate change Discussion document, Govt of Ghana, Nov 2010

objectives of the Agricultural policy of the country (FASDEPII). This is primarily because MOFA does not feel they have a mandate for climate change related activities. While a coordinating body has been appointed at the center (NCCC), there is no corresponding body at the regional/local level raising questions about extent to which environment related activities percolate down to the district level and are incorporated by the district director of food and agric dept.

Climate change mitigation in agriculture and food security:

The contribution of the Agriculture sector to green house gas emissions in Ghana was 24% in 2006 and came down from 38% in 2000. In absolute terms, total emissions from the agricultural sector increased steadily from nearly 4.6 $GgCO_2e$ in 1990 to 5.5 $GgCO_2e$ in 2000 and to 6.68 $GgCO_2e$ in 2006.[9]

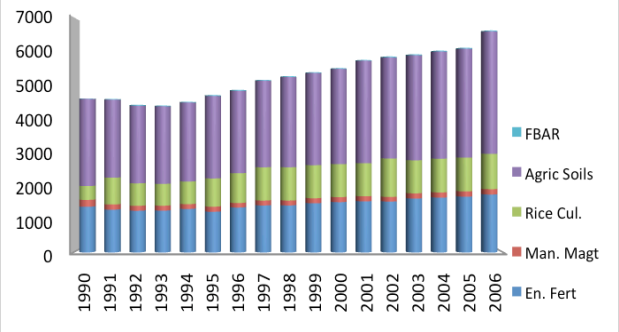

Figure 3: Trends of Total emissions by categories in the agricultural sector (GgCO2e)

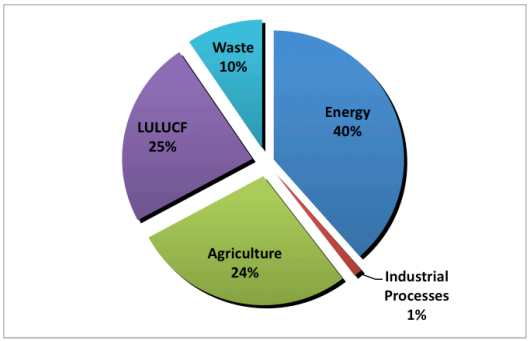

Figure 4: Share of GHG emissions by sectors in 2006

Source: Ghana's Second National Communication to the UNFCCC Draft, March 2011

Business as usual scenario's created for rice cultivation and enteric fermentation indicate that the total CO2 equivalent of methane emission from livestock and rice production would increase by 534% from 2000 to 2050.[10] Further, a the focus of agricultural growth on modernization- a common theme that is found across FASDEPII and GSGDA, could imply increased emissions from large-scale irrigation and mechanization and increased use of fertilizers.

[9] EPA, Ghana second national communication to the UNFCCC draft, March 2011 (Page 20)

[10] Oppong, Samuel Kingsley; Acheampong,Emmanuel; Opuni-Frimpong, Emmanuel; Kwasi Adu, Joseph; National Greenhouse gas mitigation assessment for the forestry and agriculture sectors of Ghana Final Report, Submitted to EPA, Feb 2010 (Page 14)

Ghana's Policy response:

Ghana's outlook on the issue of climate change mitigation has been to aim for low carbon growth to take advantage of additional new opportunities that are presented in the form of **direct economic and social benefit, international competitiveness** and **increased access to available international support** (financial, technical and capacity building). For the agriculture sector this could be inferred to include (1) Low hanging fruits: Activities being already carried out in agriculture that can be construed as mitigation presenting access to international support (2) Climate smart growth including agricultural mitigation actions that offer synergies with food security presenting direct economic and social benefit and access to finance. Since access for funds for adaption is linked to mitigation in the international arena today, this may be of even more importance. However there is a lack of focus on the agriculture sector in Ghana's low carbon plan.

The progress in the policy arena towards low carbon growth generally and specifically in the agriculture sector are:

1. Climate change mitigation has been mainstreamed in the medium term development plan GSGDA.
2. The NCCPF discussion document has as one of its objectives, low carbon growth. The cocoa sector finds prominent mention in the opportunity to practice sustainable agriculture with combination of shade trees also contributing to higher yields.
3. Ghana is attempting to seize the opportunity of NAMA's being an innovative and powerful source of funding by doing significant amt of work in this area since last year. Initially a list of 55 NAMA's were

Box 1: How will NAMA's be financed?

"The current thinking around NAMA's distinguishes three types of NAMA's and associated financing. 1) Unilateral NAMA's represent countries own actions and are not eligible for external financial assistance, 2) supported NAMA's would be eligible for direct financial assistance and 3) credited NAMA's would rely on the sale of carbon credits on international markets."

Source: Policy Brief(DFID and Dutch Government): NAMA's and the Ghana Shared growth and development agenda 2010-2013 , Feb 2011

submitted which was further prioritized across various sectors to arrive at a top five list across various sectors including agriculture. Ghana then worked to develop 2 actions from the prioritized NAMA list that can be concrete proposals for which funding could be sought – for which costing has been done, monitoring, reporting and verification is possible, etc. The two actions identified are both in the agricultural sector: Animal feed management and climate smart agro forestry.

Low focus on agricultural sector

Agriculture holds a lot of potential for a co-benefit approach – (e.g) soil carbon can be good for the environment, for livelihoods and for food security. However there is lack of sufficient focus on agriculture in the national policy. The NCCPF focus sectors are energy and forestry (REDD+). This might be due to the international competitiveness/cost reduction potential of the energy sector and access to international funding for REDD+ agenda, (e.g.) Ghana has already been selected as a Forest Investment Program pilot country and is set to receive significant funding over four years.

Agricultural mitigation does indirectly get addressed through the REDD+ agenda of the country since agriculture has been recognized as the primary driver of deforestation[11] Agro forestry consequently has emerged as one of the two REDD+ thematic areas for national strategy in Ghana. In cocoa, shaded cocoa has emerged as a recommendation based on its potential to increase carbon stock (Box 2). One of the drawbacks of shaded cocoa discussed is lower productivity resulting in further deforestation. However the Reading university research indicates that traditional shaded cocoa farms store more carbon per unit area than an equivalent area of land consisting of

Box 2: Cocoa carbon storage through shaded cocoa

Reading University research has found that, including soil carbon and the cocoa trees, shaded cocoa (crown canopy in excess of 30%) was found to store about 159 tonnes C ha-1 or 70% of the carbon found in intact high forest (224 tonnes C ha-1), and over double that stored in unshaded (under 10% canopy cover) cocoa (72 tonnes C ha-1). Excluding soil carbon, shaded cocoa stored 107 tonnes C ha-1 about two-thirds the carbon in high forest (156 tonnes C ha-1) and almost three times more than unshaded cocoa (38 tonnes C ha-1).

Source: Katoomba XV; "Sweetening the Deal for Shade-Grown Cocoa: A Preliminary Review of Constraints and Feasibility of 'Cocoa Carbon' in Ghana"; Oct 2009

[11] The Forestry commission Ghana, Readiness preparation proposal (R-PP) submitted to FCPF, Jan 2010 (Page 38)

a combination of intensively managed cocoa and an area of retained or replanted native forest. [12]

Therefore the competing approach to agro forestry's "increased carbon stock"[13] argument is the "avoided deforestation"[14] approach achieved through intensification of agriculture through increased use of fertilizers and seeds. The avoided deforestation approach could exacerbate the situation of high contribution of agricultural soil to Ghana's emissions due to increased use of fertilizers and subsequent N2O emissions. This does not get factored in today's discussions since REDD+ is the focus and soil carbon is not getting factored in anywhere.

The other drawback in the policy process is lack of institutionalization of the GHG inventory activity. The process is spurred into action only when grants come in.

Programs and projects in agriculture and climate change

Ghana has had a longstanding engagement on climate change related issues. Further given its economic and political stability since 1992, it has not had problems attracting international donor and project funds. Therefore there are many ongoing projects implemented by Government, NGO and multilateral organizations. A recent study by ECN estimates funding for climate change initiatives from 1995 - 2010 to equate 240 million out of which

Box 3: Ghana's longstanding engagement on climate issues:

United Nations Framework Convention on Climate Change: Officially became a party to the Convention by 5th December 1995.

Kyoto Protocol: Ghana acceded in March 2003. The Kyoto Protocol entered into force globally on 16th February 2005.

Copenhagen Accord: , Ghana associates itself with the Copenhagen Accord that was taken note of in December 2009.

COP16: To continue upon actions such as NAMAs mechanism as agreed during COP 16 in Cancun in 2010.

12 Katoomba XV; "Sweetening the Deal for Shade-Grown Cocoa: A Preliminary Review of Constraints and Feasibility of 'Cocoa Carbon' in Ghana"; Oct 2009

13 Katoomba XV; "Sweetening the Deal for Shade-Grown Cocoa: A Preliminary Review of Constraints and Feasibility of 'Cocoa Carbon' in Ghana"; Oct 2009

14 Interview with IITA-sustainable tree crops program

close to $87 mio were agriculture and forestry projects.[15]

An innovation in the area of financing is the setting up of The Natural Resource Governance desk at the Ministry of Finance and Economic Planning, which is a coordination effort to bring together various ministries in environment and natural resources so that they can benefit from donor contributions. At present there is also an effort to include climate change in budget guidelines even though specific funds have not been created.

The main development organizations (current and potential) active in Ghana in the area of climate change and agriculture are World Bank, UNDP, IFAD, DANIDA, USAID, FAO,WFP and JICA. Some of the large climate change related projects funded by these organizations are: "Promoting Value Chain Approach to Adaptation in Agriculture" by IFAD; "Sustainable land and water management" by World Bank/GEF; Adaptation learning programme for Africa (ALP) by Danida and an early warning system project– AAP by JICA. Some of the potential projects are: A joint initiative by FAO, UNDP, WFP on climate change adaptation in Northern Ghana, mainstreaming of climate change into existing IFAD programs: Root and Tuber improvement and marketing program and Northern Region poverty-Reduction program (inclusion of conservation agriculture) and a new commercial agriculture program that will look at 3 value chains(rice, maize and soya) with elements of sustainable use of pesticide, sustainable use of water and conservation agriculture by USAID Feed the future initiative. Many of these projects take into consideration explicitly food security and women issues.

An examination of these projects indicates that most of the agriculture related carbon projects are part of larger REDD+ projects that have agro forestry and other agriculture related components. This is in part because even when projects are initially conceived explicitly as forestry projects, at the design finalization stage, livelihoods become an important consideration and component, which then ends up involving agriculture.

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[15] Laura Wurtenberger, Ingo Bunzeck, Xander von Tilburg, Initiatives related to climate change in Ghana-Towards coordinating efforts,Climate and Development Knowledge Netowrk, April 2011

The programs in the area of capacity building are: "Finalization of the National climate change adaptation strategy" is a "CC-Dare" project supported by UNDP[16] ; Green house gas inventory studies including mitigation assessment for agriculture and forestry through UNDP/GEF support; NCAP program to develop National climate change scenarios and climate change vulnerability assessment studies for sectors including gender and women livelihoods, poverty, land use management, root crop and cocoa production; Policy advice series including one on agriculture and food security by UNDP Ghana; An assessment on impact of climate change- 'Economics of Adaptation to Climate Change" by World bank[17] ; R-PP preparation got support from FCPA and ramping up of REDD will be supported by FIP.

There are other projects carried out by NGO's such as Cocoa Carbon Initiative (CCI), Rainforest Alliance (RA), A Rocha Ghana and CARE. While RA and A Rocha are agro forestry projects, CARE is a soil carbon project. Further, CCI is a carbon-offset pilot project where benefits can be passed on to the farmers. RA project helps with certification and hope to access REDD+ credits in the future. While A Rocha began the CCBA certification process to secure carbon financing, they abandoned it due to prohibitive costs associated and continue to depend on individual voluntary offsets. CARE just completed a conservation agriculture project (soil carbon) in June 2011.

An analysis of the profile of existing and potential projects and interviews with project owners indicates that while currently agro forestry denominates the project space and is being carried out in the context of REDD+, there is an increasing interest in agricultural carbon with some development agencies wanting to mainstream practices such as conservation agriculture into existing/potential programs.

Carbon finance in agriculture in Ghana is predominantly multilateral climate finance and there are no market-financed projects. CCI is attempting to pioneer efforts to obtain voluntary market finance.

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16 http://www.ccdare.org/Countries/Ghana/tabid/6763/Default.aspx

17 Laura Wurtenberger, Ingo Bunzeck, Xander von Tilburg, Initiatives related to climate change in Ghana-Towards coordinating efforts,Climate and Development Knowledge Netowrk, April 2011

B. **Ghana Profile**

1 National government
1.1 Organization and structure of actors
1.1.1 National government coordinating body

Coordinating Body at Policy level: At the policy level, the national government coordinating body that is responsible for mitigation and adaptation for all sectors including agriculture, land use and land use management and forestry is "The National Committee on Climate Change" (NCCC). The Ministry of Environment, Science and Technology (MEST), the lead institution for climate change and all UNFCCC activities in Ghana, hosts the NCCC.

Composition of NCCC: The NCCC is a multi stakeholder committee composed of the representatives from relevant ministries, research institutions, private sector and Non-Governmental Organizations (NGOs) (Details in the Organogram :Annexure A)

Coordinating body at operational level: At the implementation level, the Environment Protection Agency (EPA) on behalf of MEST, performs the role of technical coordination of climate change related activities, UNFCCC and other environmental conventions ratified by Ghana and is designated as the main Country Implementing Institution (CII)[18]. Specifically for climate change related activities, a specialized unit called "Energy Resources and Climate Change" has been created within the EPA.

Mandate

The NCCC has been mandated under a Ministerial directive among other things to: "Formulate a National Climate Change Policy for Ghana that takes into account mitigation and adaptation actions necessary for sustainable national development and endeavor to ensure that the policy is integrated into planning processes at national, regional and district levels; Envision for Ghana mitigation and adaptation strategies for implementing the Climate Change Policy or otherwise review any existing sector strategies and associated action plan (s); Recommend for the consideration of the Minister, Environment, Science and Technology (MEST), relevant area (s) of study that

[18] EPA, Ghana second national communication to the UNFCCC draft, March 2011 (Page 97)

could provide a sound basis for comparative analyses of climate change adaptation strategies. Identify skills deficiencies within sectors and propose training needs for particular sectors, training modules and institutions for action by the sectors; Evolve harmonized climate change programmes from all sectors especially in the key sectors of finance and economic planning, forestry, agriculture, land and water, health, energy and coastal zones management to ensure coherence and building of synergies among these sectors; Source and utilize funding for the implementation of climate change mitigation and adaptation activities and strengthen financial mechanisms for sustainable implementation; Develop a communication strategy for climate change related matters in Ghana; Prepare a common Ghanaian position in relation to the on-going climate change negotiations. Such a position should as far as possible be consistent and feed adequately into the overall African position and ultimately the Group of 77 and China but highlighting national areas of difference; Offer strong technical backstopping to the political leadership, Cabinet and Parliament in particular, to share the common African vision on efforts made to combat climate change in general and on the African climate platform."

The mandate of the EPA, "Energy Resources and Climate Change unit" is : "Serve as the technical focal point on climate change and related issues in Ghana; Provide support to the Ministry of Environment, Science and Technology on core technical and implementation issues bordering on climate change and related issues; Lead in the facilitation and implementation of the various provisions of the UNFCCC; Serve as nucleus for archiving and sharing climate change information to aid in national planning; Provide technical backstopping to the CDM/DNA (Designated National Authority)"

Actions taken so far

1. NCCC has done considerable work towards developing a national climate change policy framework (NCCPF). The NCCPF will provide strategic direction and pave the way for a multi sector approach to deal with the issue of climate change comprehensively in Ghana. A discussion note on the NCCPF based on extensive stakeholder discussions and feedback has been published.

2. A first order draft of the national climate change adaptation strategy has been finalized by EPA. This involved prioritizing sectoral adaptation options through an the "Akronpong approach"
3. Climate change has been mainstreamed into development policy (GSGDA)
4. 55 NAMA's containing 8 from the field of agriculture were initially submitted that have further been prioritized to arrive at 2 actions that can be concrete proposals for funding.
5. GHG inventory has been completed for 1990-2006 that covers five sectors, namely; Energy, Industrial Process (IP), Agriculture, Land Use Land-Use Change and Forestry (LULUCF) and Waste as well as these greenhouse gases; carbon dioxide, methane, nitrous oxide, tetrafluorocarbon and hexafluoroethane.
6. Initial communication to UNFCCC was submitted in 2000. Technical drafting and third party review of Second National Communication has been completed. The launch of the third National Communication is expected by August, 2011

Assessment:

1. The NCCC has strong links with policy making: Most NCCC participants are also discussants of the development policy of the country (GSGDA) and this is reflected in the mainstreaming of climate change issues in the medium term development policy of the country between 2010-13.
2. The capacity of the EPA is high with highly qualified team with PhD's[19] in them and several capacity building projects already completed.
3. Low participation levels of farmers and other stakeholders: One such example is the development of the adaptation strategy, where there were 72 options that had to be prioritized. This was done so by the "Akropong approach" that involved consultations between 30 stakeholders from academia, CSO's, departmental organizations, etc and farmers were left out. Further, while the NCCC committee does have members of Civil society organizations serving on it, participatory agenda setting is still lacking since overall the process is not consultative at

[19] Information obtained during Interviews with stakeholders

various stages of policy/agenda setting. In 2010, a meeting of 57 civil society activists representing 43 civil society organizations, jointly organized by SEND Ghana and Civic Response with support from the Rights and Resource Initiative and Christian Aid discussed this topic and issued a communiqué asking for " the opportunity on a non-exclusive basis to engage with Government on fast-track development of a more effective national consultative process"[20] which would involve the following: "stakeholder representation on appropriate bodies; effective feedback mechanisms for representatives to their constituencies; better and more appropriate information sharing and would cover consultations between the State and stakeholder groups and amongst stakeholder groups; the sourcing and allocation of resources to enable marginalized citizens and groups to participate in an informed manner in the process"

4. Low access to information: Very few people outside the immediate climate change policy circles in the Government know anything of what is going on.
5. Low coordination: While a coordinating body has been appointed at the center (NCCC), there is no corresponding body at the regional/local level. Further various other ministries do not feel they have a mandate for climate change related activities.
6. Lack of institutionalization of many activities/processes given the dependence on donor funds.

Key contacts are presented in Appendix B

1.1.2 Major government units concerned with mitigation and adaptation

a. Ministry of Food and agriculture (MoFA)

MoFA has the lead responsibility in formulation and coordination of the food and agriculture policy of Ghana. FASDEP II is the current agricultural policy of Ghana and climate change does not find any mention here. While the food security objective targets production as well as post harvest losses, it does not take into consideration exacerbation

20 file:///Users/pritinsp/Dropbox/untitled%20folder/allAfrica.com:%20Ghana:%20National%20Climate%20Change%20Mitigation%20Agenda.webarchive

of the food security problem due to climate change. Similarly, the objective of Sustainable Management of Land and Environment while addressing environmental issues in food and agriculture, fails to specifically target strategies towards minimizing effects of climate change.[21]

Box 4: Policy Objectives of FASDEP II (2007-2012)

1. Food security and emergency preparedness
2. Improved Growth in incomes
3. Increased competitiveness and enhanced integration into domestic and international markets
4. Sustainable management of land and environment
5. Science and technology applied in food and agriculture development
6. Improved Institutional coordination

However, several on-the ground interventions by MoFA[22] are climate change related such as afforestation and forest protection programmes, agroforestry, land management, zero grazing, integrated pest management, conservation agriculture,etc. Further, while all the interventions are presented as adaptation strategies, many of the listed strategies are also mitigation actions that illustrates the interdependence of mitigation and adaptation. A large project ($8.5 mio) involving MOFA is an IFAD funded project called "Promoting Value Chain Approach to Adaptation in Agriculture"

b**. Forestry Commission:**

Forestry commission is responsible for management and regulation of utilization of wildlife and natural resources and falls under the purview of the Ministry of Lands and Natural Resources (MLNR), which is the lead national entity responsible for overall oversight and direction on REDD+ activities in Ghana. MLNR is represented at the National Climate Change Committee. Ghana's Forestry Commissions has established a Climate Change Unit with special focus on forestry and REDD+. The REDD+ secretariat at the Forestry Commission in collaboration with the National REDD+ Steering

[21] EPA Policy advice series No 2; "Can Ghana feed itself in the face of Climate Change impacts?

[22] List shared by MoFA during face to face interview titled "Project level and on-the-ground interventions-Adaptation strategies"

Committee coordinate REDD+ related activities. REDD+ is relevant to the agriculture sector because agriculture sector ahs been identified as a primary driver of deforestation and therefore one of the two REDD+ components of the national strategy for Ghana is agroforestry / tree crops / agriculture sector from which emerge many options for REDD+.

Activities: The REDD+ secretariat at the Forestry Commission in collaboration with the National REDD+ Steering Committee facilitated Forest Carbon Partnership Facility (FCPF) process with support from World Bank. This involves among other things: Getting a R PP ready, carrying out pilot projects in areas identified as drivers of deforestation such as unsustainable agriculture, bushfires, unsustainable logging, charcoal burning, etc.

c. DNA

As a party to the Kyoto Protocol, Ghana is mandated to set up the DNA (designated national authority). This is to assist project investors to go through a country process for CDM. DNA has to be established within the countries focal ministry for environment – in Ghana's case – MEST. Initially DNA was set up in 2005 under the EPA-an agency under the ministry of environment. But DNA moved from EPA to directly being under MEST this year (Feb 2011). The reason was to reconstitute the structure and strengthen transparency and credibility. Now it is more or less a secretariat with 2 primary commissions (1) carbon credit trading commission (2) technical review commission. Market based carbon finance has not been very successful so far with only 2 CDM projects have gone through and with no opportunity for agriculture projects.

d. The Ministry of Finance and Economic Planning (MoFEP)

MoFEP hosts the Natural Resource Governance desk, which is an innovative coordination effort to bring together various ministries in environment and natural resources so that they can benefit from donor contributions. MoFEP is also represented at the NCCC and has been nominated for accreditation as the National Operating Entity (NIE) to the Adaptation Fund Board that will allow it to function as the fiduciary

administrator of the adaptation fund[23]. At present there is also an effort to include climate change in budget guidelines. MoFEP may be playing even greater roles with ideas such as channeling climate change financing through it (that can also be used to improve fiscal situation) being discussed.[24]

1.2 National policy

1.2.1 Adaptation Strategy

Ghana does not need to prepare NAPA since it's not in the list of least developing countries. However a first order draft adaptation policy has been prepared and is conceived as a critical input to the NCCPF. EPA is coordinating the preparation of the adaptation strategy .

Ghana's adaptation strategy has its foundation in various climate change scenarios constructed at a national scale over a long term. The GCM approach has been used also including methods for scenario development at sub-grid scales.25 Specifically scenarios developed are for the six eco-climatic zones of Ghana for climate parameters of mean daily temperature, precipitation, rise in sea level and sea-surface air temperature centered at 2020(that is 2006 to 2035), 2050 (that is 2036 to 2065) and 2080 (that 2066 to 2095). In spite of varying conclusions leading to uncertainly on future scales and impact of climate change, there are clear warnings in all the models. Over the past 30 years, temperature has increased by 1°C and further increases to the tune of 1.7 °C to 2.04 °C by 2030 in the northern Savannah regions.[26] The models also revel a great uncertainty with regard to rainfall, which could increase or decrease.

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23 EPA, Ghana second national communication to the UNFCCC draft, March 2011

24 Interview with World Bank and EPA

25 The method after Hulme et al., 1999, in which regional sub-grid observed climatologies are combined with projected changes associated with the GCM grid box within which they lie, was adopted in the scenario development.(As referenced in : National Climate change adaptation strategy draft)

26 EPA, Ghana second national communication to the UNFCCC draft, March 2011 (Page 20)

Further vulnerability assessment studies have been carried out for seven sectors and those that pertain to farmer adaption are: yields of specific crops such as root crop and cocoa; impact on land use- soil fertility and land degradation; impact on livelihoods and poverty; impact on gender and women. The Netherlands Government Climate Change Studies Assistance Project (NCAP) has funded both the climate change scenarios and climate change vulnerability assessment studies.

There were 3-10 adaptation actions that emerged from each of the sectors and in order to prioritize these activities, a cross sectoral impact analysis based on set criteria was used ("Akropong" approach) and a range of stakeholders were involved in the discussions. 10 activities were identified through this approach for Ghana which would constitute the national adaptation action plan and would be implemented using an integrated programmatic approach. Agriculture related activities out of the 10 identified were: "Minimizing Climate Change impacts on socio-economic development through agricultural diversification" and "Enhance national capacity to adapt to Climate Change through improved land use management". Two out of the ten options (early warning systems and health) are currently being implemented through two different programs funded by Govt of Japan and UNDP-GEF respectively. Work has not begun on the agriculture related options.

The main shortcomings in the work done in the area of adaptation are: Low reliability of climate models therefore creating a high level of uncertainty about impacts of climate change and Low participation levels of farmers in setting priorities.

Nationally appropriate mitigation actions (NAMAs):

Ghana associated itself with the Copenhagen accord and in responding to Paragraph 5 of the CA Ghana submitted a list of 55 NAMA's in 2010.[27] These NAMA's are voluntary Mitigation actions that can be in the form of low carbon alternative actions to Ghana's development. NAMA's provide Ghana an opportunity to access international finance .

[27] Policy Brief(DFID and Dutch Government): NAMA's and the Ghana Shared growth and development agenda 2010-2013 , Feb 2011

The initial list of 55 NAMA's contained 8 from the field of agriculture and all of the NAMA's pertained to crop production – land preparation, cultivation and harvest to post harvest. Subsequent to the COP 16 in Cancun, Ghana did further work on prioritizing the NAMA's across various sectors in order to develop concrete proposals that can be implemented. National stakeholders across sectors initially screened these NAMA's based on qualitative data and then scored and ranked them based on the following valuation criteria: Emission reduction potential, alignment with national development policy framework, contribution to sustainable development, market and technology feasibility, indicative cost and scope of implementation. The top five NAMA's that emerged in the agriculture sector are:

-Promote cultivation of high yielding upland rice

-Promote minimum tillage

-Reduce enteric fermentation through genetic improvement

-Appropriate manure management system

-Adopt feed conservation system

This analysis took into consideration livestock related emissions (very important source in Ghana) that the initial list of 55 NAMA's had not considered.

Finally since the primary interest in NAMA's are to make them a source of finance, Ghana worked to develop 2 actions from the top 5 NAMA list generated that can be concrete proposals – for which costing has been done, monitoring, reporting and verification is possible, etc.

The two actions identified are both in the agricultural sector: Animal feed management and climate smart agro forestry.

1.2.2 **National Communications to UNFCCC**

Initial communication was submitted in 2000 covering the period 1990 to 1996. Technical drafting and third party review of Second National Communication completed

and will be submitted to UNFCCC after national endorsement. The launch of the third National Communication is expected by August, 2011.

The EPA was overall responsible for coordinating the preparation of the second national communication. Guidance and direction in the process was also given by The Project Advisory Committee (PAC) and Project Steering Committee (PSC). The PAC was made up of Ministry of Environment, Science and Technology (MEST), Environmental Protection Agency (EPA, Ghana UNDP Representative, Energy Commission (EC), Forestry Commission (FC), representative from the Universities, National Development Planning Commission (NDPC) and Civil Society Organization (CSO) representatives.

Ghana has completed the GHG inventory for 1990-2006 that covers five sectors, namely; Energy, Industrial Process (IP), Agriculture, Land Use Land-Use Change and Forestry (LULUCF) and Waste as well as these greenhouse gases; carbon dioxide, methane, nitrous oxide, tetrafluorocarbon and hexafluoroethane. EPA designated the Environmental Application and Technology (ENAPT) Centre to coordinate the implementation of the Greenhouse Gas inventory activities. Quality Assurance / Quality Control (QA/QC) in the national GHG inventory is implemented in two layers. ENAPT Centre and QA/QC coordinator at the EPA implemented the first layer of the QA/QC. The second level of the QA/QC is mainly focused on quality assurance and it involves third party reviewers. The third-party reviews were by experts from the following international bodies: United Nations Development Programme Office (UNDP), New York, UNFCCC, Bonn and ECN, Netherlands. Apart from the international reviews, comments from nearly 50 national experts were solicited through electronic Delphi-panel method.

The contribution of the Agriculture sector to green house gas emissions in Ghana was 24% in 2006 and came down from 38% in 2000. In absolute terms, total emissions from the agricultural sector increased steadily from nearly 4.6 $GgCO_2e$ in 1990 to 5.5 $GgCO_2e$

in 2000 and to 6.68 $GgCO_2e$ in 2006.[28] The general rising levels of agricultural emissions between 1990 and 2006 reflects increasing trends in emissions from fertilizer application (largest source of emissions in the agricultural sector was agricultural soils) and in livestock numbers (The second largest contributor of agricultural emissions was from enteric fermentation of livestock). Apart from these two areas, rice cultivation and manure management also contributed to agricultural emissions

The main issue with inventories is that it is not institutionalized. The process is spurred into action only when a grant/funding comes in. Now every 2 years inventories need to be reported –so system needs to be put in place.

1.2.3 **National Development Plan**

The National Development plan in Ghana is the *Ghana Shared Growth and Development Agenda 2010 – 2013*. The GSGDA is a medium term development authored by the National Development Planning Commission (NDPC) that "aims to accelerate growth of the economy and raise the living standards of Ghanaians."[29]

GSGDA and climate change

There is increasing appreciation of the links between climate change and development and at a policy level and climate change is being mainstreamed into Ghana's medium term development plan. Climate Change is featured explicitly in the Ghana Shared Growth Development Agenda" as a key focus area and the corresponding policy objectives outlined in the document are Adaptation and mitigation of climate variability and change and use of Low Carbon Growth (LCG) as a specific approach to integrate the link between climate and development. Agriculture and forestry related strategies that

[28] EPA, Ghana second national communication to the UNFCCC draft, March 2011

[29] Policy Brief(DFID and Dutch Government): NAMA's and the Ghana Shared growth and development agenda 2010-2013 , Feb 2011

figure in this list are[30]:

- Adaptation: Minimize climate change impacts on socio-economic development through agricultural diversification; enhance national capacity to adapt to climate change through improved land use management
- Mitigation: Promote sustainable forest management and implement forest governance initiatives; Promote various mitigation options in the agricultural sector including education and efficient management practices

A mapping of the initial list of 55 NAMA's submitted by Ghana with the GSGDA strategies, revels that quite a few of the agriculture related NAMA's are already mainstreamed in the GSGDA as specific strategies.

The GSGDA does not specifically allocate funds for climate change. It is understood that guidelines to include climate change in the budget are presently being prepared (however no funds have been created)[31]

GSGDA and Agriculture

The Government is committed to increase its spending on agriculture development to reach the target of 10 per cent of its total budget, as agreed in the Maputo Declaration.[32]

(The Government in the 2009 fiscal year spent GHC 781.4 million on the agriculture sector, which represented 9.0

Box 4: Agriculture Quick facts

Contribution of Agriculture has come down form 44% in 1990[1] to 33.6%of GDP in 2008 (ISSER, 2009- GHG assessment report for agriculture and forestry) but it remains the largest sector

Foreign exchange earnings from agriculture rose from US$1,549 million in 2007 to US$1,999 million in 2008. The major contributors to agricultural foreign exchange earnings are cocoa, timber and non-traditional agricultural exports (ISSER, 2009- GHG assessment report for agriculture and forestry)

Agricultural GDP growth averaged 4.5% from 1997-2008.(World Bank)

Agriculture remains the backbone of the economy contributing to 38% of the GDP, accounting for 75% of export earnings and contributing over 90% of food needs of the country.(World Bank)

30 National Development Planning commission, Government of Ghana, Ghana Shared growth and development agenda,Volume I: Policy framework, Dec 2010(page 50 and 51)

31 Interview with EPA

32 Ministry of Food and Agriculture; Medium term agriculture investment plan(METASIP) 2011-2015,Sep 2010 (Page xii)

per cent of its total spending). GSGDA takes on the focus of agricultural modernization as outlined in Food and Agriculture Sector Development Policy (FASDEP II) and the corresponding investment plan as detailed in the Medium-Term Agricultural Sector Investment Plan (METASIP).

The resources required to implement interventions relating to agriculture modernization and natural resource management thematic area for the time period of the plan (2010-13) is US$ 906.354 million. 80% of this amount is budgeted for agricultural modernization (minimizing production and distribution risks and bottlenecks, increasing agricultural competitiveness and enhance integration into domestic and international markets, and promoting selected crop development for food security, export and industry). The other 20% is expected to go to activities relating to natural resource management and environmental Governance.

1.2.4 **Climate action framework**

Considerable work has been done towards developing a national climate change policy framework coordinated by Ministry of MEST through the National Climate Change Committee (NCCPF). NCCPF will provide strategic direction and pave the way for a multi sector approach to deal with the issue of climate change comprehensively in Ghana. A discussion note on the NCCPF based on extensive stakeholder discussions and feedback is published and has as its pillars the following three objectives:

- Low carbon growth
- Effective adaptation to climate change
- Social development

The pillars outlined on which the objectives would be achieved are: Governance and coordination; Capacity building; Research and knowledge management; Finance; International cooperation; Communication; Monitoring and reporting

The main thrust of the NCCPF is on adaptation and agriculture has been dealt with in detail specifically in the context of food security in the document. The NCCPF mentions

"impact on agriculture, with reduced yields leading to more poverty and food insecurity, and the loss of national revenue from cash crops such as cocoa" as one of the primary concerns of impacts of climate change. "Impact on women, who are particularly vulnerable to the impact of climate change, given their higher levels of poverty and their responsibilities for household water, food and fuel" is another primary concern outlined reflecting the reality that 70% of subsistence crops33 is produced by women while they face inequities in the form of lack of access to land, formal financial services and collateral.

The vulnerability of cocoa sector, a significant foreign exchange earner for Ghana, is examined in detail in the context of its vulnerability to climate change. The NCCPF states that some projections suggest falling production from 2020 to 2080, and some even suggest that the cocoa sector will not survive.

Towards the objective of low carbon growth, the main sectors discussed are energy and forestry (REDD+) while agriculture sector is not directly addressed. Agricultural carbon is however mentioned in the context of REDD+ as in the case of afforestation and its interaction with increased yields in the agricultural sector (e.g.) The cocoa sector finds prominent mention in the opportunity to practice sustainable agriculture with combination of shade trees also contributing to higher yields.

1.2.5 **Agricultural development Plan**

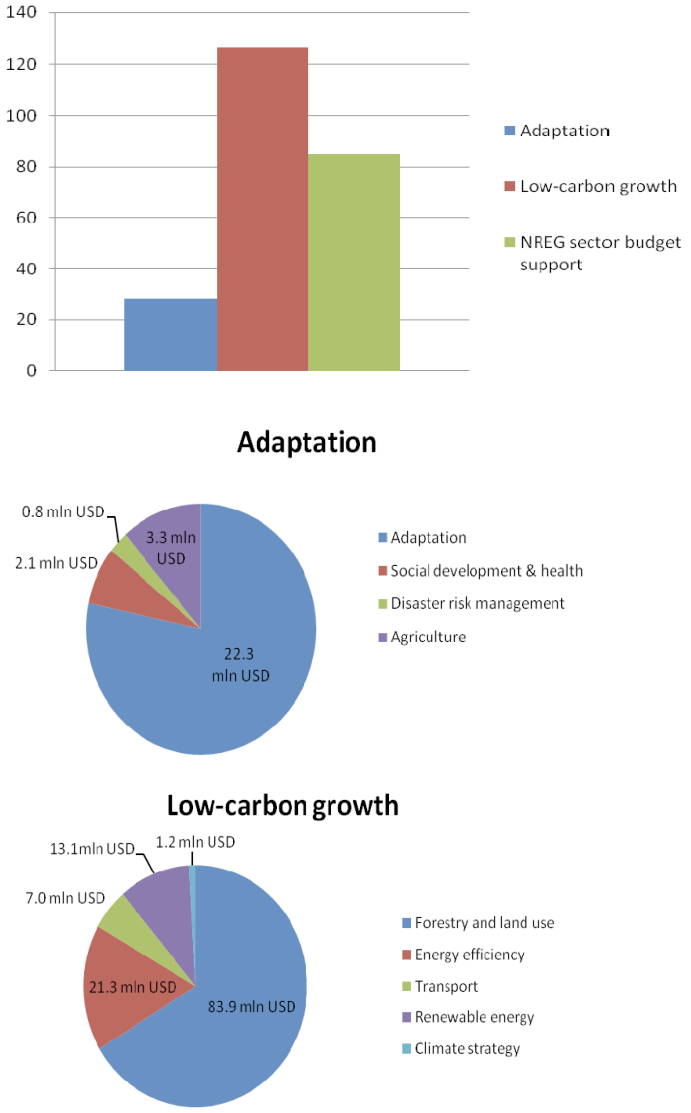
The long-term agricultural policy of the country is laid out in FASDEP II. The METASIP is the investment plan to implement the medium term (2011-2015) programmes of the policy. FASDEP II does not address the issue of climate change (details discussed in the section on MoFA on Page 16).

33 MEST, Ghana goes for green growth-National engagement on climate change Discussion document, Govt of Ghana, Nov 2010

1.3. Financing

Apart from the Government of Ghana and the national endowment fund, the main source of funding for projects seems to come from donors. Given Ghana's long-standing engagement with the issue of climate change its political and economic stability, there are no issues attracting donor funds. A recent study by ECN estimates funding for climate change initiatives from 1995 -2010 to equate 240 million[34] and the results are presented below.

Figure 5: Funding for Climate change Initiatives



34 Laura Wurtenberger, Ingo Bunzeck, Xander von Tilburg, Initiatives related to climate change in Ghana-Towards coordinating efforts,Climate and Development Knowledge Network, April 2011

1.4 **National issues or debates**

1.There are two different discourses on the issue of climate change in the country. Some feel that Ghana's association with the Copenhagen accord undermines African solidarity and call for a principled and unified African approach that focuses on adaptation. However the official Ghanaian position is that apart from adaptation the country will aim for low carbon growth. This approach helps Ghana to take advantage of additional new opportunities that are presented in the form of **direct economic and social benefit, international competitiveness** and **increased access to available international support.**

2. Cocoa is very critical to the Ghanaian economy. Currently cocoa trees are not included in the definitions of what constitutes forests. However the R-PP definition of forests includes cocoa. This can help in establishing baselines in such a way that cocoa can be used as means of afforestation.

3. Bio-fuels: Currently there is no clear policy on bio-fuels in Ghana. Some feel that the discussion around bio fuels has a negative bias and concentrates too much on issues surrounding land grab and food security. These advocates of bio-fuels argue that degraded land could be used and quote examples such as Brazil and Ethiopia. Some others advocate a more cautious approach and recommend a clear and comprehensive policy on bio fuels to begin the discussion.

1.4.1 Priorities for investment in agricultural development and intensification

Agricultural modernization is the focus of agricultural development and is clearly evident from the medium/long term policy document (FASDEP II) as well as the medium term planning document: GSGDA. The views of entities outside the Government confirmed that the focus of the government is on mechanization, irrigation and fertilizers and that climate change issues are not prioritized.

METASIP investment estimates for implementing agricultural policies as laid out in FASDEP II were further analyzed to examine focus areas. METASIP investment estimates for the next 5 years-2011-2011 totals GHC 1,532.4 million. The largest investments are in the area of Development of Rural Infrastructure (GHC 450 million) followed by Irrigation and Water Management (GHC 285 million). A value chain approach to agricultural development is being prioritized by MoFA with investments towards Development of Pilot Value Chains for Two Selected Commodities in Each Agro-Ecological Zones (GHC 200 million). The other priority investment areas that can be seen are livelihood diversification, productivity improvement and mechanization.

1.4.2 Linkages between adaptation and mitigation and potential for coordination

While no formal link is acknowledged by Government, in reality, in many on the ground projects the line between the two is very thin with mitigation projects offering adaptation benefits and vice versa. In fact instances were noted where donors presented projects as adaptation projects when the benefits were clearly primarily mitigation related.

1.4.3 REDD: Treatment of Agriculture

Ghana has identified REDD+ as an important low carbon strategy as well as adaptation strategy. The access to international finance form REDD+ mechanism could be a very strong motivation (e.g) Ghana participates in funding mechanisms such as the Forest Carbon Partnership Facility (FCPF) and the Forest Investment Programme (FIP). Ghana's REDD+ Readiness Preparation Plan (R-PP) was submitted in Dec 2010. Agriculture has been identified as primary driver of deforestation: The relative importance of various drivers mentioned in the R-PIN are: agricultural expansion [c.50%]; harvesting of wood [c. 35%]; population & development pressures [c. 10%]; mineral exploitation and mining [c. 5%].[35] Specific drivers that are mentioned related to agriculture mentioned are: increasing local demand for agricultural and wood products;

[35] The Forestry commission Ghana, Readiness preparation proposal (R-PP) submitted to FCPF, Jan 2010 (Page 38)

limited technology development in farming systems and continued reliance on cyclical 'slash and burn' methods to maintain soil fertility and fire as a tool in land management.

Therefore one of the two REDD+ components of the national strategy for Ghana is agroforestry / tree crops / agriculture sector from which emerge many options for REDD+. The cocoa sector finds prominent mention in the opportunity to practice sustainable agriculture with combination of shade trees. This are is also listed as a Further research area : "to study the feasibility of re-introducing shade-dependent varieties, and the policy issues arising".

While the R-PP recognizes "slash and burn" in agricultural systems by smallholder farmers as a driver of deforestation, the view is that given that livelihoods of poor people who have no other options might be impacted and therefore further research is needed in this complex area before actions can be implemented. Towards this end the R-PP proposes setting up of a Challenge Fund on Fire Control to support projects to work with local communities in finding ways to improve fire management.

R-PP mentions that the current phase involves pilot projects to be carried in areas identified as drivers of deforestation such as unsustainable agriculture, bushfires, unsustainable logging, charcoal burning, etc). The latest update is that an ad was given out and 17 project proposals have been received which need to be further evaluated.[36]

1.4.4 Capacity strengthening

Ghana has been involved in international climate negotiations since 1995 and there have been several programs in the area of capacity building over the years. Some of the projects are: "Finalization of the National climate change adaptation strategy" is a "CC-Dare" project supported by UNDP[37] ; Green house gas inventory studies including mitigation assessment for agriculture and forestry through UNDP/GEF support; NCAP

[36] Interview with Forestry Commission
[37] http://www.ccdare.org/Countries/Ghana/tabid/6763/Default.aspx

program to develop National climate change scenarios and climate change vulnerability assessment studies for sectors including gender and women livelihoods, poverty, land use management, root crop and cocoa production; Policy advice series including one on agriculture and food security by UNDP Ghana; An assessment on impact of claimte change- 'Economics of Adaptation to Climate Change"by World bank[38] ; R-PP preparation got support from FCPA and ramping up of REDD will be supported by FIP. WASCAL – a climate change unit at AGRA is also helping with capacity building with climate modeling.

Developing human capacity is a critical aspect of capacity strengthening and has been an approach taken by many donors. WASCAL is planning to build universities. EMBRAPA in Ghana is focusing on agricultural training and capacity building among locals. The straining is in the form of taking scientists, researchers, etc to Brazil to demonstrate how things work in Brazil to make them believe the possibilities. The areas that EMBRAPA is most keen on is soil conservation, Seeds for livestock grazing(tropical grass seeds) and Choosing proper grass with conservation agriculture (cover crop). They have 16 projects of capacity building-training and local extension services. The government of Ghana established The University of Development Studies (UDS) in 1992 with the aim of "bringing academic work to support community development in Northern Ghana"[39] This also helps students to learn experientially and inculcate a problem solving approach.

The area of institutional strengthening is very crucial for development of carbon markets. World Banks Forest carbon partnership facility is trying to create the environment for creating carbon markets

38 Laura Wurtenberger, Ingo Bunzeck, Xander von Tilburg, Initiatives related to climate change in Ghana-Towards coordinating efforts,Climate and Development Knowledge Network, April 2011

39 Juma Calestous, The new harvest Agricultural innovation in Africa, Oxford university Press, 2011

2. Other actors

2.1 Non-governmental institutions

a. Rainforest Alliance

Rainforest Alliance (RA) has a climate unit that looks at mitigation activities that include climate education, certification and trading.

Rainforest Alliance is collaborating with the Global development Alliance of the USAID on a joint project called the Forest, Climate & Communities Alliance in Ghana[40]. While the FCCA itself a community-based forest management and trade program, in western Ghana where it operates the project employs a landscape approach involving Sustainable agriculture network (SAN) certification, agro forestry, REDD, enterprise development, trading (through Olam) and governance(land tenure). The emphasis on agro forestry is because in western Ghana is dominated by cocoa farming and encroachment has led to only patches of forests remaining. Therefore the program is concentrating on intensification program and helping farmers increase productivity of the farm through agro forestry. The 24,000 hectare project is located in Juabeso and aims to secure carbon finance in the future. Apart from project looking at macro (land tenure-governance) and micro issues (increasing productivity of farmers, increasing incomes through premiums from certification, etc),the project uses an interesting institutional design of using farmers(known as lead farmers) as extension service providers.

b. CARE international

CARE has many agriculture related programs in Ghana that address climate change mitigation and adaptation. In forest areas, interest is in mitigation (easier to grow trees). In the north of Ghana where it is semi-arid, focus of projects is on adaptation.

In 2003, CARE had a bushfire management. A program that just got completed in June 2011 was the conservation agriculture project. CARE felt that CA best way forward for

[40] http://www.rainforest-alliance.org/publications/newsletter/community-forestry-benefits

sustainable use of land. A participatory technology development approach was used by CARE getting together MoFA, research institutions, universities and farmers and to identify key technologies pertaining to the three main components of CA: No tillage, crop rotation, permanent soil cover. Questions such as what crop to use for permanent cover, whether location was suitable for no tillage, etc were decided on. The project also used interesting institutional design of Community based extension system. The conservation agriculture program did not look at carbon finance due to several ambiguities: how carbon measurement is done, process for access to funds, etc

c. **A Rocha Ghana**

A Rocha Ghana is a faith-based institution that believes in conservation. They have an agro forestry initiative in Ghana that involves local people-farmers setting aside land and planting trees. A Rocha emphasizes planting of local species. A Rocha provides seeds and services free of cost. A Rocha also pays the farmers for labour to keep them on the site. Once the farmers get into the project within 5 years there are fruit trees and timber trees and in order to tackle the situation of canopies closing at a certain point, A Rocha also has alternate livelihood programs in these areas such as bee keeping. The Ministry of Food and agriculture provide extension services. For farmers in short term it leads to increased income and in long term plants and land are more fertile. This program is on in Damango.

A Rocha tried to link the projects with the carbon markets and attempted to get the CCBA certification. However mid way into the process, the cost of the certification increased to 1.10,000 pounds due to which they gave it up. Instead the project relies for a portion of their costs on voluntary offsets by individuals and groups of individuals. However this reliance on informal networks and good will of people raises sustainability issues. The organization also attracts Peace Corps volunteers.

Apart from agro forestry, A Rocha also has tree-planting program in schools that are run by A Rocha Ghana.

2.2Private Sector

A. Blue Skies:

The Company processes fresh fruits such as pineapple, mango, passion fruit and pawpaw for sale in European markets. The company helps farmers to get certified which is then used to get a premium in the European markets. The certifications used by Blue skies relating to sustainable land management practices are LEAF and Global gap and farmers getting certified practice the following: less of fertilizers, less use of machinery (no-till) manual weeding with dutch hoes, plastic mulching, seed management, giving plants right nutrients, etc.

The list of recommended practices is developed by the team of agronomists who are employed by the company who keep track of the latest research and based on inputs/training from research partners such as MOFA,GTZ,TIPCEE,etc. The Agronomists get quarterly training on seeds, techniques, etc. Blue Skies presently employs 10 agronomists. Training of famers is done through the agronomist team and through field coordinators. Further the internal audit is done on an ongoing basis by the company, which then gets verified by the external agency at certain regular intervals

Farmers are certified free of cost and this costs the company $4500 per year in the case of both Global gap and LEAF certification. The farmer saves since she/he does not have the resources to get himself/herself certified (it costs $2500 per certification if it is individual). The farmers get themselves a better livelihood by associating themselves with Blue skies since minimum price for fair trade is paid and they also get access to extension services with a touch point frequency of receiving a visit from the agronomists once a week. The farmers can also grow food crops and can sell to outside markets if they wish to do so. Farmers are enrolled as and when they get orders and the benefit to the farmer is evident with the long waiting list of farmers who are eager to join the program.

There are two kinds of farming techniques based on the certification: For global gap, the farming done is organic, without tillage (Dutch hoes are used) and sustainable land management techniques are used. There are 80 such organic farmers producing pineapple

– since along with no tillage, no use of fertilizers is allowed, the size of the holding are pretty small and on an average each of the farmers have 5 hectares of land. Under LEAF, the farming practices employed are minimum tillage, no cutting down of trees, conserving natural features, enhancing biodiversity, low energy use, etc and for this there are 70 low tillage farmers who are employed with average lot sizes of around 100 hectares. Total land under cultivation is 3065 hectares.

A while ago, there was a threat of ban on exports of sugarloaf pineapple from Ghana and flowers form Kenya to UK. However blue skies prepared a report that showed that either ways planes were flying and these goods were only getting added on to existing passenger flights.

Blue skies also runs a compost facility of unused fruits and this goes back to the farmers

Box 6: Blue Skies: Farmer perspectives

Mr Albert Dadzie, a farmer in his 50's with 6 grown up children, joined the blue skies program in 2008 after hearing about the program from friends and after applying to blue skies. He says Blue skies has given him many techniques such as mulching (permanent soil cover) that has ensured good yield even as the farm gets old. The main attraction to Mr. Dadzie of the program is the assurance of a market for his produce from a sustainable company from where he also gets a better price and gets paid for the produce by weight (which does away with the problem of not being able to sell small sized fruits). However he did mention that when his fruits did not pass the Quality control of the company he would then sell in the open market.

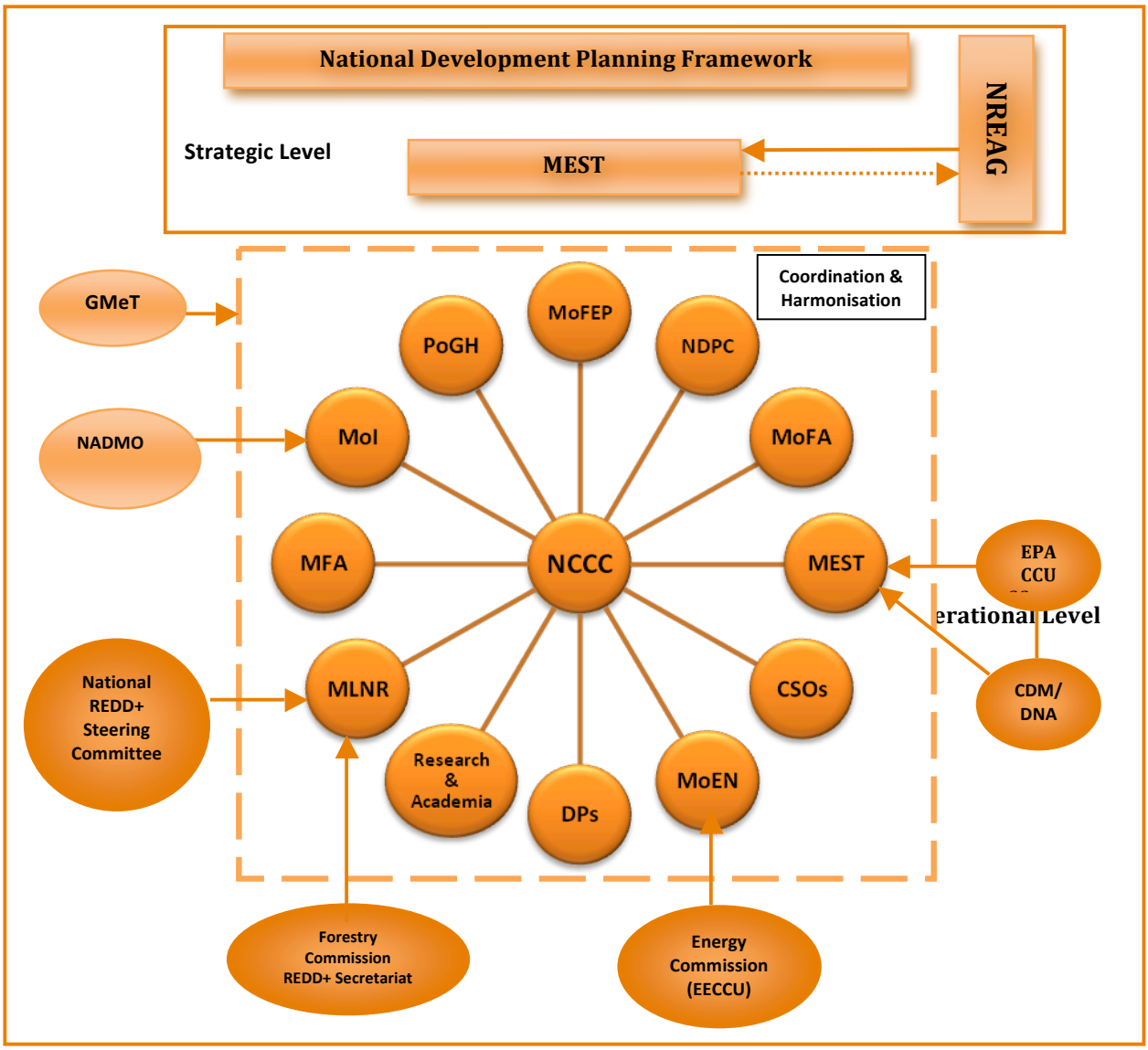
Mr Osei Kofi in his 30's started with 6 acres and after associating with Blue skies has explanded to 28 acres. He now employs people to work for him. He feels what he has learnt that is most useful is on hygiene and how to take care of victims in cases such as snakebites.

Mr James Dadzi and James Opong both in their 20's started very small with 1 acre each when they joined the blue skies program and both of them have 5 acres of land now. Their main learning from agronomists at Blue skies are the practices of mulching and crop rotation of maize after 5-6 years of growing pineapple. Both of them mentioned doubling of yields after associating themselves with Blue skies (from 6000 pineapples per acre to 12,000 pineapples now and from 5000 pineapples per acre to 10,000 pineapples per acre now respectively). As in the case of other farmers the draw of a readily available market for their fruits seem to be the main attraction to blue skies. Both farmers claim certainty of income and the fact that more income has meant better health and better education for kids as the biggest payoffs from their association with Blue Skies.

2.3 Influential individuals in Climate change and food security

NAME	ORGANIZATION/TITLE	CONTACT
Daniel Tutu Benefor	EPA Project Officer	dbenefor2000@gmail.com dbenefor2000@yahoo.com
Flavio Chavez	The World Bank Natural Resources Management specialist	fchaves@worldbank.org
Justice O.Odoi	USAID Ghana Environmental specialist Economic growth office	jodoi@usaid.gov
Robert K. Bamfo	Forestry Commission Head, Climate Change	bamforobert@yahoo.com
Prof Dr Paul L.G. Vlek	Universitatbonn Center for development Research	p.vlek@uni.bonn.de
Atsu Titiati	Rainforest Alliance Project Director- TREES Program	atitiati@ra.org
Leovegildo Lopes de Matos	Embrapa Regional Resident Representative	Leo.matos@embrapa.br
David Sumbo	CARE	David.Sumbo@co.care.org
Jim Gockowski	IITA	j.gockowski@cgiar.org
Prof E.A Gyasi **Alex B Aseidu**	University of Ghana Dept of geography & resource development	

APPENDIX A: ORGANOGRAM (Institutional Arrangement for Coordinating Climate Change Activities in Ghana)



***Key**:*
***NCCC** – National Climate Change Committee, **MoFeP**: Ministry of Finance and Economic Planning, **NDPC**: National Development Planning Commission, **MLNR**: Ministry of Lands and Natural Resources, **MoFA**: Ministry of Agriculture, **MEST**: Ministry of Environment, Science and Technology, **CSOs**: Civil Society Organizations; **CCU**: Climate Change Unit, **EECCU**: Energy Efficiency and Climate Change Unit, **CDM/DNA**: Clean Development Mechanism/Designated National Authority, **MoEn:** Ministry of Energy, **DPs**: Donor Partners, **MFA**: Ministry of Foreign Affairs, **PoGH**: Parliament of Ghana, **MoI**: Ministry of Interior, **NREAG**: Natural Resource and Environment Advisory Group, **GMeT**: Ghana Meteorological Agency*

Note:
This institutional arrangement does not represent the hierarchical flow of functions and roles within the national development planning process. The various institutions, particularly those involved in the processes of coordination and harmonization are only a representation of their respective institutions and contributions to the national climate change activities.

SOURCE: Ghana second national communication to the UNFCCC draft, March 2011 (Prepared by EPA)

APPENDIX B: LIST OF KEY CONTACTS

Organization	Name	Contact
GOVERNMENT		
Environmental Protection Agency	Daniel Tutu Benefor Project Officer	dbenefor2000@gmail.com dbenefor2000@yahoo.com
National Committee for climate change (NCCC)	Rudolph Kuuzegh Director	sanuikuuz@yahoo.co.uk
Forestry Commission	Robert K Bamfo Head, Climate Change	bamforobert@yahoo.com
Clean Development Mechanism (CDM) Secretariat	Peter J Dery National Coordinator	peterdery@yahoo.com
Ghana Environmental conventions coordinating Authority	Dr Nicholas K. Iddi National Project coordinator	Nicholas.iddi@gecca.org
Ministry of Food and Agriculture	Delali Kofi Nutsukpo Deputy Director- Land Mgt	kofi_nutsukpo@live.com
INTERNATIONAL ORGANIZATIONS		
The World Bank	Flavio Chavez Natural Resource Management Specialist	fchaves@worldbank.org
Food and Agriculture Organization (FAO)	Musa Saihou Mbenga Deputy Regional Representative for Africa	MusaSaihou.Mbenga@fao.org
USAID	Justice O.Odoi Environmental Specialist	jodoi@usaid.gov
IFAD	Ulac Demirag Country Programme Manager	u.demirag@ifad.org
NGO's		
Rainforest Alliance	Atsu Titiati Project Director TREES Program	atitiati@ra.org
CARE	David Sumbo	David.Sumbo@co.care.org
A Rocha Ghana	Seth Appiah-Kubi	Seth.appiah-kubi@arocha.org

	National Team Leader	
PRIVATE SECTOR		
Blue Skies	Mawuli Dogbo	mawuli.dogbo@blueskies.com
RESEARCH INSITUTIONS		
Embrapa	Leovegildo Lopes de Matos Regional Resident Representative	Leo.matos@embrapa.br
Universitatbonn Center for development (at WASCAL – Climate change unit at AGRA)	Prof Dr Paul L.G. Vlek	p.vlek@uni.bonn.de
IITA	Jim Gockowski Sander Muilerman Anthropologist& Development Sociologist	j.gockowski@cgiar.org s.muilerman@cgiar.org

APPENDIX C: PROJECT/PROGRAM INVENTORY

PROJECT	ORGANIZATION	SITE	DATES	DESCRIPTION
1.Sustainable land and water management **Contact:** **Flavio chavez** **fchavez@worldbank.org**	Funder: World Bank (GEF) Amt: $8.15 mio Borrower: Government of Ghana Responsible Agency: MEST	Project in northern Ghana savannah ecological zone **Climate:** semi-arid	Jan 2011 – Feb 2016	***Adaptation & mitigation*** Consists of component of improving sustainability of agriculture through crop rotation, integrated nutrient management and soicl conservation; Agroforestry, fire management in agricultura landscapes
2.Promoting value	Funder: GEF-IFAD	GHANA	Approved	Objective: Help overcome

chain approach to adaptation in agriculture **Contact:** **Mr Delali Kofi Nutsukpo** **Deputy Director-Land mgt** **MoFA**	Amt: $2.6 mio Responsible agency: Ministry of food and agriculture, EPA		in end 2010 Project duration is 30 months	climate induced risks to food security and income or rural communities by minimizing: 1.impact of climate change on root and tuber production/processing 2.Socio-economic vulnerability of climate change to poorest groups,particularly women engaged in cassava & agricultural products for livelihood
3. Adaptation learning programme for Africa[41]	Funder: DFID,DANIDA Amt: 5 mio GBP Implementing agency: CARE	GHANA	Jan 2010-Dec 2014	Being implemented in 40 communities across Ghana,Niger,NMozambiqu and Kenya
4. Innovative Insurance Products for Adaptation to Climate Change (IIPAC)[42]	Funder: German Federal Ministry of the environment Amt: 2.25 mio EUR Implementing agency: GTZ	GHANA	Dec 09-Jun 2013	
5. Climate change adaptation in Northern Ghana[43]	Funder: DANIDA Implementing Organization: WRC	GHANA	Jan 08-Dec 2011	
6. Africa Adaptation Programme	Funder: Japanese Government Amt: $2.7 mio Implementing organization: MEST	Ghana and 5 pilot districts to fund practical projects: Aowin Suaman, Fantaekwa,Keta,Sissala East and West MAmprusi	2009-2011	Project objective: Ensure broadened and improved institutional capacity and financing mechanisms for addressing climate change risks and demonstrating positive impact in linking

41 Laura Wurtenberger, Ingo Bunzeck, Xander von Tilburg, Initiatives related to climate change in Ghana-Towards coordinating efforts,Climate and Development Knowledge Network, April 2011

42 Laura Wurtenberger, Ingo Bunzeck, Xander von Tilburg, Initiatives related to climate change in Ghana-Towards coordinating efforts,Climate and Development Knowledge Network, April 2011

43 Laura Wurtenberger, Ingo Bunzeck, Xander von Tilburg, Initiatives related to climate change in Ghana-Towards coordinating efforts,Climate and Development Knowledge Network, April 2011

				disaster risk AAP is also working with 5 pilot districts to fund practical adaptation projects
7.Vodaphone-Raising awareness for climate chane	Funder: Vodaphone Amt: 150,000 GHC Implementing agency: EPA	Ghana	June 10-july 2012	
8. Forest, Climate & Communities Alliance	Funder: USAID Implementing Agency: Rainforest Alliance	24,000 hectare project is located in Juabeso	Ongoing	employs a landscape approach involving Sustainable agriculture network (SAN) certification agro forestry, REDD, enterprise development, trading (through Olam) and governance(land tenure).
9. Agroforestry Program	Implementing Agency: A Rocha Ghana	Damango	Ongoing	Faith based organization that believes in conservation. Agro forestry initiative in Ghana that involves local people-farmers setting aside land and planting trees
10. Conservation Agriculture Program	CARE	Northern Ghana	Completed in June 2011	Participatory technology development Focus on increasing yields
11. Cocoa Carbon Initiative	Funding: Rainforest foundation,Moore foundation, Cadbury Implementing organization: NCRC/Forest trends			Project attempts to create cocoa carbon transaction based on extra carbon grown in shade.
12. CGIAR Water and Food program	Lead insitution: KNUST	Volta Basin		Explores the institutional and technical aspects of small reservoir development and maintenance, embedded

				within a wider rainwater management system for the Volta River Basin
CAPACITY BUILDING PROJECTS				
Greenhouse gas inventory study including mitigation assessment for forestry and agriculture	**UNDP/GEF Capacity Building Project**			
Developing National climate change scenarios and climate change vulnerability assessment studies for sectors including gender and women livelihoods, poverty, land use management, root crop and cocoa production	NCAP			
CC-DARE: Finalization of National Climate Change Adaptation Strategy	UNDP and EPA			
Economics of Adaptation to Climate Change study	World Bank			
Policy advice series (one on agriculture and food security)	UNDP Ghana			
Technical Assistance to the Ghanaian National Climate Change Policy Framework (NCCPF)	DFID (UK Department for International Development) and the Dutch Government			
R-PP Analytical work	FCPA			
Ramping up of REDD-Analyze proposals, pilot projects,etc	FIP			
POTENTIAL PROJECTS				
1.**Mainstreaming Climate Change into**	IFAD			Conservation agriculture will be included

northern region poverty reduction program				
2.**Mainstreaming climate change into Root tuber improvement and marketing program(processing peels for bio fuel)**	IFAD			
3. **Joint initiative by FAO,UNDP and WFP**	UNDP,FAO,WFP	Wa West distrcit		Outputs are: - Improved rural sector adaptive capacity for climate change(FAO) - Knowledge on adaptation capacity of climate change assessed with reference to women(UNDP) - Strengthened community resource management for climate change adaptation(WFP)
4.**Commercial Agriculture Program**	USAID Feed the future initiative			Will look at 3 value chains (rice, maize and soya) with elements of sustainable use of pesticide, sustainable use of water and conservation agriculture

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