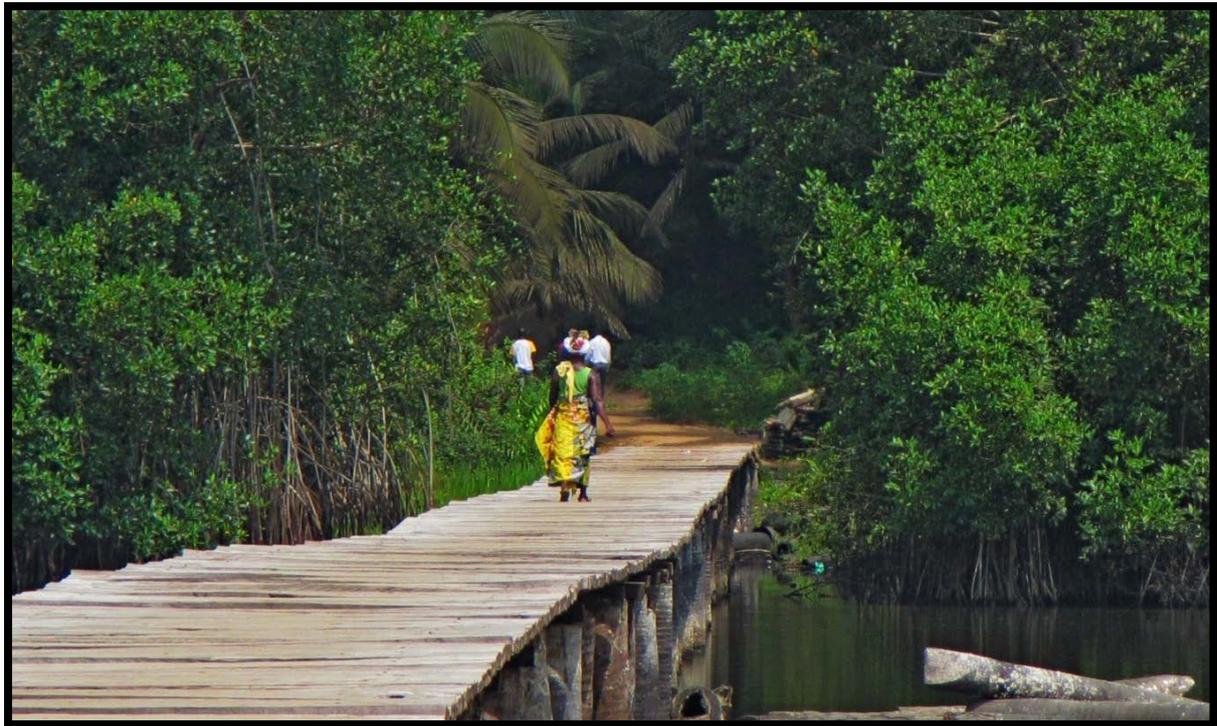




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Feasibility for a wetland forest restoration project in Western Ghana Fact Finding Mission Report



Hen Mpoano

THE
UNIVERSITY
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GRADUATE SCHOOL
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Cover Photo: *Mangrove walkway in Western Region*

Cover Photo Credit: *A. Vallejo*

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1 Background for this report

Wetlands ecosystems in Ghana constitute about one percent (1%) of the country's total land surface and have been determined as important carbon sinks, especially in their soils, as well as providers of many ecosystem services. Wetlands in the south-western districts of Ghana have high conservation value while also supporting the livelihoods and well-being of numerous communities.

Based on the emerging potential of blue carbon as a climate change mitigation mechanism, Coastal Resources Center, a USAID funded project in the south-west of Ghana contracted NCRC to conduct a preliminary assessment of carbon stocks in the mangrove and swamp forest ecosystems in the greater Amanzule wetlands (spanning from the Ankobra River to the western shoreline bordering Cote d'Ivoire). The objective of the assignment was to generate baseline information on total carbon stocks, as well as carbon stock changes associated with various land-use dynamics in the wetlands. The intention was to generate useful data that will give insights for decision-making regarding REDD+ potentials in the landscape. Given the enormous carbon stocks that were recorded in the wetlands, relative to terrestrial forests and land cover, interests in a possible REDD+ initiative were heightened. However, critical data gaps for a viable REDD+ pathway remained unanswered.

In the light of this, CRC further expressed interest to engage NCRC to provide a detailed REDD+ pathway and implementation strategy that could be rolled out in the Greater Amanzule wetlands.

In November 2012 NCRC entered into an agreement with Carbon Decisions International (CDI) to assist to bring their vast experience to a pre-feasibility assessment of a potential mangrove/swamp forest restoration carbon project in Ghana.

The collaboration between NCRC and CDI was structured in several phases. The goal of phase 1 was to study existing documentation of the proposed A/R carbon related project activities and to carry out a joint fact-finding mission to the region where the project is to be implemented. Phase 2 would involve the preparation of a Project Design Document (PDD) and validation and registration of the PDD under CDM or VCS; and Phase 3 would be to assist the project proponents in project monitoring tasks and periodical verifications.

During the field mission, it became evident that the proposed A/R project would not be feasible as originally envisioned and therefore it was decided that other options for developing a forest-based carbon project should be explored. This report concludes phase 1 and addresses the items listed below. Follow-through on subsequent phases will depend upon whether the NCRC chooses to take the work forward.

1. A summary of the missions and its findings;
2. A background on wetlands, A/R and REDD+ in Ghana
3. Methodological and technical issues relevant to the project context
4. Analysis of the realistic opportunities for the implementation of a forest carbon project (A/R, REDD+ or landscape-level);
5. Potentially useful institutions for A/R, REDD+ implementation
6. Checklists for CDM, VCS and Plan Vivo project document design processes.

2 Summary and findings of the mission

2.1 Mission participants

From CDI

- Álvaro Vallejo (AV)

From NCRC

- Winston Asante
- John Mason (NCRC)
- Rebecca Asare (NCRC / Forest Trends)

From CRC

- Richard Adupong
- Nii Nortey

2.2 Activities

Date	Activity	Location
Sunday 06.01.2013	Arrival to Accra.	Accra.
Monday - 07.01.2013	Brief meeting with Winston. Meeting with NCRC.	NCRC office, Accra.
Tuesday - 08.01.2013	Meeting with Climate Change Unit – FC. Depart to Takoradi.	FC, Accra.
Wednesday - 09.01.2013	Meeting with CRC. Meeting with Wildlife Division Regional Director. Visit to Apataim mangrove area.	CRC office, WD office, Takoradi.
Thursday - 10.01.2013	Visit to Ankobra river and Essiama mangrove areas.	Esiama
Friday - 11.01.2013	Visit to Ebonloa mangrove area.	Apatam
Saturday - 12.01.2013	Visit to mangrove areas in Effaso, Kablazoazo, Metika and Half Assini.	Ankobra, Half Assini.
Monday - 14.01.2013	Office work and report preparation	Ebonloa area
Tuesday - 15.01.2013	Debriefing meeting with CRC, Departure to Accra	Takoradi
	Debriefing meeting with NCRC and meeting with invited stakeholders. See list of assistants in Annex 1.	Accra
Wednesday - 16.10.2013	Departure from Accra.	Accra

2.3 Summary of findings

Wetlands in Ghana

Mangroves and wetlands in general are important for biodiversity, for their socio-economic benefits, for carbon sequestration and for other environmental services. Therefore, they should be considered in the design and implementation of the REDD+ national strategy.

Mangroves in Ghana are estimated to cover 100 km² and are limited to a very narrow, non-continuous coastal area around lagoons in the west of the country, and the fringes of the lower reaches and delta of the Volta River in the east. While mangroves tend to be fragmented, following deforestation, most of them became “forest” again because they were converted to coconut plantations, or because natural regeneration took place in the wake of agricultural crops with enough trees regenerating to classify as “forest” according to the national CDM /

REDD+ forest definition. Therefore, from this technical standpoint, cleared mangrove areas are only “temporarily un-stocked” and therefore would not be eligible for generating A/R carbon credits.

Mangrove governance in Ghana (and in general) is quite complex and depends on several governmental institutions, as well as the Traditional Authorities. This makes it difficult, though not impossible, to coordinate effective conservation and restoration actions. For example, forest policy deals with timber products, forest governance while fisheries policy deals with aquatic biodiversity and management, climate change policy partly deals with carbon sequestration potential and ability to absorb sea level rises, and coastal management policies deal with the shoreline protection provided by mangroves. The implementation of these policies is spearheaded by different ministries and agencies, with extensive opportunities to improve and build synergy. In addition, the increasing development pressure fueled by the emerging oil and gas industry suggest that in western Ghana the pressure to convert mangroves to other land uses will likely increase.

Forest restoration for carbon sequestration

Globally, there are no A/R CDM activities on wetlands other than mangroves, and even in this case, there are few examples of mangrove restoration projects through A/R CDM activities (e.g. Oceanium small scale project in Senegal now expanding to a Program of Activities and a project in Kenya which is still in design), but none of them are located in Ghana.

There are currently four carbon standards that could be considered for developing a carbon sequestration project in Ghana’s wetlands: CDM (Clean Development Mechanism), VCS (Verified Carbon Standard), GS (the Gold Standard, formerly CarbonFix standard in relation to afforestation/reforestation projects) and PV (Plan Vivo Standard).

Because of the eligibility rules under CDM and VCS (see Section 4.3.2) there is no potential for a pure Afforestation/Reforestation (A/R) wetlands restoration project in Western Ghana using the most well-known C standards, i.e. A/R CDM and VCS.

There may be potential for developing a small A/R project using the Gold Standard but this will be clearer when the V.3 of the Gold Standard is published in mid-2013.

Although Plan Vivo could be used for a pure A/R project, its real potential lies in the ability to combine several activities in a landscape-level carbon project (see below).

REDD+ projects in wetlands in Ghana

There are a few examples of REDD+ projects being designed for wetlands worldwide and none has been registered under the VCS.

Wetlands in general and mangroves in particular are not mentioned in Ghana’s Readiness Preparation Plan for REDD+. It was agreed by participants at the debriefing meeting held on 15.01.2013 in Accra, that while mangroves have yet to be considered or play a role in Ghana’s REDD+ strategy, they should be taken into account as they form part of Ghana’s forest resources. In this sense, mangroves should be considered when work begins to define the sub-national REDD+ reference levels /regions (e.g. by defining a sub-national coastal REDD+ region). In addition, it was clear during the field mission that many REDD+ actors at the national level are aware of the importance and value of wetlands and specifically mangroves. There is widespread awareness that mangroves serve as important carbon sinks, host critical biodiversity, and have significant socio-economic value for local communities.

Therefore, the inclusion of wetlands in Ghana's REDD+ discussions and activities is welcome and would face few challenges, practically speaking.

Under **current circumstances**, a REDD+ project considering only wetlands in Western Ghana is not feasible because: 1) their small area; 2) their high fragmentation; 3) the low potential for reduced emissions because of the comparatively high soil carbon stocks of post-deforestation land use; 4) the high cost of generating all required data and scenarios.

In the case of forest degradation and carbon stocks enhancement, the barriers are bigger, because the higher complexity of monitoring carbon stock changes through remote sensing and the lower gain in terms of carbon, compared to avoided deforestation.

A carbon stocks map has been produced as a collaborative effort between the Forestry Commission, Nature Conservation Research Centre (NCRC), NASA and Oxford University. However, this map has not yet been used in the construction of REDD+ Reference Emissions Level. There are several on-going Monitoring, Reporting and Verification (MRV) initiatives in the country which are likely to inform MRV activities, including; Forest Preservation Program (Japan), Forest Monitoring System (GIZ/Germany). According to the REDD+ Secretariat, the sub-national carbon accounting approach will be pursued as a first step to manage the national carbon accounting and actions related to crediting.

There are seven national REDD+ pilot projects in Ghana, which were selected as part of the national strategy. However, none of these projects focus on wetland areas, and it is likely that some may not be viable or have yet to move forward in a meaningful way.

There may be, however, an option for developing a wetlands REDD+ initiative¹ in Ghana, provided that:

- The wetlands carbon project is scaled up to include all country wetlands.
- All existing data and resources are available for assessing the real extension (area) of mangroves, the rate of deforestation or degradation, and their mitigation potential.
- Wetlands can be inserted into the national REDD+ strategy and resources are dedicated to analyze deforestation hotspots and understanding agents and drivers of such deforestation.
- The wetlands carbon project is able to capture additional resources other than from carbon.
- If the scale deforestation is not large enough to make it feasible as a VCS REDD project, then wetlands could be integrated into other "deforestation" hotspots located in the same REDD+ region as wetlands.
- Under this scenario, the role and potential of CREMAs² as a REDD+ mechanism should be analyzed in relation to wetlands.

¹ This "initiative" could be a regular REDD+ project, a pilot project, a national program or a group of related actions towards the inclusion of wetlands in Ghana's REDD strategy.

² In Ghana, a CREMA is a geographically defined area that includes one or more communities that have agreed to manage natural resources in a sustainable manner.

Landscape-level wetlands carbon project

- The only standard allowing a landscape approach, where different activities can be credited is the **Plan Vivo Standard**³. Western Ghana's wetlands fulfill basic eligibility and additionality requirements under this standard (see Section 4.1.4), while the rules to expand the project are quite flexible.
- Although Plan Vivo is considered a less strict carbon standard, it offers an opportunity to break most of the barriers created by other standards in their quest for transparency and credibility by dramatically decreasing transaction costs, increasing community involvement, simplifying eligibility and monitoring and adopting a landscape-level approach where different types of activities are allowed.
- In a Plan Vivo project, the following activities would be eligible (see Section 4.1.4): A/R (both for wetlands restoration and for provision of sustainable bioenergy), direct reduction of GHG emissions (through the use of efficient fish-smoking stoves), forest conservation and forest improvement.
- Plan Vivo is also designed for flexible and natural growth in terms of participants and project intervention areas.
- A Plan Vivo project designed for the wetlands of Ghana would be more suitable for attracting funds for biodiversity and other environmental and socio-economic services.
- CREMAs could be the implementing institutions for the Plan Vivo approach, but their potential and limitations should be well understood.

Institutional support for a wetlands carbon project

There are several institutions and funding sources that could be mobilized around a wetlands carbon project. A non-exhaustive list includes: U.S. Forest Service (interested in developing a sustainable landscape project in the Greater Amanzule landscape), USAID (funding the current scope of activities in which this feasibility assessment is a part), is involved in several other initiatives related to mangroves in other countries, CRC (current implementing organization with funding from USAID) and oil and gas companies such as Tullow Oil Ghana. Also, NGO Microsfere.org (local actions to improve use of firewood and implementing firewood plantations).

Final considerations

The best opportunity is to create a national wetlands initiative which could be attractive to oil and gas companies, showing them carbon from wetlands as a “gourmet” type of carbon, produced in highly fragile and rich ecosystems. This national scale approach would help to overcome some of the technical challenges associated with a single project. This could be achieved in two ways, either through the scaling-up of a wetlands REDD+ initiative, or by designing an expandable Plan Vivo project for wetlands. Given that the value of wetlands stretches far beyond their carbon sequestration and storage functions, to include other ecological and socio-economic benefits, any such initiative should aim to attract additional sources of financing beyond that of carbon markets.

Regardless of which type of project is selected, governance, use, and access rights must be clarified, and benefit sharing well thought out.

³ The Jurisdictional Nested REDD of the VCS (VCS-JNR) is a framework for integrated crediting of REDD+ activities across jurisdictions. However, there are not yet methodologies for its application.

Although there are several sources of data on the current expanse of mangroves and their carbon stocks, as well as other socio-economic information, these are not comprehensive enough to provide sufficient data to calculate the carbon mitigation potential. Therefore, additional information will need to be collected, processed and analyzed before becoming effective for the calculation of the climate change mitigation potential of wetlands in Ghana. Important data gaps such as real current extension of wetlands, their carbon stocks, their deforestation rates, and agents and drivers of deforestation will have to be filled in before any wetlands carbon project can be adequately designed.

As a standard, Plan Vivo is not as robust or well known as the CDM or VCS, but transaction costs are much lower and it allows a project much greater eligibility in terms of the land area and associated community-driven activities. Using this standard, the existing information is sufficient to start designing a relatively small project that could be registered and then expanded to a scale where any wetland area of the country could be included once data gaps and other barriers for inclusion in the Plan Vivo are solved.

3 Background - Wetlands, A/R and REDD+ in Ghana

3.1 The value of wetlands for climate change mitigation and other socio-economic and environmental services

The key importance of wetlands is recognized in many international conventions such as the Ramsar Convention on Wetlands, the Convention on Biological Diversity (CBD), the World Heritage Convention (WH), the United Nations Convention to Combat Desertification (UNCCD), the Convention on Migratory Species (CMS) and the United Nation Framework Convention on Climate Change (UNFCCC).

In comparison to tropical forests, mangroves have actually been found to be more efficient at carbon sequestration (Laffoley and Grimsditch, 2009). Mangrove forests in coastal swamps may contribute up to 10% of total global deforestation emissions, despite covering just 0.7% of tropical forest area. Mangroves are thus an option for countries interested in developing REDD+ actions. However, despite their impact on emissions, there are few REDD+ mangrove projects in preparation at national or sub-national scale. Their inclusion in REDD+ mechanisms is now being promoted by a number of organizations, including the United Nations Development Program, Danone, Wetlands International, the International Union for Conservation of Nature and Ramsar through the Wetland Carbon Partnership.

Apart from their value as carbon sinks, mangroves also provide many other socio-economic benefits including regulatory services (protection of coastlines from storm surges, erosion and floods; land stabilization by trapping sediments; and water quality maintenance), provisioning services (subsistence and commercial fisheries; honey; fuel-wood; building materials; and traditional medicines), cultural services (tourism, recreation and spiritual appreciation) and supporting services (cycling of nutrients and habitats for species). For many communities, mangroves provide a vital source of income and resources from natural products and also serve as fishing grounds.

In Kenya, researchers from the Kenya Marine and Fisheries Research Institute have been using GIS mapping to assess deforestation rates in mangrove forests to create a baseline. This means mangroves can be included under any national REDD+ strategy in Kenya, greatly improving the potential for REDD+ in mangrove forests (bluecarbonportal.org)⁴. In Senegal, the first A/R project in mangroves⁵ was validated under CDM, for the rehabilitation of 1,700 ha of degraded mangroves, while a nation-wide Program of Activities is being drafted for expanding this successful initiative.

3.2 Current situation of wetlands in Western Ghana

The Central African mangrove eco-region is located in western Africa, and encompasses mangrove areas along the coastlines of Ghana, Nigeria, Cameroon, Equatorial Guinea, Gabon, Democratic Republic of Congo (DRC), and Angola.

There is no a clear estimation of wetlands area at national level, while mangroves in Ghana are estimated between 10,000 and 14,000 ha, limited to a very narrow, non-continuous coastal area around lagoons on the west of the country, and to the east, on the fringes of the

⁴ http://bluecarbonportal.org/?page_id=668

⁵ Oceanium mangroves project. <http://cdm.unfccc.int/Projects/DB/ErnstYoung1316795310.61/view>

lower reaches and delta of the Volta River. They are extensive in a stretch of coastline between Cape Three Points and Côte d'Ivoire to the west, especially in areas around Half Assini, Amanzule Lagoon, Axim, Princes Town and Shama, among others. To the east of the country, they are found at Apam, Muni Lagoon, Winneba, Sakumo-1 Lagoon, Botwiano, Korle Lagoon, Teshie, Sakumo-2 Lagoon, Ada, Sroegbe and Keta Lagoon. Mangroves are enclosed part of the year by sediments, when rainfall is lower and freshwater outflow is not sufficient to counteract ocean swells (Sackey et. al. 1993). Sixty to seventy percent of mangroves in Western Ghana are located in the general area of the Ankobra River.

A recent survey⁶ showed that “over 1,000 ha of mangrove forests exist in scattered pockets of less than 10 ha (in 50% of the sites) in Amanzule area. Most of the mangroves do not appear in the current vegetation maps of the area (but on-going vegetation mapping through remote sensing and ground truthing methods initiated by CRC will soon produce better maps)”. Deforestation rate at national level is estimated at 2% but there is no an estimation for wetlands or mangroves.

Open lagoons are often dominated by *Rhizophora racemosa*, while closed lagoons with an elevated salinity contain *Avicennia germinans*, *Conocarpus erectus*, *Laguncularia racemosa* and *Acrostichum aureum*. The mangrove swamps are very restricted in area and distribution and rarely develop beyond a thicket stage. *Laguncularia racemosa* and *Rhizophora racemosa* are found on the seaward side of lagoons in saline conditions. *Avicennia germinans* occurs on the landward side of the swamps.

In most areas mangroves are secondary forests with degraded faunal composition due to the intensive wood use, especially for fuel wood to smoke fish and for construction purposes. The bark of *Avicennia germinans* is often used also for tanning fishing nets, and as firewood for local use. Losses of mangrove areas have also been caused by reclamation of lands for agriculture, urbanization and salt ponds. Some stands of mangroves have also been degraded due to oil pollution.

While these mangroves contain no endemic species, they are known for their diverse pelagic fish communities, including some narrowly distributed species, abundant avifauna, and the presence of some rare mammals and turtles. Coastal mangroves and wetlands are primarily important for large concentrations of birds that use the areas during migration, although some wetland species also breed here.

Most common land use near or intermixed with wetlands observed during the field missions were old coconut plantations (established several decades ago and now extensively dying as a result of Cape St. Paul wilt disease), rubber plantations (old and young) and small patches of home gardens and annual crops.

The institutional landscape for mangrove management is often complex. Mangrove management is rarely covered by one specific national policy, with numerous policies covering the various benefits provided. For example, forest policy deals with timber products, fisheries policy deals with aquatic biodiversity, climate change policy will sometimes deal with carbon sequestration potential and ability to absorb sea level rises, and coastal defense policies deal with the shoreline protection provided by mangroves. With multiple ministries holding responsibility for their management, mangrove forests can come under real pressure. As there are currently no estimations of deforestation rates, no analysis of agents and drivers

⁶ Preliminary Rapid Assessment to Determine the Potential for Promoting Marine and Coastal Payment for Ecosystem Services (PES) in the Coastal Districts of the Western Region of Ghana. Report Submitted by Forest Trends to NCRC, 2011.

of deforestation and no available carbon maps for wetlands, so that establishing a provisional baseline is not possible using available data.

Fish smoking is a very frequent practice in artisanal fishery in West Africa, because it enables a better and longer preservation of the fish, facilitates its transport and sale in regions further away from the coast and enhances the fish flavor. The use of wood as source of energy for fish smoking is widely practiced in Ghana, using trunks, branches, and other parts of trees. The particular species of wood used for fuel depends on what is available in a given locality. Although all kinds of inputs such as baskets, basins, grills, basket nets, fuel wood, and brown paper are used as fuel, trees are preferred. Some smokers use so-called Chorkor kilns and utilize various inputs such as baskets, basins, grills, basket nets, fuel wood, and brown paper. Fish is processed using a mix of firewood and coconut shells before further smoking it at low temperatures with sugarcane giving the fish a shiny appearance and a higher quality, which is reflected in the price fetched by the processors.

There are only a few examples of wetland management experiences in Ghana which can be considered related to carbon sequestration activities and none has been formulated under any relevant international carbon standard. One of these examples was REDO⁷, proposing a new system for producing fuel wood in designated woodlots outside the fragile mangrove ecosystems. REDO chose a fast growing, highly tolerant tree species – *Cassia* sp. – to plant in the community woodlots. The project duration allowed REDO to remain involved in the area while the first trees matured and the communities could see the benefits of the alternative. A 30-hectare woodlot was created with each family responsible for a specific section. Giving specific families a designated area within the community woodlot was crucial to its success. At the same time, the mangroves were rehabilitated and the communities noticed an increase in crab catches and the size of tilapia, shell and finfish from the Oyibi lagoon during the life of the project. REDO (as well as Danone's mangrove restoration project in Senegal) used extensive showing films about mangrove conservation in the villages and giving the project media coverage on local radios and newspapers to communicate their message and effect change.

3.3 Overall situation and opportunities for A/R projects

The Clean Development Mechanism (CDM) allows emission-reduction projects in developing countries to earn certified emission reduction (CER) credits, each, equivalent to one ton of CO₂, which can be traded and sold, and used by industrialized countries to meet a part of their emission reduction targets under the Kyoto Protocol (KP). KP established emission reduction targets for industrialized countries for the period 2008 -2012 (first commitment period). The second commitment period runs from 1 January 2013 to 31 December 2020 inclusive, and countries may continue to participate in existing CDM projects and may also participate in new CDM projects registered from 1 January 2013 onward.

CDM continues to be an alternative for developing A/R projects, while other emerging standards, such as VCS and Gold Standard, can be used as an alternative under the voluntary markets or when the project does not fit specific rules of A/R CDM.

⁷ <http://redoghana.org/>

Project: Mangrove Restoration and Management. Sponsors: NC-IUCN (Netherlands Committee of the International Union for the Conservation of Nature). Duration: 1998 – 2001. Venue: Nsuekyir and Sankor, Central Region, Ghana.

At country level, Ghana has ratified the KP, has assigned the Environmental Protection Agency, Ministry of Environment, Science & Technology as the Designated National Authority (DNA) to the KP. Also as a request for developing CDM projects, the country has defined “forest” (see Section 4.3.1 - Forest definition and wetlands). Projects to be registered as CDM activities require the approval of the country DNA.

In order to be approved, an A/R CDM project must fulfill a list of requirements of which the most important requirements are analyzed in Section 4.3 - Technical issues. Beyond those rules, A/R CDM projects must contribute to sustainable development, as defined by the country hosting the project.

There are several restrictions limiting potential markets for A/R CDM projects. Some important countries in terms of carbon markets such as USA and Australia did not ratify the KP, while big GHG emitting countries such as China have no emission reduction targets, they are however allowed to host CDM projects. The European Union also limits the trading of A/R CDM credits. These limitations (among other reasons), have contributed to the emergence of alternative standards for the so called “voluntary” markets, such as the Verified Carbon Standard. These standards are briefly analyzed in Section 4.1 - Carbon Standards/regulatory frameworks for AR/REDD projects.

Some key elements for successful implementation of A/R are:

- **Minimum scale to cover carbon related transaction costs.** The minimum viable size for an A/R project depends on many factors, such as the selected standard, sequestration potential of used species and technologies and other project characteristics. However, as a rule of thumb, a small-scale A/R CDM or a VCS project should have at least an area of 700 ha, while there are CarbonFix (now Gold Standard) registered projects as small as 250 ha and yet smaller Plan Vivo registered ones. On the other hand, opportunities for finding carbon buyers will be higher for CDM and VCS. In the case of the Western Ghana wetlands, while it is possible to find enough areas for establishing a reforestation project, it will be difficult to find enough **eligible** areas for doing mangroves/wetlands restoration (see eligibility in Section 4.3.2).
- **Sufficient technical and financial capacity for the implementation of the reforestation activities.** Establishing forest plantations require relatively high investments, even without considering land acquisition, ranging from some USD500 to 3,000 per hectare (depending on the country, species, site preparation, etc.) while also requiring periodic investments for appropriated forest management practices such as pruning, thinning, fertilization, forest protection, infrastructure maintenance, etc. In some cases, these monetary flows are minimized through community participation in forest implementation and maintenance activities. However, many projects having started as carbon sequestration initiatives have failed in securing funding. This is especially difficult in the case of mangroves, which are mainly planted for restoration, in addition to the fact that it is not usually feasible doing final clear-cut harvests. In the case of Danone’s mangroves restoration project in Senegal, big areas of mangroves, are planted by communities and very low investment is done on forest maintenance. On the other hand, these mangroves are not harvested and then carbon credits are the only source of incomes for granting financial closure of project. In the case of the Western Ghana wetlands, A/R eligibility rules, forest definition and mangroves fragmentation are elements limiting the implementation of such a project design.

CDM has now two approved methodologies applicable to wetlands, one for regular scale CDM A/R projects (AR-AM0014 - Afforestation and reforestation of degraded mangrove habitats - Version 2.0.0) and one for small scale projects (AR-AMS0003 Simplified baseline and monitoring methodology for small scale CDM afforestation and reforestation project activities implemented on wetlands - Version 2.0).

The experience of REDO described above could provide valuable data for assessing the feasibility of designing an A/R project for mangroves, regarding costs, technologies, community issues, lessons learned, etc.

3.4 Current state of REDD+ activities in Ghana

While the form of future REDD+ commitments to be made by countries under the UNFCCC negotiations are still unknown, two main facts are driving the development of REDD+ at international level:

1. Countries are preparing to adopt a future REDD+ regime and commitments for protecting their forests under UNFCCC.

Several initiatives are helping countries on this preparation for the future REDD+ regime, being the most important:

- **FCPF.** The Forest Carbon Partnership Facility, which became operational in June 2008, is a global partnership focused on REDD+. The FCPF complements the UNFCCC negotiations on REDD+ by demonstrating how REDD+ can be applied at the country level and by learning lessons from this early implementation phase. Ghana has been selected as an FCPF country. FCPF has two funds:
- **Readiness Fund.** With assistance from the Readiness Fund (currently about US\$230 million committed or pledged by 15 public donors, each having provided at least US\$5 million), each participating country prepares itself for REDD+ by developing the necessary policies and systems, in particular by adopting national strategies; developing reference emission levels; designing measurement, reporting and verification (MRV) systems; and setting up REDD+ national management arrangements, including the proper safeguards.
- **The Carbon Fund** provides payments for verified emission reductions from REDD+ programs in countries that have made considerable progress towards REDD+ readiness. About five REDD Country Participants will qualify for the Carbon Fund based on a progress assessment by the FCPF Participants Committee. Programs implemented at the sub-national scale will need to be consistent with the emerging national strategies, reference emission levels and MRV systems, and be accompanied by measures to assess and minimize the risk of leakage.
- **FIP,** the Forest Investment Program, is a targeted program of the Strategic Climate Fund (SCF), which is one of two funds within the framework of the Climate Investment Funds (CIF). The FIP supports developing country efforts to reduce deforestation and forest degradation and promote sustainable forest management that leads to emissions reductions and enhancement of forest carbon stocks (REDD+). Ghana is a FIP selected country.

- **UN-REDD⁸**. The UN-REDD Program was created to assist developing countries to answer just these kinds of questions and help them get ready to participate in a future REDD mechanism. Through its nine initial country program activities in Africa, Asia and Latin America, the UN-REDD Program supports the capacity of national governments to prepare and implement national REDD strategies with the active involvement of all stakeholders, including indigenous peoples and other forest-dependent communities. Within countries, the UN-REDD Program supports processes for REDD readiness and contributes to the development of national REDD strategies. Ghana is a UN-REDD country.

Ghana joined the REDD+ readiness process as a pilot country in the FCPF. The Readiness Preparation Proposal (R-PP) was completed based on extensive analysis and consultation processes in 2010. Ghana is also one of the pilot countries for the FIP, which aims at piloting and providing up front investments to test and initiate the REDD+ activities. In 2012, Ghana was also included in the UN-REDD program. The FIP investment plan has been prepared built on and to support the strategies identified in the R-PP. The development of the Ghana's national REDD+ strategy is led by the Forestry Commission of Ghana.

2. REDD Methodological development is currently lead by VCS.

VCS has been the leader and *de facto* standard for developing structured REDD+ initiatives and projects. REDD+ local activities (REDD projects) were the first initiatives to be developed and many are still under development. At a macro level, governments have been establishing new policies and programs for generating forest carbon benefits across entire states, provinces and countries. Several tools, modules and methodologies have been designed and approved under VCS to operate at project level, while VCS has been also developing a regulatory and methodological framework for generating verified emission reductions across the different scales of REDD+ (project, sub-national and national).

VCS framework has influenced the development of Ghana's REDD+ strategy and is frequently used as a technical guidance for REDD+ methodological issues.

Implementation of Ghana's REDD+ strategy

Ghana has stated clearly that the country will opt for a sub-national approach for its REDD+ strategy. This has been cited by the REDD Secretariat as the prudent option to be pursued.

With respect to technical aspects, Ghana considers developing different reference scenarios for the following zones: the high forest zone, the transitional zone, and the savannah zone. It is still, however, possible that one reference scenario is established for all three forest zones, especially if monitoring costs prove to be significantly lower with one reference scenario.

According to the R-PP, Ghana intends to establish an MRV system by the end of 2013 but this development is running behind schedule. The MRV system will monitor deforestation cover and carbon emissions using remote sensing technology and ground truthing information. The MRV system will be the responsibility of a Sub-Working Group under the National REDD+ Technical Working Group. The Forestry Commission will also be monitoring land use and land use changes, implementing forest inventories and compiling tree measurements in Ghana through its Climate Change Unit and Resource Management Support Centre.

⁸ UN-REDD Program Supporting countries to get ready for REDD.

According to the R-PP, Ghana:

- Has already selected seven REDD+ pilot projects selected on the ground implementation.
- Carbon baseline map has been produced as a collaborative effort between Forestry Commission, Nature Conservation Research Centre (NCRC), NASA and Oxford University. The on-going carbon map project was supported by the Gordon and Betty Moore Foundation and Rockefeller Foundation.
- There are several on-going Monitoring, Reporting and Verification (MRV) initiatives: Forest Preservation Program (Japan), Forest Monitoring System (GIZ/Germany), National Carbon Mapping (NCRC).
- Sub-national carbon accounting approach will be pursued as a first step to manage the national carbon accounting and actions related to crediting. Institutional capacity building and strengthening are being planned with the support of consultants.

The Ghana carbon baseline map has been published and is available on the Forest Trends website, with the meta-data has been handed over to the FC-CCU, CERSGIS and FC-RMSC.

There are also seven REDD+ projects defined in Ghana which have been identified and integrated into the national REDD+ strategy as pilot projects, it was known during the mission that some of them may not be viable or have not started adequately. Thus, the option for including an initiative related to mangroves and/or wetlands is worth exploring.

Depending on the current situation and availability of the carbon baseline map, the current situation and available results of the MRV initiatives, the performance of the pilot projects and the current state of the definition of the REDD+ sub-national regions to understand the potential of including Ghana's wetlands in the overall REDD+ national strategy, wetlands at national level could be inserted into the REDD+ national strategy, gaining support and access to data and resources. It was perceived during the field mission that many stakeholders and REDD+ actors at national level are aware of the importance of wetlands (specifically mangroves) in terms of carbon sinks, biodiversity and socio-economic importance for local communities.

An element which is important for the Ghana's REDD+ strategy are the **Community Resource Management Areas (CREMA)** in Ghana. A CREMA is a geographically defined area that includes one or more communities that have agreed to manage natural resources in a sustainable manner. Its management structure is composed of a CREMA Executive Committee and a Community Resource Management Committee (CRMC). The CRMC is the local unit of the organization and is formed at the level of each community, while the Executive Committee formed out of the CRMC acts as the operational part of the organization. Existing structural features of CREMAs could easily fit into existing corporate forms under Ghanaian law.

CREMAs can be registered as cooperatives, community-based organizations, companies limited by guarantee or limited or unlimited companies. In other words, nothing prevents CREMAs from being created and registered as legal (corporate) entities under Ghanaian law. Once registered and endowed with legal personality, they can serve as effective structures for the conferment of rights and benefits on individuals and communities entitled to manage their resources in order to minimize carbon emissions and maximize carbon storage and to receive REDD+ benefits from their activities. The legal basis for the allocation of carbon rights and benefits in a CREMA will depend upon how carbon is categorized under Ghanaian law. If carbon rights are recognized as property rights that are derived directly or indirectly from

land rights, they are protected by the Constitution. Insofar as carbon rights are tied to carbon sequestered in clearly delineated forest lands owned by local communities, those that own the land are entitled to carbon rights, and benefits and royalties accruing to communities will be shared according to the formula provided under Article 267(6).

However, if carbon is treated as an ecosystem service, the sharing formula in respect of naturally occurring and planted trees is a potential option. Another likely possibility is that Parliament will devise an entirely new regime for the allocation of carbon rights and benefits. The danger is that as long as there is no legislation stating explicitly what the benefit-sharing formula is, when revenue begins to flow from a REDD+ project, the government could seek to modify the sharing ratio to suit its purposes.

4 Methodological issues

Although the main objective of the mission was to evaluate the feasibility for a carbon restoration project in wetlands in Western Ghana, a broader analysis was accomplished to include also options for REDD+ projects. Also, the possibility of applying other standards than CDM and VCS was analyzed.

4.1 Carbon Standards/regulatory frameworks for AR/REDD projects

Carbon offsetting is an increasingly popular means of taking action on climate change mitigation. By paying someone else to reduce GHG emissions elsewhere, the purchaser of a carbon offset aims to compensate for (“offset”) their own emissions.

Carbon offset markets exist both under compliance schemes and as voluntary programs. Compliance markets are created and regulated by mandatory regional, national, and international carbon reduction regimes, such as the Kyoto Protocol and the European Union’s Emissions Trading Scheme. Voluntary offset markets function outside of the compliance markets and enable companies and individuals to purchase carbon offsets on a voluntary basis (

The participation in carbon markets or in a regulatory system (such as the Clean Development Mechanism of the Kyoto Protocol) requires the compliance of a technical standard which is accepted by the participants of such markets or regulatory systems. Several different carbon standards have been defined, either specifically for A/R projects or for a wider type of projects including A/R activities and are currently available.

4.1.1 Clean Development Mechanism Afforestation/Reforestation projects (A/R CDM)

The CDM is part of the United Nations Framework Convention on Climate Change (UNFCCC). As the largest regulatory project-based mechanism, the CDM offers the public or private sector in developed nations the opportunity to purchase carbon credits from offset projects in developing nations. CDM is involved in setting standards and verifying projects. Certified Emissions Reductions (CERs) are verified and certified by authorized third parties (Designated Operational Entities.) CDM standards are stringent and robust yet complex and with high transaction costs so that usually only large projects are registered.

CDM cannot be used for developing REDD+ projects.

CDM was the first standard⁹ to be developed and after a relatively long and exhausting history, it is considered a benchmark, but it is now losing its momentum because of:

- **The restriction of the European Union Emission Trading System (EU ETS) for CDM forestry projects.** The EU ETS is the largest multi-national, emissions trading scheme in the world and is a major pillar of EU climate policy. The EU ETS incorporated Kyoto flexible mechanism certificates (including CDM) as compliance tools; however, temporary credits coming from forestry projects are not accepted for compliance and they should only be considered after a thorough review of the pilot phase and for the period after 2020.

⁹ CDM was not initially developed as a regular standard but as a regulatory framework. It has recently developed its own standard (the CDM Standard)

- **The temporary nature of A/R CDM credits.** Because of the non-permanence of the carbon sequestration in A/R CDM projects, credits from this type of projects are temporary, and have to be replaced after a certain period.
- **No demand from US for CDM credits.** US did not ratify the Kyoto protocol but is being developing its own climate change mitigation initiatives, including its own carbon markets and standards.
- **The difficulty for relatively small projects for facing high transaction costs.** Small-scale and community based projects under the CDM face high transaction costs, relative to the likely return on investments. Although most important factor for making small scale projects viable is carbon price, standards other than CDM may make smaller projects viable (Guigon *et al.* 2009).
- **Bloated and ever changing regulatory framework.** The structure of the regulatory framework is extremely complex, changes frequently and has many gray areas. Confirming the validity of specific provisions/decisions is very time consuming.

Voluntary carbon markets and standards solve or alleviate these issues by generating alternative markets and permanent credits, simplifying modalities, procedures and lowering transaction costs for A/R projects, while allowing the development of REDD and other land use types of projects.

This report specifically analyses other carbon standards (Verified Carbon Standard -VCS-, A/R Gold Standard -GS- and Plan Vivo -PV-) that could better fit the characteristics of degraded wetlands in Western Ghana. Among these, the A/R GS and PV are alternatives worth considering for developing forestry carbon projects in Ghana's wetlands.

4.1.2 Verified Carbon Standard (VCS)

Full-fledged carbon offset standard focused only on GHG reductions which does not require projects to have additional environmental or social benefits. VCS is broadly supported by the carbon offset industry (project developers, large offset buyers, verifiers, projects consultants) and approved carbon offsets are registered and traded as Voluntary Carbon Units (VCUs) and represent permanent emissions reductions of 1 metric ton of CO₂ using a buffer approach. Given that the VCS 2007 is broadly supported by the carbon offset industry, it has become the most important standards in the voluntary offset market among recently launched projects.

VCS can be used for developing A/R and REDD projects (it is indeed the leader in relation to REDD regulatory framework and methodologies). It is compatible with CDM A/R methodologies and tools, and has gained its experience from CDM. It also accepts CAR¹⁰ methodologies.

4.1.3 Gold Standard (GS)

GS is a voluntary carbon offset standard for renewable energy, energy efficiency and (recently) A/R projects launched in 2003. The GS can be applied to voluntary offset projects and to Clean Development Mechanism (CDM) projects. It was developed under the leadership of the World Wildlife Fund (WWF), with a focus on offset projects that provide lasting social, economic and environmental benefits.

¹⁰ Climate Action Reserve

GS cannot be currently used to develop REDD+ projects, but it is likely avoided deforestation will be part of the standard in the short term (mid 2013), so that GS can have a true landscape-level approach.

Regarding A/R projects, GS recently acquired the CarbonFix Standard in 2012 and now this type of projects is under a transitional specific standard. Merging of the two standards will be complete in June 2013.

CarbonFix has been recognized as a simple, less expensive but solid standard for offsetting emissions. Under GS, procedures and rules for A/R have been kept simple and have indeed gained more flexibility and maintained its advantages when compared to best known A/R carbon standards, i.e. CDM and VCS.

CarbonFix excluded wetlands from eligible areas but, since GS accepts all CDM approved methodologies (which can be applied to wetlands, both at small and regular scales) and is now expanding to a landscape-level approach, it is probable that wetlands will be included in Version 3 of the GS.

GS shares the same approaches to social and environmental safeguards with FSC¹¹ certification, while FSC accepts the carbon certification of GS.

4.1.4 Plan Vivo (PV)

Plan Vivo is an Offset Project Method for small scale Land Use, Land Use Change and Forestry (LULUCF) projects with a focus on promoting sustainable development and improving rural livelihoods and ecosystems. Plan Vivo works very closely with rural communities and emphasizes participatory design, on-going stakeholder consultation, and the use of native species.

The Plan Vivo System was initiated in 1994 for a research project in southern Mexico. The system was developed by the Edinburgh Centre for Carbon Management (ECCM), a consulting company that focuses on climate change mitigation strategies and policies, in partnership with El Colegio de la Frontera Sur (ECOSUR), the University of Edinburgh and other local organizations with funding from the UK Department for International Development (DFID).

Plan Vivo projects can undertake the following REDD+ activities: afforestation and agroforestry, forest conservation, restoration and avoided deforestation. The projects are intended solely for community-focused forestry projects, with communities expected to lead project design and implementation.

Plan Vivo Certificates are issued by the Plan Vivo Foundation for projects that support the long-term sequestration of carbon dioxide while also providing environmental and social benefits. These Certificates can be issued *ex ante* or *ex-post* and sold on behalf of producers by the Project Coordinator.

Table 1 presents the main characteristics of the aforementioned forestry carbon standards.

¹¹ Forest Stewardship Council

Table 1. Main characteristics of four forestry carbon standards

Feature	Standard			
	VCS	CDM	Gold Standard	Plan Vivo
Eligible activities	<ul style="list-style-type: none"> - Afforestation, Reforestation and Revegetation (ARR) - Agricultural Land Management (ALM) - Improved Forest Management (IFM) - Reduced Emissions from Deforestation and Degradation (REDD) 	<ul style="list-style-type: none"> - Afforestation/reforestation (including silvi-pastoral and agroforestry systems that comply forest definition). 	<ul style="list-style-type: none"> - Afforestation/reforestation (including silvi-pastoral and agroforestry systems that comply forest definition). Forest definition includes all woody species (palms, bamboos, etc.). - Other sectors. 	<ul style="list-style-type: none"> - Afforestation/reforestation - Agroforestry - Forest restoration - Avoided deforestation - Not direct result of legislative decrees or commercial land-use.
Land eligibility	<ul style="list-style-type: none"> - Has not been forest within 10 years prior to the project start (or proof no relationship of project participants with cause of deforestation). 	<ul style="list-style-type: none"> - Was deforested before January 01, 1990. - Is not forest at project start. - Would not be forest without project activities. 	<ul style="list-style-type: none"> - Non forest at project start. - No relationship with previous cause of deforestation. 	<ul style="list-style-type: none"> - Small-holder owned or leased farmland. - Community owned land. - Land for which communities have agreed use rights with the owner.
Forest definition	UNFCCC parameters or FAO.	Defined by DNAs according to UNFCCC parameters.	Defined by DNAs according to UNFCCC parameters.	Land with more than 0.5 ha, 10% of forest canopy cover and potential for trees with more than 2 m of height.
Project start date and crediting period	<ul style="list-style-type: none"> - No start date restrictions provided conditions are met. - Crediting period from 20 to 100 years. 	<ul style="list-style-type: none"> - After January 01, 2000. - Crediting period of 20 (renewable once or twice) or 30 years. 	<ul style="list-style-type: none"> - No start date restrictions provided conditions are met. - Crediting period from 30 to 50 years (or more, applying provisions). 	<ul style="list-style-type: none"> - Start date after the creation of the Plan Vivo Standard.
Permanence assurance	Buffer	Temporary credits (t-CERs and I-CERs)	30% buffer	Buffer of at least 10% of VERs
Eligible methodologies	<ul style="list-style-type: none"> - VCS approved methodologies (none for A/R yet). - CDM approved methodolo- 	<ul style="list-style-type: none"> - CDM approved methodologies. Bloated, despite efforts for simplification. 	<ul style="list-style-type: none"> - CDM approved methodologies - CarbonFix (now GS) simple 	<ul style="list-style-type: none"> - Approved Plan Vivo 'project specific methodologies' (Technical Specifications).

Feature	Standard			
	VCS	CDM	Gold Standard	Plan Vivo
	gies.		and clear methodology.	
Additionality proof	UNFCCC tool.	UNFCCC tool.	UNFCCC tool (minus Step 0) or own procedure ¹² .	Not required. Land eligibility ensures additionality.
Other characteristics	Leader of voluntary market. Expanding harmonically.	Bloated rules, ever changing. Temporary CERs are not as bad as supposed.	Recognises social and environmental safeguards of FSC (Forest Stewardship Council). FSC recognises GS carbon certification. Ex-ante and ex-post credits.	Focused on communities and on environmental and social benefits.
Expansion of areas	Flexible. New areas checked at verifications.	Rigid, validation of new areas required.	Flexible. New areas checked at verifications.	Flexible. New areas reported in annual reports.
Comparative formalization costs	High	Very high	Low	Low

¹² Projects located in Ghana (or other countries with HDI <0.5) are considered additional.

4.2 Specific methodological considerations for a wetland carbon project in Ghana

Following, some potential issues and advantages of using the aforementioned standards to a potential carbon project in wetlands in Senegal are presented. The analysis is done first by technical issue and then by potential project type.

4.3 Technical issues

4.3.1 Forest definition and wetlands

- **CDM** defines **forest** as a portion of land with an area of at least 0.1ha, a tree crown cover of at least 15% of the area and a minimum tree height at maturity *in situ* of 5m¹³; **VCS** and **GS** also accept this definition. A forest may consist either of closed forest formations where trees of various stories and undergrowth cover a high portion of the ground or open forest. Young natural stands and all plantations which have yet to reach these limits are included under forest. The low limits for area and crown cover have several effects in potential restoration activities in wetlands: while small patches without trees can be considered non forest (such as small crop areas), a small group of trees in the middle of pastures could be considered as forest. Also the low area limit requires more refined remote sensing analysis for assessing eligible areas. **VCS** also accepts FAO forest definition (minimum area of 0.5ha, minimum 10% tree crown cover and 5m mature tree height), which may also require detailed remote sensing analysis.
- **PV** defines **forest** with a minimum area of 0.5ha, 10% of minimum tree crown cover and 2m of height of mature trees. As eligible rules for PV do not require areas to be non-forest at the start of the project, forest definition does not poses any restriction for designing projects and most restoration activities would easily reach the forest definition.

It is worth to notice that some mangroves may not reach the height parameter of Ghana's forest definition. Also, the definition of forest is a two-edged sword. While a minimum area of 0.1 ha implies that small land interventions such as planting a few scattered trees could be eligible for crediting, the presence of a few trees e.g. from natural regeneration in a landscape creates a "forest."

4.3.2 Eligibility

In order to be eligible for a carbon sequestration project, lands must meet a set of specific conditions, as explained below for considered standards.

- **CDM eligible areas** are those that: where deforested before January 01, 1990, are not forest at project start and would not be forest without project activities. This rule poses a considerable restriction for developing a carbon sequestration project in degraded wetlands in Western Ghana since in most cases in visited areas, wetlands: a)

¹³ According to Ghana's forest definition for CDM A/R projects. Palms and bamboos are excluded.

where deforested before 1990 and then became forest again -either as coconut or rubber plantation or as secondary forest- or were deforested after 1990.

- **Eligible areas for VCS** are those that have not been forests within 10 years prior to the project start, or it can be proven that there is no relationship of project participants with the cause of deforestation. Rules for defining eligible areas under VCS are less restrictive than CDM rules, but they still represent a limitation since local communities would in most cases be project participants and could have caused deforestation.
- **GS** has not yet defined eligibility rules under V.3, but in CarbonFix, eligible areas are: 1) non-forest at project start and 2) **there is no relationship of land owners with previous cause of deforestation**. Although in this case it is not required to prove former land cover, being local communities as the usual cause of deforestation, this rule also restricts the use of this standard in the case of Western Ghana's wetlands.
- For **PV**, eligible areas are: small-holder owned or leased farmland, community owned land or land for which communities have agreed use rights with the owner. In this case, eligibility rules are the most flexible and adequate for developing a wetland carbon project in Western Ghana.

For all the standards, it must be demonstrated that project participants have control over the areas included in the project.

4.3.3 Additionality

A/R activities must be additional to those that would have occurred in the absence of such activities. Projects must demonstrate that they are not viable without the support of the carbon markets:

- **CDM** and **VCS** are very strict regarding **additionality** and both apply the same specific tool for proving it. Additionality for a carbon sequestration project in Western Ghana's wetlands could be proven, using the argument of "*first of its kind*".
- **Additionality for a GS** forestry activity would be automatically granted in the case of Ghana's wetlands, since projects developed in countries with Human Development Index below 0.5 are considered additional.
- Also, for **PV**, **additionality** would not be an issue, since eligibility rules ensure additionality.

4.3.4 Project scale, grouping and expansion

Regarding **project scale**:

- **CDM** makes a distinction between *small scale* (SSC) and *regular scale* projects. Small scale forestry projects are those developed or implemented by low-income¹⁴ communities and individuals, resulting in net removal of less than 16 Kt CO₂/year; otherwise, projects are *Regular scale* projects. There is a specific methodology for

¹⁴ Host party to define "low-income".

small scale wetlands projects which could be applied to Ghana's wetlands complying with eligibility conditions. CDM allows **grouping** SSC projects (*bundling*) for the purpose of validation provided that each component does not lose its distinctive characteristics. CDM grouping allows some flexibility for project expansion but strict rules must be followed, including a careful design of the bundled project before its implementation. Each added unit must be validated separately, requiring additional costs and efforts.

- **VCS** does not distinguish between Small Scale and Large Scale, but considers *megaprojects* those greater than 1,000,000 tCO₂e per year. VCS allows the use of CDM A/R methodologies (for using A/R Small Scale methodologies, the project must be compliant with the CDM Small Scale limit). VCS **grouping** allows more flexibility, requiring a list of new areas to be reported on each verification.
- **GS** does not distinguish projects based on scale, nor sets rules for project expansion. However, Version 3 of the standard is not ready and its full text is not yet known.
- **For PV**, there is no minimum or maximum size limitation for Plan Vivo projects. Projects generally expand in size over a number of years as the project makes more sales and more smallholders or communities engage in the project, learn more about the notion of selling carbon as a commodity, and see it working in practice.

4.3.5 Project start date

Since there are no on-going initiatives that already started implementing activities, there are no specific issues regarding project start date under analyzed standards.

5 Types of projects

Although the main objective of the mission was to evaluate the feasibility for a carbon restoration project in wetlands in Western Ghana, a broader analysis of other types of forest carbon projects is required to assess the potential for taking actions to improve wetlands based carbon mitigation activities. The following sections analyze the advantages/issues of implementing A/R, REDD+ or Landscape-level initiatives.

5.1 Pure A/R project

A pure A/R project to be developed for Western Ghana's wetlands could use in principle any of the aforementioned standards. The following considerations apply:

- **CDM A/R** would be too restrictive both in terms of eligible lands and expansion options. Selecting enough areas to conform just a small scale project (near to 500-1,000 ha) would require analyzing extensive areas and would result in a scattered project. A PoA of Small Scale CPAs (Component Project Activities) would be recommended, but even so, the project would hardly be viable. Because of the exclusive focus on carbon sequestration and the probable absence of commercial wood production from wetlands, sources of financing project implementation would be scarce.
- **VCS A/R** would improve eligibility and expandability of the project, but probably not to an extent that makes it viable. Same rationale as CDM A/R.
- **GS A/R** requires waiting for the publication of the V. 3 Standard. Under similar conditions to current CarbonFix Standard but allowing wetlands projects¹⁵, eligibility rules could restrict project options as much or more than in the case of CDM and VCS. Transaction cost would be lower but the project would not address the issue of mangroves degradation/restoration.
- **PV pure A/R** could be an option, since most or all analyzed lands would be eligible, but the project would get more benefits using this standard for developing a mixed project, as explained below.

Because the eligibility rules an A/R project exclusively for wetlands restoration would hardly be feasible, except, as noticed in the case of PV. It is worth noting that during the field mission, some interviewees expressed the view that there could be more potential for a restoration project if mangroves in Eastern Ghana were included. This affirmation is to be assessed but, as analyzed in Sections 5.2 and 5.3, the only option for developing a wetlands carbon project is increasing the scale of selected areas, either by 1) designing REDD+ activities in coordination or as part of the national REDD+ strategy or 2) designing a Plan Vivo project with the potential to include all communities related to wetlands in Ghana.

A reforestation project oriented to planting woodlots for firewood production for fish smoking, so that people would no longer need to harvest mangrove for wood could be possible. Most recommended standard could be GS A/R and PV (if at least a few hundred hectares may be compromised), although, if some 700 ha or more can be selected, Small Scale CDM

¹⁵ Current CarbonFix standard does not allow projects in wetlands. This situation may change with the transition to GS, also because regular scale and small scale CDM methodologies have been approved and GS accepts CDM methodologies.

or VCS could be used (being CDM preferred over VCS because of higher number of credits). This project, however, could be a component part of a bigger project (either REDD+ or PV), as proposed in Sections 5.2 and 5.3.

Some identified potential species for woodlots plantation are *Terminalia avicennoides*, *Anogeissus leiocarpus*, *Combretum ghasalense* and *Pterocarpus erinaceus*.

5.2 Pure REDD+ project

Currently, the only standard allowing for the development of REDD+ projects is VCS. However, PV also includes forest conservation as accepted activity, but there are no currently PV projects or *technical specifications*¹⁶ for pure forest conservation projects. GS has plans to expand the standard to include avoided deforestation but there is currently no indication on what shape this standard will take.

A pure REDD+ project to be developed for Ghana's wetlands should use a VCS REDD methodology for avoided deforestation. There are currently four VCS REDD methodologies dealing with different types of deforestation, of which three (VM0007, VM0009 and VM0015) exclude their application in peatlands, restricting their utility for Ghana's wetlands.

Basically, the design of a REDD+ project requires the following steps:

- REDD credits are calculated by subtracting ex-ante changes in baseline carbon stocks, ex-post monitored emissions from leakage, and ex-post monitored emission sources from the ex-post monitored changes in carbon stocks in the project areas.
- Baseline emissions in the project area are calculated based on historical deforestation or forest degradation rates in a reference region that is similar to the project area.
- Net emission reductions from avoided deforestation and avoided forest degradation are treated separately. When changes in forest biomass cannot be measured with sufficient accuracy, credits from avoided forest degradation must be excluded. Credits from avoided deforestation may still be included. For the case of Ghana's wetlands, quantification and monitoring of forest degradation is a challenging task, both because monitoring forest degradation may not be feasible using remote sensing and because the small minimum area of forest (0.1), requiring very high resolutions in the analysis.
- The quantification of baseline deforestation/degradation rates is based on field-calibrated remote sensing analyses over a historical reference period. Credits from avoided deforestation are discounted based on the accuracy of observing forest vs. non-forest. Credits from avoided degradation are discounted based on the accuracy of observing individual forest biomass classes.
- Carbon stock densities are quantified by permanent sampling plots on forest lands and temporary sampling plots on non-forest lands (conservative default values may be used for non-forest lands). Net emission reductions are discounted based on the attained precision of the biomass measurements. If the forest biomass density can-

¹⁶ [The equivalent to methodologies under CDM or VCS.](#)

not be measured with sufficient precision, the project is not eligible. This restriction could also be a difficulty for mangroves, due to an apparent high variability of carbon stocks observed during the field mission.

- Leakage is monitored and quantified using a leakage belt approach for geographically constrained drivers and by a factor approach for geographically unconstrained drivers. Market-effect leakage must be accounted for within each PD, according to the rules set forward within the VCS guidance. Note that the market-effect leakage section within the PD is subject to rigorous dual validation.
- While reforestation is not allowed under the VCS AFOLU guidance for REDD projects, increased forest cover through natural regeneration and assisted natural regeneration must be included in the baseline and project scenarios. This is achieved by applying the empirically observed baseline regeneration rates in the reference region to the project and baseline scenarios. Note that (human-induced) assisted natural regeneration activities are allowed as a leakage prevention activity, but only to the extent that it increases the baseline natural regeneration rate.

The following provides some considerations on the options for a REDD+ project under VCS standard for Western Ghana's wetlands:

- As part of national preparedness for REDD+, large investments have been made to assess rates of deforestation to create a baseline for future activities. However, few countries have included wetlands in national baseline inventories or ongoing monitoring, reporting and verification (MRV) systems. As a result, REDD+ projects in mangrove forests are far more costly, as the MRV of emissions needs to be factored into on-going management costs. However, during the field mission, the Forestry Commission expressed a potential interest to include Wetlands in the national MRV system, but for this to become a reality, it is required someone REDD+ stakeholders keeping wetlands over the table in the discussions (meetings, conferences and other REDD+ related activities) and seeking ways for such integration in the MRV system.
- According to recent findings on the fate of C in mangroves, part of C stocks of biomass are incorporated in the soil organic carbon after deforestation/degradation events through decomposition. This means that these soil carbon stocks could not be credited under REDD+ activities.
- Because of the complexity of rules and high transaction costs, REDD+ requires projects to be of very large scale, where deforestation rates reach many hundreds or maybe thousands of hectares per year (minimum area depending of many factors such as effectiveness of project activities, sources of financing, existing information on C stocks and deforestation rates, co-existing initiatives, subnational/national initiatives and support, etc.).
- However, there may be some options for wetlands under the national REDD+ strategy, if a subnational region could be defined for Ghana's wetlands, and REDD+ activities for wetlands are designed in coordination or as part of the national REDD+ strategy. Under this scenario, wetlands could be included in one of the subnational REDD+ levels, benefitting from national and/or regional baselines and international resources coming to the national REDD+ strategy. Wetlands could also be integrated in bigger REDD+ projects, but the feasibility of this idea requires having ad-

vances in the determination of deforestation rates and carbon maps, so that deforestation hotspots (where private REDD+ activities could be profitable) can be clearly identified.

- Under this scenario, Community Resource Management Area (CREMA), as presented by Chagas et al. 2010¹⁷ and Rebecca Asare¹⁸ are very useful for solving several REDD+ issues such as carbon rights and community involvement and governance.
- One factor that could increase the feasibility of implementing a wetlands REDD+ project is the inclusion of other than carbon values in a way that additional funds can be attracted. However, if this were the case, it would be required to also opt for certifying other carbon benefits of the project, using e.g. the CCB standard, which on the other hand would imply additional transaction costs. Also, from the point of view of a REDD+ project, PV is the best option under current circumstances.
- Forest degradation and forest stocks enhancement.

Although under current regulatory framework it is possible to design and implement REDD+ activities dealing with forest degradation and forest stocks enhancement, there are two main difficulties that must be solved in order for such activities to become feasible:

- The lower gains in carbon stocks, in comparison to deforestation, coming from avoided degradation or carbon stocks enhancement, requiring thus bigger areas to reach the financial closure and,
- The higher difficulties in monitoring carbon stocks changes through remote sensing.
- The higher costs of implementing activities for controlling degradation agents.

Because of these difficulties, this type of project would require even a higher scale than a deforestation project in order to be feasible.

5.3 Landscape-level project

- The only standard allowing a landscape approach, were different activities can be credited is **PV**. Western Ghana's wetlands fulfill basic eligibility and additionality requirements, while the rules for expansion of the project are quite flexible.
- Although PV is considered a less strict carbon standard, it allows breaking most of barriers created by the standard in their quest for transparency and credibility by dramatically decreasing transaction costs, increasing community involvement, simplifying eligibility and monitoring and adopting a landscape-level approach were different types of activities are allowed.
- In a PV project, the following activities would be eligible: A/R (both for wetlands restoration and for provision of sustainable bioenergy), direct reduction of GHG emissions (through the use of efficient fish-smoking stoves), forest conservation and forest improvement.
- PV is also designed for flexible and natural growth in terms of participants and project intervention areas.

¹⁷ Thiago Chagas et al. 2010 - Consolidating National REDD+ accountin and subnational activities in Ghana.

¹⁸ Community Resource Management as a Strategy to Manage African Forest Resources. Powerpoint presentation, no date.

- A PV project designed for the wetlands of Ghana could be in the future integrated into the national REDD+ strategy, being at the same time more suitable for attracting funds for biodiversity and other environmental and socio-economic services.
- The role and potential of CREMAs as institutions for the implementation of PVs should be analyzed.

The Mikoko Pamoja project - Mangrove restoration in Gazi Bay, Kenya¹⁹, is an example of project implementation under the Plan Vivo Standard. The overall objective of this project is to channel finance to the protection and restoration of mangrove ecosystems in Kenya through the provision of and payment for quantifiable ecosystem services. The proposed project aims to protect, enhance and expand an area of mangrove forest at Gazi in southern Kenya, in the expectation that this will inform mangrove conservation throughout Kenya. Activities to be implemented are mangroves restoration, forest conservation, forest management and establishment of firewood and timber plantations.

5.4 Final considerations regarding the type of project

Either the scaling up of a wetlands REDD+ initiative or the designing of an expandable Plan Vivo for wetlands could be used as a basis to create a national mangrove initiative which could be attractive to oil and gas companies. Having wetlands widely recognized as ecological and socio-economic values far beyond carbon sequestration, such initiative should have the potential to attract other sources of financing than carbon markets.

In any case, no matter which type of project is selected, governance and use and access rights must be clarified and codified, and huge data gaps will have to be filled in before any wetlands carbon project can be adequately designed. Although there are several sources of data regarding the current extension of mangroves and their carbon stocks, as well as other socio-economic data, these are to be collected, processed and analyzed before becoming effective for the calculation of the climate change mitigation potential of wetlands in Ghana.

¹⁹ http://www.planvivo.org/wp-content/uploads/gazi_pin_PlanVivo_Kenya.pdf

6 Potentially useful institutions

- Engaging a host of institutions that could be useful for data acquisition, sources of funding or participating in the design or implementation of a wetlands carbon project. The list is hardly complete but arises from the mission findings and further exploration on published documentation regarding mangroves, natural resources and carbon markets in Ghana.
- **US Forest Department** has expressed interest in developing sustainable landscape management project, which includes mangroves in Ghana. This could be part of a project involving oil and gas companies impacting on these resources in Ghana.
- **USAID** has several initiatives related to mangroves in several countries. In Ghana, it supported the Integrated Coastal and Fisheries Governance (ICFG) Initiative, a four-year project to contribute to overall goal of ensuring that Ghana's coastal and marine ecosystems are sustainably managed to provide goods and services that generate long term socio-economic benefits to communities while sustaining biodiversity. USAID could fund a project involving oil and gas companies whose activities impact on these resources in Ghana. Blue carbon, REDD+, and the adaptation values of these wetlands, among others should be emphasized. USAID staff stated that they remain very interested in both PES and marine offset opportunities, so the additional research and analysis that could support feasibility studies and business plans for innovative financing are likely well worth the investment of time and resources.
- **MAP – Mangrove Action Project.** The Mangrove Action Project is dedicated to reversing the degradation and loss of mangrove forest ecosystems worldwide.
- **CRC.** CRC is well known in the project area and could be a key institution in this context.
- **Microsfere.org.** A local NGO accomplishing actions to improve the use of firewood for fish smoking and implementing woodlots for firewood production in Amanzule. They have experiences and knowledge to share.
<http://www.microsfere.org/>.
- **The Livelihoods Fund.** The Livelihoods Fund is an investment fund, providing its investors with a return, albeit not a financial return per se, under the form of high quality carbon offsets. The Fund invests also in mangrove carbon. Corporate investors had invested over €26 million by early 2012 and projects included 14,000 hectares of mangroves planted in four countries. The fund has an Excel tool to quickly assess the potential of a project to be supported by the fund.
- Several students are currently working with mangroves in relation to forest degradation, carbon sequestration and remote sensing²⁰.
- **Oil and gas companies.** The rapidly moving developments associated with oil & gas development may have the greatest potential of all to supply investments in coastal ecosystem services protection – while at the same time being the single greatest threat to the coastal and marine habitats²¹. Continued engagement with

²⁰ Kofi Agbogah, Coastal Resources Center (CRC), personal communication.

²¹ Preliminary Rapid Assessment to Determine the Potential for Promoting Marine and Coastal Payment for Ecosystem Services (PES) in the Coastal Districts of the Western Region of Ghana. Report Submitted by Forest Trends to NCRC, 2011.

Tullow Oil and other energy companies could ensure that a revenue stream in the form of a PES scheme will help to secure the necessary funds for a wetlands project.

- **Ghana Wildlife Society (GWS)** has been working for some time on social aspects of mangrove management, such as the current use of the mangroves by communities for agriculture and fuel wood and the governance and use and access rights, but the momentum behind these activities has declined over time. Finding a way (if possible) to obtain these data and to reenergize an effective collaboration could be useful in this context.

7 Work program and financial proposal for Phase 2

As explained in the report, we find that a pure A/R project for carbon sequestration is not feasible for western wetlands of Ghana and we do not recommend continuing with Phase 2 as stated in the Terms of Reference. Thus, we do not present any work program nor financial proposal.

Although our analysis shows that there may be room for developing a Plan Vivo project, we have no experience with this standard and, given the initial small scale a Plan Vivo would have, our services would not be competitive.

Following, a short list of persons with experience working with Plan Vivo Standard that could be engaged to lead the formulation of such a project. We don't have any formal relationship with any these persons and we do not endorse them, although we have selected them because of their reputation or experience with Plan Vivo:

1. William Arreaga. Rainforest Alliance, Guatemala. warreaga@ra.org (Guatemala)
2. Wendy Aubrey. Bioclimate Research and Development. wendelin.aubrey@brdt.org (UK).
3. Rocio Perez Ochoa. CDM AR Advisers. info@medlaradvisers.co.uk (located in UK).

Also, a list of registered PV projects with contact data is available at <http://www.planvivo.org/projects/registeredprojects/>. Projects located in Africa could give some advice on how to start developing a project or finding suitable consultants for this task.

Finally, Table 2 presents the estimated costs for the review of a Project Idea Note and the validation process under Plan Vivo. These costs are only for the Plan Vivo registration process.

Table 2. Estimated costs of validation of a project under Plan Vivo Standard.

Process	Involves	Costs
Project Idea Note (PIN) review	Desk review by PV Foundation	\$750 (fixed)
Validation		
Project Design Document review	Desk review by the PV Foundation	\$500 (fixed)
Field visit	Visit to project site by expert review to assess capacity of project coordinator and check implementation of systems	\$5,000 – \$10,000 estimate (depending on the rate of the expert reviewer. \$5,000 represents a lower estimate for a small project i.e. <100ha using an expert reviewer. Using an accredited organization for validation will push up costs to at least \$9,000).
Technical specification review	Peer review by Technical Advisory Group and wider experts	\$200 per tech spec (fixed). Assume e.g. 4 tech specs = \$800 total
Review of validation report and project registration	Desk review and finalization of project registration by PV Foundation	\$500 (fixed)
Total		\$7,550 – \$12,550 (estimated)

8 Generic checklists of required data for drafting projects under CDM, VCS and PV

8.1 Generic checklist for A/R CDM Project Design Document or VCS Design Document

Data	Comments
Additionality data	
Evidence on seriously considering CDM as an alternative for overcoming reforestation barriers.	Documents, contracts, agreements, meetings acts, etc.
Chronology of the action taken for the project participants to secure carbon credits.	(i.e.: project chronology from its very start). With accompanying evidence.
Business plans and financial calculations.	
Baseline information	
Estimation of carbon stocks of each baseline land use/land cover.	And supporting documentation/calculations. Existing studies may be used, plots measurements are very welcome.
Historic records or databases on existing reforestation activities in the region	
Environmental analysis	
Relevant data of the region: climatic data, soils, flora, fauna, endangered species.	Emphasis on the specific project areas more than on the overall region.
Leakage data	
Survey of landowners on cattle rising and plans for displacing cattle (or managing it inside the farm).	Either if there will be or not leakage from activities displacement the project will need to do leakage assessment and monitoring.
Survey of landowners on agricultural activities and plans for displacing them (or intensifying them inside the farm).	
Legal	
Copy of all land titles of farms to be reforested.	
Copy of contracts (if any) with land owners or legal documents demonstrating the control over areas to be included in the project.	
Project activity information	
Technical description of the project	Land selection procedure, description of technology to be employed, species, seed sources, nursery production, site preparation.
Planting schedule and goals. Data affecting carbon sequestration such as estimated sites productivities, initial stand density, thinning and rotation ages.	
Existing allometric and growth models.	
Copy of existing training material and forest management plans.	
Project participants	
Legal and relevant data of each company involved in the process.	Including description of roles in relation to the project
Contact information and person in charge.	
Description of funding sources to be used for the	

Data	Comments
implementation of the project.	
Socio-economic analysis	
Socio-economic data	Focused on owners of farms to be reforested and people to be directly benefited from project activities
Spatial data	
Map or remote sensed data of forest/not forest for the potential areas of the project of a date as near as possible to 31.12.1989 (or 10 years ago for VCS).	Resolution must be enough to determine forest cover at the scale of minimum forest definition for Ghana (15% forest cover, 5 m height and 0.1 ha).
Map or remote sensed data of forest/not forest for the potential areas of the project of a date as near as possible to the starting date of project activities	Resolution must be enough to determine forest cover at the scale of minimum forest definition for Ghana (15% forest cover, 5 m height and 0.1 ha).
GPS coordinates of all polygons to be planted as part of the project activity.	The exact boundaries of each polygon are required, it is not sufficient to have farm level boundaries.
Stakeholders consultation	
Diffusion of the project among stakeholders. Press releases, pamphlets and promotional campaign.	Not necessarily for recruiting participants but for proving stakeholders knowledge of the project and having consulted them.
Stakeholders consultations	Workshops, meetings, surveys to be held with stakeholders.

8.2 Checklist for PV Project Idea Note

Data	Comments
Project location data	
Project developer team data	
Definition of project activities	
Identification of target groups	
Identification of local organizations capacity	
Physical description of project area	
Identification and location of land use categories inside the project area	
Identification of drivers of deforestation	
Socio-economic description	
Identification of community income sources	
Local and national governance structure	
Availability of technical data	
Carbon estimations	
Ownership of carbon rights and land tenure	
Description of applicant organization and proposed governance structure	
Community-led design plan	
Additionality analysis	
Compliance with regulations	
Sources of start-up funding	

9 Annexes

9.1 Annex 1 – Ghana map and field trip



9.2 Annex 2 – List of attendants of the final debriefing meeting

Name	Institution
Robert Bamfo	Climate Change Unit, Forestry Commission (FC)
Nana Adu-Nsiah	Wildlife Division, FC
Kwakye Ameyaw	Forest Services Division, FC
Yaw Kwakye	Climate Change Unit, FC
Roselyn Adjei	Climate Change Unit, FC
Sulemana Adamu	Climate Change Unit, FC
Kofi Agbogah	Coastal Resources Center (CRC)
Nicholas Jengre	Rainforest Alliance
Prof. Chris Gordon	Centre for African Wetlands
Justice Odoi	USAID
John Mason	Nature Conservation Research Centre (NCRC)
Rebecca Asare	NCRC / Forest Trends
Winston Asante	NCRC
Alvaro Vallejo	Carbon Decision International