REQUEST FOR PROJECT/PROGRAMME FUNDING FROM ADAPTATION FUND

The annexed form should be completed and transmitted to the Adaptation Fund Board Secretariat by email or fax.

Please type in the responses using the template provided. The instructions attached to the form provide guidance to filling out the template.

Please note that a project/programme must be fully prepared (i.e., fully appraised for feasibility) when the request is submitted. The final project/programme document resulting from the appraisal process should be attached to this request for funding.

Complete documentation should be sent to

The Adaptation Fund Board Secretariat
1818 H Street NW
MSN G6-602
Washington, DC. 20433
U.S.A
Fax: +1 (202) 522-3240/5
Email: secretariat@adaptation-fund.org

ADAPTATION FUND

DATE OF RECEIPT:
ADAPTATION FUND PROJECT ID:
(For Adaptation Fund Board Secretariat Use Only)

PROJECT/PROGRAMME PROPOSAL

PART I: PROJECT/PROGRAMME INFORMATION

PROJECT/PROGRAMME CATEGORY:	**REGULAR PROJECT**
COUNTRY/IES:	**CAMBODIA**
TITLE OF PROJECT/PROGRAMME:	**ENHANCING CLIMATE CHANGE RESILIENCE OF RURAL COMMUNITIES LIVING IN PROTECTED AREAS OF CAMBODIA**
TYPE OF IMPLEMENTING ENTITY:	**MULTILATERAL IMPLEMENTING AGENCY (MIE)**
IMPLEMENTING ENTITY:	**UNEP**
EXECUTING ENTITY/IES:	**MOE**
AMOUNT OF FINANCING REQUESTED:	**4,954,273** (IN U.S Dollars Equivalent)

Short summary

The climate change-induced hazard of erratic rainfall, which leads to droughts and floods, is decreasing agricultural productivity in Cambodia thereby constraining efforts to reduce poverty levels. These erratic rainfall events are predicted to increase under future climate change scenarios. Some of the most vulnerable communities in Cambodia are rural communities living in Protected Areas (PAs). This is because of the dependence of these communities on ecosystem services and a lack of alternative, climate-resilient livelihoods. As a result of the erratic rainfall and consequent decreasing agricultural productivity, these communities are increasingly reliant on forest ecosystems to provide supplementary food sources and income from collecting and selling non-timber forest products (NTFPs) and fuelwood. Widespread degradation of forest ecosystems, however, is reducing the efficacy of this adaptation response. The consequences of the climate change-induced hazard of erratic rainfall include: i) increased erosion as a result of floods which damages crop production; ii) crop failure or reduction of yield as a result of drought; and iii) damaged infrastructure as a result of extreme rainfall events which limits access to urban markets. The Adaptation Fund (AF) project will use the ecoagriculture concept to build the resilience of rural Cambodian communities living in PAs to climate change. The ecoagriculture concept employs a "landscape approach to natural resource management that seeks to sustain agricultural/food production, conserve biodiversity and ecosystems and support local livelihoods". It will be implemented using two approaches: i) an extensive approach in which degraded forests will be restored into multi-use forests in Community Protected Areas (CPAs) at a landscape-level, by planting predominantly indigenous tree species that provide food, diverse NTFPs and a range of ecosystem services such as erosion control and water flow regulation; and ii) an intensive approach in which interventions include planting multi-use tree species along rice paddy boundaries and other existing cultivated areas to enhance crop productivity, establishing trial plots of drought-tolerant hybrid rice cultivars and intensifying/diversifying existing agricultural areas and introducing conservation agriculture practices. These interventions have been identified through two separate CPA Community Surveys of vulnerable rural communities living around CPAs i.e. they have been designed following a participatory approach and in response to community requests. The restoration component (extensive approach) will improve at least 1,875 ha of degraded CPA forest. The agricultural interventions (intensive approach) will intensify and diversify the agricultural production of at least 1,907 families living in communities around the five CPA intervention sites, benefiting at least 8% of families living around CPAs in all PAs in Cambodia. The CPA intervention sites where the AF project will be implemented were selected on the basis of the two CPA Community Surveys. The five CPA intervention sites are: Chiork Beungprey, Chom Thlork, Skor Mreach (all in Beung Per Wildlife Sanctuary), Ronouk Khgeng (Phnom Prech Wildlife Sanctuary) and Chop Tasok (Phnom Kulen National Park). The increased agricultural productivity will provide communities with food and revenue and reduce the pressure on forests. This will make both the forests and the services they provide to local communities more resilient to climate change. Further benefits as a result of landscape management to enhance ecosystem services will accrue in downstream communities, outside of CPA intervention sites. The AF project approach of restoring the natural

capital of forests on which the communities depend, and intensifying agriculture using a limited area within PAs is a highly cost-effective approach to adaptation with numerous environmental, social and economic benefits. Protection of restored forests and agricultural areas, and thus the sustainability of the AF project interventions, will be ensured by: i) collaborating with communities, fostered by the AF project's consultative and participatory approach; ii) intensive training of local communities on climate change adaptation responses; iii) recommending revisions to policy and legislation, including recommended budget allocations; iv) establishing multi-use forests that will incentivise protection of the trees because of the value of the productive landscape; v) training communities on business plan development to ensure that alternative livelihoods are successfully implemented; vi) utilising the existing culture of protecting homegardens in Cambodia; vii) ensuring effective management and protection of restored landscapes; and viii) the legislative protection afforded by the formal inclusion of restored forests into CPA management plans. An upscaling strategy will be developed for implementing the AF project ecoagriculture approach in other CPAs in Cambodia.

PROJECT / PROGRAMME BACKGROUND AND CONTEXT:

1.1. Geographic and environmental context

Cambodia occupies 181,035 km^2 in the tropical Indochina peninsula of South-east Asia and shares borders with Laos, Vietnam and Thailand. The country is divided into 20 provinces (including districts, communes and villages) and four municipalities (including communes, quarters and villages). Its landscape is dominated by low-lying central plains which include the Tonle Sap Lake system and the uppermost part of the Mekong River Delta. These features are surrounded by the mountainous regions of the south-west, north and north-east (Figure 1). All rivers drain into the Mekong River or Tonle Sap Lake system with the exception of rivers in the south-west draining towards the coast.

Cambodia has a tropical monsoon climate. The wet season occurs from May to October when strong prevailing winds from the south-west bring heavy rains and high humidity. The dry season occurs from November to April when winds are weaker and humidity is low. Average annual rainfall ranges from 1,400 mm in the central lowlands to 5,000 mm in the coastal zone. The average temperature is 28 ºC, with a maximum monthly average of 38 °C in April and a minimum average of 17 °C in January[1]. A unique hydrological feature of Cambodia is the expansion of the Tonle Sap Lake system during the wet season[2]. During this period the lake expands from ~2,600 km^2 to ~16,000 km^2. This expansion is associated with reversal of flow in the Tonle Sap River which connects the lake to the Mekong River. In the wet season, water pushes in a north-west direction up the Tonle Sap River into the lake, swelling the size of the lake and flooding fields and forests in the floodplain. At the end of the wet season, the flow reverses and water drains from the lake down the Tonle Sap River into the Mekong River. Much of Cambodia's economy is dependent on the annual flooding of the Tonle Sap Lake and the Mekong River because the provision of freshwater and the deposition of nutrients by floodwaters are crucial for productivity of fisheries and agriculture (particularly rice)[3]. The intensity and duration of the flooding, however, varies markedly from one year to the next and has a pronounced effect on agricultural production. As rural Cambodian communities depend on this regular pattern of flooding, relatively early or late onsets of the wet season and longer lasting or higher intensity floods have considerable social, environmental and economic impacts.

In addition to natural hazards such as droughts and floods, environmental problems in Cambodia include the loss of ecosystem services and biodiversity, land degradation and deforestation. Forest cover of Cambodia is diverse and includes dry deciduous and moist deciduous rainforest, coniferous forest, moist evergreen forest, moist mountain forest, dwarf evergreen forest, flood forest, bamboo forest and mangroves. A significant portion of Cambodia's forest falls within PAs and CPAs, and these forests provide important livelihood opportunities and ecosystem services to communities living in and dependant on them. Such services include the provision of food, NTFPs, timber and fuelwood for sustainable use and income generation. Typical NTFPs include fruits, resin, fibre, rattan, medicinal plants, honey, mushrooms, yams and spices. The NTFP Working Group has a list of over 60 NTFPs collected and used by the community of the Srey Thom CPA in Phnom Prech PA. It is estimated, however, that more than 100 NTPS are used for subsistence use and commercial sale. In Kampong

[1] MoE. 2002. Cambodia's Initial National Communication under the United Nations Framework Convention on Climate Change.
[2] Ibid.
[3] Ibid.

Thom Province, rattan collection is estimated to be worth US$ 600 per household per annum, while resin collection is valued at US$ 300 per household per annum[4]. Malva nuts are the most valuable NTFP collected by rural communities in the Virachey NP of Ratanakiri Province, with the annual harvest estimated to be worth US$ 131 per household[5].

Additional services provided by forests include climate regulation, water purification and the regulation of water flow in the Mekong River Basin. Although the deforestation rate in Cambodia has decreased recently due to the implementation of a number of forestry reforms, it still remains high when compared to the average global rates. Between 1990 and 2005, the annual average deforestation rate was 1.4%, which is almost three times the global average. Prior to 1960, forests covered 73% of Cambodia's total land area. By 2006, forest cover was reduced to 58%[6]. Major drivers of deforestation include: i) expansion of agricultural and urban land as a result of an increasing population; ii) commercial logging; iii) illegal logging which is responsible for up to 94% of the total deforestation[7]; iv) firewood collection; v) forest fires; vi) a lack of transparency in the land/forest concession system; vii) unsustainable harvesting by concessionaires; and viii) poor management. Recent efforts have, however, been made by the Cambodian government to counteract these drivers. The government has cancelled at least 15 forest concessions since 1999 and reduced the total area under logging concessions by ~3,4 million ha[8]. However, limited financial resources and institutional capacity hinder the implementation of anti-logging laws and hamper efforts to further limit the number of timber concessions. As a result, deforestation and biodiversity losses still continue to undermine the resilience of Cambodian forest ecosystems to the threats of climate change[9].

[4] Tola, P. *et a*l. 2010. Economic Importance of Non-Timber Forest Products. Case Studies on Resin and Rattan in Kampong Thom Province, Cambodia.
[5] Rural Livelihoods and Natural Resource Development Research Programme. 2010. Social Landscapes and rural Livelihoods: Cambodian Communities in Transition. Phnom Penh: The Learning Institute.
[6] MoE. 2002. Cambodia's Initial National Communication under the United Nations Framework Convention on Climate Change.
[7] EC. 2006. Cambodia – European Community Strategy Paper. http://www.eeas.europa.eu/cambodia/csp/07_13_en.pdf. [Accessed 2 September 2011].
[8] FAO. 2010. Country Report: Cambodia. Global Forest Resources Assessment, Food and Agriculture Organisation, Rome.
[9] Wingqvist, G.O. 2009. Cambodia Environmental Change and Policy Brief. Environmental Economics Unit, University of Gothenburg, Sweden. Available from http://www.sida.se/Global/Countries%20and%20regions/Asia%20incl.%20Middle%20East/Cambodia/Environmental%20Policy%20Brief%20Cambodia.pdf. [Accessed 7 September 2011].

Figure 1: Relief map of Cambodia showing the 20 provinces.

Assessments of biodiversity in Cambodia are limited by a lack of recent data. Approximately 100 terrestrial mammals have been recorded within Cambodia of which 49 taxa are listed by the International Union for Conservation of Nature (IUCN) as "globally threatened", "near-threatened" or "data deficient". Some 500 bird species have been recorded for Cambodia but data from neighbouring countries suggest that over 600 species are likely to occur. Birdlife International lists 39 Cambodian bird species as "globally threatened" or "near-threatened". Estimates of Cambodia's fish species range from 800-1,200 varieties. No rigorous surveys have been made of reptile and amphibian biodiversity in Cambodia. However 28 known species of reptile have been listed by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) as "threatened". Over 2,300 species of seed plants have been listed, but this number is considered an underestimate given the diversity of flora in the neighbouring countries of Laos, Thailand, and Vietnam[10]. Much of the biodiversity is preserved within PAs, where threats include habitat loss and over-exploitation.

There are 23 PAs in Cambodia, covering 18% of the country's surface. These include National Parks (NPs), Wildlife Sanctuaries (WSs), Protected Forests, Protected Landscapes and Multiple Use Areas[11]. The Tonle Sap Lake is protected as a Biosphere Reserve, and there are four Ramsar (Wetlands of International Importance) sites: Boeng Tanle Chhma, Koh Kapik, Prek Toal and a northern section of the Mekong River in Stung Treng Province. Threats to PAs include: i) unrestricted grazing by livestock; ii) unmanaged fishing; iii) illegal logging; iv) collection of fuelwood and NTFPs; v)

[10] MoE. 2002. National Biodiversity Strategy and Action Plan.
[11] ICEM. 2003. Cambodia National Report on Protected Areas and Development. Review of Protected Areas and Development in the Lower Mekong River Region. International Centre for Environmental Management. Indooroopilly, Queensland, Australia. 148 pp. http://www.mekong-protected-areas.org/cambodia/docs/Cambodia_nr.pdf.

population growth and migration; and vi) habitat degradation and disturbance resulting from human activities[12].

Cambodia has maintained its network of PAs since 1925 when forests surrounding the Angkor Wat temples were declared NPs, becoming the first PAs in South-east Asia. In the period 1953-1969, following independence from French rule, 12% of Cambodia was protected within NPs or WSs and natural resources were promoted as a national asset[13]. However, during the period of instability and conflict from 1970-1992, PA management was abandoned and much of the existing infrastructure destroyed. Extensive areas were deforested to increase agricultural output, to sell timber and to improve visibility for security reasons[14].

In the relative stability that followed a peace settlement in 1991, Cambodia entered an era in which PAs were re-established. However, at the same time the use of forest resources was promoted by the coalition government and extensive concessions were awarded to commercial logging companies. Illegal logging also continued in some areas[15]. After the 1998 election the new government took steps to reverse this trend by withdrawing or suspending concessions, by increasing efforts to combat illegal logging[16] and by establishing new PAs[17]. In 1993, 23 sites covering ~3,3 million ha were formally designated as PAs by Royal Decree. The Ministry of Environment (MoE) is the government agency assigned the mandate of managing PAs. The Royal Government of Cambodia (RGC) established the PA Law in 2008, which directs PA management. An additional seven Protected Forest sites covering ~1,3 million ha were added to the PA network by the Ministry of Agriculture, Forestry and Fisheries (MAFF). By 2010, over 25% of Cambodia was under some form of legal protection[18].

Most PAs in Cambodia are in remote regions with little surrounding commercial development and few livelihood options. Over 87% of the communities living in and around PAs have a “medium” or “high” poverty rating[19,20]. The findings of a Research Programme on Local Livelihoods in Protected Areas (2006-2009) indicated that the average income of rural communities living in and around PAs was derived from NTFPs, crop farming and raising animals. The research programme reported that these communities are faced with food supply problems[21]. In addition, diseases and malnutrition are widespread. Most of the communities are unable to access health care services, and the level of hygiene education is poor. The development of private sector agro-industry projects has altered the landscape by removing forest cover, thereby exacerbating food shortages for communities dependant on the forests, disease and the effects of natural disasters such as droughts and floods.

Despite this, PAs tend to attract human settlement as they contain much of the nation’s remaining ‘free’ natural resources. As a result, most PAs in Cambodia are experiencing rapid population growth through immigration[22]. A geo-spatial survey conducted in 2009 indicated that approximately 45% of deforestation had occurred within PAs, highlighting the challenges in enforcing PA laws[23]. Demand for wildlife products, unrestricted livestock grazing, fuelwood collection, unregulated fishing and

[12] MoE. 2002. National Biodiversity Strategy and Action Plan.
[13] ICEM. 2003. “Protected areas and development: Lessons from Cambodia”. Cambodia National Report on Protected Areas and Development, Review of Protected Areas and Development in the Lower Mekong River Region.
[14] ICEM. 2003. Cambodia National Report on Protected Areas and Development. Review of Protected Areas and Development in the Lower Mekong River Region. International Centre for Environmental Management. Indooroopilly, Queensland, Australia. 148 pp. http://www.mekong-protected-areas.org/cambodia/docs/Cambodia_nr.pdf.
[15] Ibid.
[16] Ibid.
[17] MoE. 2009. Cambodia Environment Outlook. Ministry of Environment, Phnom Penh, Kingdom of Cambodia.
[18] Ibid.
[19] ICEM. 2003. Cambodia National Report on Protected Areas and Development, review of Protected Areas and Development in the Lower Mekong River Region.
[20] Where poverty is defined by rural Cambodians as the inability: i) to be certain that one can use as much local natural resources as necessary for household purposes; or ii) to be able to sell sufficient natural resources or produce to purchase basic necessities, or iii) to be certain of land tenure and security. Asian Development Bank. December 2001. Participatory Poverty Assessment: Cambodia. Phnom Penh.
[21] Rural Livelihoods and Natural Resource Development Research Programme. 2010. Social Landscapes and Rural Livelihoods: Cambodian Communities in Transition. Phnom Penh: The Learning Institute.
[22] For example, each year Ream National Park yields US$ 1.24 million in economic benefits from fishing, harvesting forest products and farming. This amounts to US$ 233 annually for each household, which is more than two thirds of the average family income of about US$ 316. ICEM. 2003. Cambodia National Report on Protected Areas and Development, review of Protected Areas and Development in the Lower Mekong River Region.
[23] https://www1.nga.mil/Newsroom/Pathfinder/nov_dec_09/Pages/DeforestationAnalysisComplementsCambodiaConflictAssessment.aspx. [Accessed 13 April 2011].

encroachment by infrastructural developments all present challenges to PA management[24,25]. Cambodia's PA Law makes provision for the potential role that local communities and indigenous groups may play in natural resource management. As a result of this law CPAs have been established. The main objective of CPAs is to designate local communities who can access the areas, thereby preventing outsiders intruding and degrading the forests. CPA Management Committees are established to co-ordinate activities such as sustainable management and use of NTFPs by local communities so that natural resources are not depleted. By the end of 2011, 100 CPAs totalling 127,634 ha had been established, benefitting 23,500 families from 188 villages surrounding the CPAs.

1.2. Social and economic context

In 1991, Cambodia entered a period of relative stability after two decades of conflict and economic isolation. Since then, development priorities have focused on ensuring peace and security, reducing poverty, rebuilding institutions, and establishing a stable macro-economic environment[26]. Cambodia's population in 2011 was ~14.8 million people, growing at a rate of 1.7% per annum[27]. Despite economic growth in the last decade, the per capita income is below that of neighbouring countries. The Gross Domestic Product (GDP) ranks 188th of 227 countries, and the Human Development Index (HDI) of 0.5 is below the regional average. Approximately 84% of the population resides in rural areas[28] and is heavily dependent on forestry, agriculture and fisheries[29].

The extensive inland water system within the Tonle Sap Lake region supports the majority of Cambodia's population, who are particularly reliant on rice cultivation and freshwater fisheries. The incidence of poverty[30] remains high despite having declined from ~35% in 2004 to ~30% in 2007[31]. Food shortages are prevalent in rural areas where Cambodians rely heavily on natural resources for their income and livelihood. Approximately 39% of rural households generate 25% of their earnings from forestry and fishery resources and 16% rely on forestry and fisheries for at least 50% of their daily wages[32].

Agriculture is the most important sector of the Cambodian economy. The majority of agriculture is rain-fed subsistence agriculture, and as such is the most vulnerable sector to the impacts of climate change. Rice cultivation occupies 84% of the total agricultural land area and provides ~70% of the population's food requirements[33]. In 1990, approximately 1.9 million ha in Cambodia were devoted to rice production, 86% of which were rain-fed[34]. Other types of agriculture include shifting agriculture, commercial field cropping and homegardening, which includes growing fruit and vegetables around homesteads. Crop cultivation is largely dependent on traditional cultivars. In the late 1990s, almost 80% of Cambodia's agricultural land was cultivated with local, unimproved varieties of rice, maize, sesame, vegetables and sweet potato. New pests and pathogens have contributed significantly to lowered productivity. Modern agriculture has reduced the diversity of crops planted country-wide, with an emphasis on a limited number of commodity crops.

Livestock and animal production is another source of income and an important source of protein for the Cambodian people. Most rural households raise poultry and pigs for household consumption, and cattle are kept as agricultural draft power for tilling fields. In 1994, livestock resources were estimated to be as follows: 2.6 million cattle, 814,000 buffalo, 21,000 horses, 2 million swine and 10 million poultry[35]. Within the CPAs consulted in the First CPA Community Survey as part of the AF Project

[24]ICEM.2003. Cambodia National Report on Protected Areas and Development, review of Protected Areas and Development in the Lower Mekong River Region.
[25]MoE. 2002. National biodiversity strategy and action plan.
[26] UNDP. 2008. Cambodia Annual Report. Phnom Penh, Cambodia. United Nations Development Program.
[27]Available from: www.cia.gov/ (2010 estimate). [Accessed 01 September 2011].
[28] Climate change country profile: Cambodia http://www.wpro.who.int/NR/rdonlyres/EF203FE3-0C6F-475F-B9C7-5C67364910E3/0/CAM2.pdf. [Accessed 02 September 2011].
[29]MoE. 2002. Cambodia's Initial National Communication under the United Nations Framework Convention on Climate Change.
[30] Defined as less than US$ 0.63/day in 2002 (NPRS, 2002).
[31]RGoC. 2010. National Strategic Development Plan Update 2009 – 2013. Royal Government of Cambodia. http://www.ilo.org/wcmsp5/groups/public/---asia/---ro-bangkok/documents/publication/wcms_145085.pdf. [Accessed 5 September 2011].
[32]World Bank. 2006. Cambodia: Poverty Assessment.
[33] UNDP. 2008. Cambodia Annual Report. Phnom Penh, Cambodia. United Nations Development Program.
[34]MoE. 2002. Cambodia's Initial National Communication under the United Nations Framework Convention on Climate Change.
[35] Ibid.

Concept preparation (see Annex II), agriculture in the form of crops and livestock was the largest source of income for community members.

Fisheries provide a major source of protein in Cambodia. Per capita consumption of fish is 60-65 kg/year[36] and fish provide approximately 75% of the population's animal protein intake. Cambodia is one of the world's largest freshwater fish producers[37] with an estimated capture rate of 400,000 tonnes/annum. Freshwater fisheries contribute approximately US$ 500 million, or 12% of Cambodia's GDP[38]. Over 6 million Cambodians are employed in fishing-related activities on at least a part-time basis. However, the fish catch-rate has been declining in the Tonle Sap region from 347tonnes/fisherman in 1940 to 196 tonnes/fisherman in 1995 to 116 tonnes/fisherman in 2008[39]. This is primarily the result of the decline in fish stocks caused by over-fishing.

Cambodia has a plentiful supply of aboveground **freshwater** resources during the wet season with an estimated annual flow of 471 km^3/year in the Mekong River[40]. There is, however, very little dry-season storage capacity in the country's dams and groundwater aquifers, resulting in significant variation in the availability of water for drinking, household use and irrigation between wet and dry seasons. The domestic water needs of rural Cambodians have been traditionally met using surface water and shallow-dug wells. When available, rainwater is used for drinking and cooking[41]. It is estimated that during the dry season, when surface and ground waters recede or dry out, approximately 43% of the population are reliant on untreated water sources, which are unsuitable for drinking[42]. In a 2006 survey, over half of respondents reported a shortage of water for household use and over 80% reported a shortage of water for agriculture[43].

Fuelwood is the primary source of **energy** for 95% of rural Cambodia households. Total fuelwood consumption was estimated to be ~6 million m^3 in 2010. This is 40% higher than in 1995. The fuelwood consumption to forest biomass increment was 0.02 in Kampong Thom province in 2004, indicating that fuelwood consumption is not a major driver of deforestation at the provincial scale. However, fuelwood consumption is said to lead to localised forest degradation around villages where collection is concentrated[44]. Petroleum and minor contributions of other biomass sources such as crop residues accounts for the remaining 5% of energy for rural Cambodian households. In response to the constant increase in electricity demand and abundant supplies of freshwater in the Mekong River, plans have been developed for increasing the number and size of hydro-electric power dams. Commercial size projects have been in operation since 1968. The current installed capacity is about 14 MW, while Cambodia's technical potential for hydropower has been estimated at 8,600 to 10,000 MW of installed capacity for the Mekong River, the Mekong tributaries and the coastal provinces. Hydro-electric power plants are being built in Kampot, Koh Kong, Pursat and Battambang provinces, with the highest capacity being 190 MW in Kampot province. The majority of the present electricity demand (i.e. 93%) is provided by diesel power plants. Offshore oil and gas exploration activities have been undertaken in Cambodia since the 1960s. Petroleum experts believe that Cambodia has a high potential for natural gas but exploration to date has not discovered reserves worth developing.

---

[36] So Nam. 2010. Fisheries Resources in Cambodia - Current Status, Key Issues, Directions. International Centre for Environmental Management. http://www.icem.com.au/documents/envassessment/mrc_sea_hp/1inception/presentations/cambodia scoping workshop/pdf/Fisheries Resources in Cambodia - Current Status, Key Issues, Directions.pdf [Accessed 2 September 2011].

[37] Ahmed, M., Navy, H., Vuthy, L., Steneck, R.S. (1998) Socio-Economic Assessment of Freshwater Capture Fisheries of Cambodia: a Report on a Household Survey. Project for the Management of the Freshwater Fisheries of Cambodia, MRC Mekong River Commission Secretariat, Phnom Penh. 186 pp.

[38] So Nam. 2010. Fisheries Resources in Cambodia - Current Status, Key Issues, Directions. International Centre for Environmental Management. http://www.icem.com.au/documents/envassessment/mrc_sea_hp/1inception/presentations/cambodia scoping workshop/pdf/Fisheries Resources in Cambodia - Current Status, Key Issues, Directions.pdf. [Accessed 2 September 2011].

[39] Ibid.

[40] Encyclopedia of Earth. 2008. "Water profile of Cambodia." in Eds. Cutler J. Cleveland, Encyclopedia of Earth. (Washington, D.C.: Environmental Information Coalition, National Council for Science and the Environment). [First published in the Encyclopedia of Earth. Available from: http://www.eoearth.org/article/Water_profile_of_Cambodia. [Accessed 09 September 2011].

[41] MoE. 2002. Cambodia's Initial National Communication under the United Nations Framework Convention on Climate Change.

[42] UNDP Climate Change Country Profiles Cambodia. McSweeney, C., New, M., Lizcanol, G. 2009. Available from: http://country-profiles.geog.ox.ac.uk. [Accessed 3 September 2011].

[43] MoE. 2002. Cambodia's Initial National Communication under the United Nations Framework Convention on Climate Change.

[44] East Asia Summit/Energy Cooperation Task Force. Biofuel Database in East Asia. Available from: http://www.asiabiomass.jp/biofuelDB/cambodia/contents003.htm [Accessed 29 September 2011].

The development of **tourism** is recognised as a potential means of financing the preservation of Cambodia's natural resources and is considered one of Cambodia's main opportunities to build its economy[45]. The potential for rapid expansion of the tourism sector depends on maintaining intact ecosystems to provide aesthetically pleasing nature-based experiences[46].

PAs have an important role to play in the expansion of all sectors mentioned above, as does the institutional and policy context in which climate change projects are implemented.

1.3. Institutional and policy context

Cambodia ratified the United Nations Framework Convention on Climate Change (UNFCCC) on 18 December 1995 and accepted the Kyoto Protocol on 22 August 2002. Cambodia's Initial National Communication (INC) to the UNFCCC was submitted in October 2002 and the preparation of the Second National Communication (SNC) began in January 2007 and should be finalised by the end of 2011. The RGC has taken a firm stance to support the Kyoto Protocol by indicating their commitment to addressing climate change risks and the MoE is the lead coordinating institution with the mandate to address climate change concerns. Additionally, to ensure effective and successful implementation of sustainable development-related programmes, the RGC has established a number of cross-sectoral national committees, such as the National Climate Change Committee (NCCC) established in 2006 and chaired by MoE with the Prime Minister as honorary chair. The NCCC serves as a policy-making body (comprising policy-makers from 19 ministries) which coordinates the development and implementation of plans, policies and measures to address climate change risks across Cambodia[47]. As such, the NCCC is the focal point for all climate change-related engagement within the RGC. Furthermore, the MoE established a Cambodia Climate Change Office (CCCO) in 2003, which was changed to the Cambodia Climate Change Department (CCCD) in 2009 and serves as a secretariat for the NCCC. The CCCD has the mandate to implement the UNFCCC and Kyoto Protocol by creating an enabling environment for effective climate change mitigation and adaptation.

At the national level, the government agencies with responsibilities related to climate change, natural resources and coastal ecosystem management and development include:

- The **Ministry of Environment** (MoE) which was established in 1993 and is responsible for environmental protection and natural resource management in Cambodia.
- The **Ministry of Agriculture, Forestry and Fisheries** (MAFF) which has an extensive network of staff at the national, provincial, district and commune levels. The Forestry Administration (FA) has the mandate for the management of Protected and Community Forests. Given this broad mandate, there is substantial overlap with the MoE in the perception of functions and responsibilities. It is noteworthy that the 2006-2010 Strategic Agriculture Development Plan does not take climate change adaptation or mitigation into account.
- The **Ministry of Water Resources and Meteorology** (MoWRAM) which has the responsibility of observing and managing all activities related to water resources and meteorology development and natural disasters.
- The **Ministry of Land Management, Urban Planning and Construction** (MLMUPC) which is responsible for the formulation of development plans and land use plans at the national- and local-levels.
- The **National Committee for Disaster Management** (NCDM) which was established in 1995, is an inter-ministerial body chaired by the Prime Minister. The members of the committee are drawn from all concerned ministries and the armed forces. NCDM plays a key role in disaster management, working both on disaster risk reduction/prevention and response preparedness.
- The **Ministry of Industry, Mines and Energy** (MIME) which is responsible for planning industrial water use and hydropower as well as water supply provision to provincial towns and administrating single-purpose schemes involving hydro-power.
- The **Ministry of Public Works and Transportation** (MPWT) which is responsible for construction of roads, infrastructure e.g. bridges and ports.
- The **Ministry of Rural Development** (MRD) which is responsible for: i) supplying small-scale water supply infrastructure to households; ii) primary health care; and iii) small-scale infrastructure in the rural areas in Cambodia. Although the MRD recognises the importance of adapting to

[45]MoE. 2002. National biodiversity strategy and action plan.
[46]Ibid.
[47] WikiADAPT, 2010. Available from: http://wikiadapt.org.

climate change, the strategic plan of the MRD does not take climate change adaptation or mitigation into account.

- The **Ministry of Health** (MoH), which is responsible for the development of the health sector for better health and well-being of Cambodians and thus contributes to poverty alleviation and socio-economic development. The Health Strategic Plan (2008-2015) of the MoH does not consider climate change impacts.
- The **Ministry of Tourism** (MoT) which aims to preserve the scenic beauty and natural resources of Cambodia.
- The **Council for the Development of Cambodia (CDC)** which is the principle contact between the RGC and all donor countries, organisations and NGOs working within Cambodia.

1.4. Observed climate hazards, trends and impacts

Due to years of conflict there are very few long-term climate observations, making it difficult to determine significant and reliable trends in climate or potential signs of climate change within Cambodia. Those observations that are available, including variability in Cambodia and South-east Asia over the recent past, are listed below:

- a declining trend in rainfall across South-east Asia between 1951-1998[48] (see Figure 2) although mean annual rainfall over Cambodia does not reflect any consistent increase or decrease since 1960[49];
- an increase in the frequency and severity of droughts, floods and windstorms in Cambodia[50];
- an increase in the frequency and intensity of extreme weather events across South-east Asia associated with El Niño over the past two decades[51];
- an increase in mean annual temperature of between 0.1 and 0.3 ºC per decade between 1951-2000[52]; and
- an increase in the frequency of hot days[53] and warm nights since 1960[54].

Figure 2 shows the variability in rainfall in South-east Asia between 1901-2005[55]. The red and blue lines show a descreasing rainfall trend from the 1950s to the late 1990s, with an increasing trend towards the present. Whilst not specific to Cambodia, the increasing trend in extreme events in four South-east Asian countries between 1960-2008, specifically floods/storms[56], is shown in Figure 3. Thailand and Vietnam border Cambodia to the west/north and east/south-east, respectively (see Figure 1).

[48] Cruz, R.V., H. Harasawa, M. Lal, S. Wu, Y. Anokhin, B. Punsalmaa, Y. Honda, M. Jafari, C. Li and N. Huu Ninh, 2007: Asia. Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds., Cambridge University Press, Cambridge, UK, 469-506.
[49] UNDP Climate Change Country Profiles Cambodia. McSweeney, C., New, M., Lizcanol, G. 2009. Available from: http://country-profiles.geog.ox.ac.uk. [Accessed 3 September 2011].
[50] According to villagers' observations included in the NAPA (2006).
[51] Ibid.
[52] Cruz, R.V., H. Harasawa, M. Lal, S. Wu, Y. Anokhin, B. Punsalmaa, Y. Honda, M. Jafari, C. Li and N. Huu Ninh, 2007: Asia. Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds., Cambridge University Press, Cambridge, UK, 469-506.
[53] 'Hot' day or 'hot' night is defined by the temperature exceeded on 10% of days or nights in current climate of that region and season.
[54] UNDP Climate Change Country Profiles Cambodia. McSweeney, C., New, M., Lizcanol, G. 2009. Available from: http://country-profiles.geog.ox.ac.uk. [Accessed 3 September 2011].
[55] Asian Development Bank. 2009. The Economics of Climate Change in Southeast Asia: A Regional Review.
[56] Ibid.

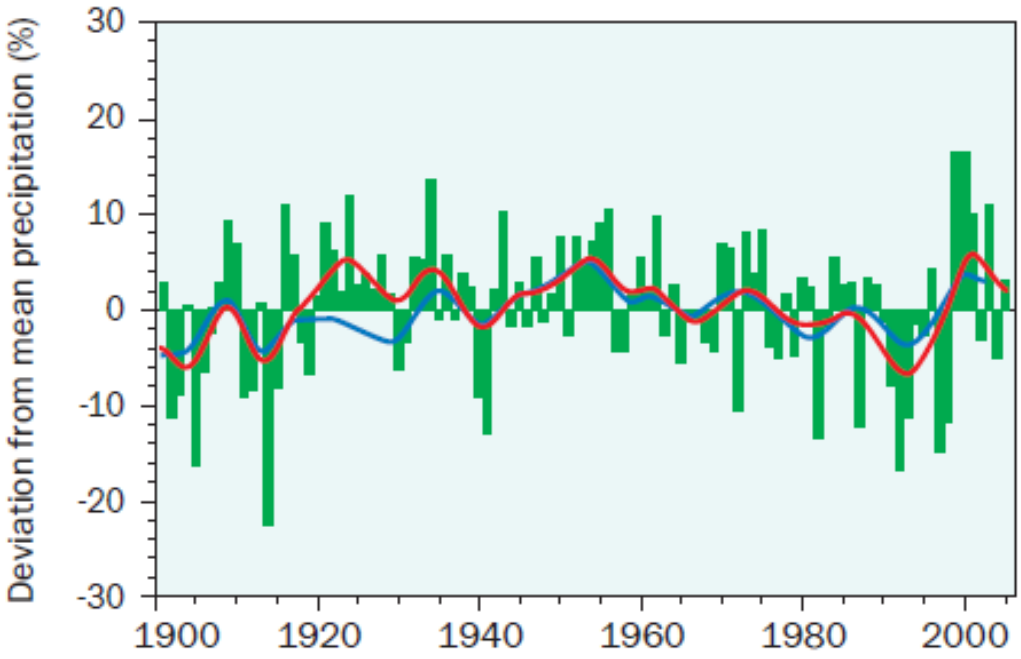


Figure 2: Annual precipitation variation in South-east Asia (1901-2005)[57].
Note: Mean precipitation (2455 mm) is computed from 1961 to 1990. Green bars indicate annual variations in precipitation. Coloured lines highlight decadal variation. The blue line is based on Global Historical Climatology Network data from the National Climatic Data Center. The red line is based on data from the Climatic Research Unit.

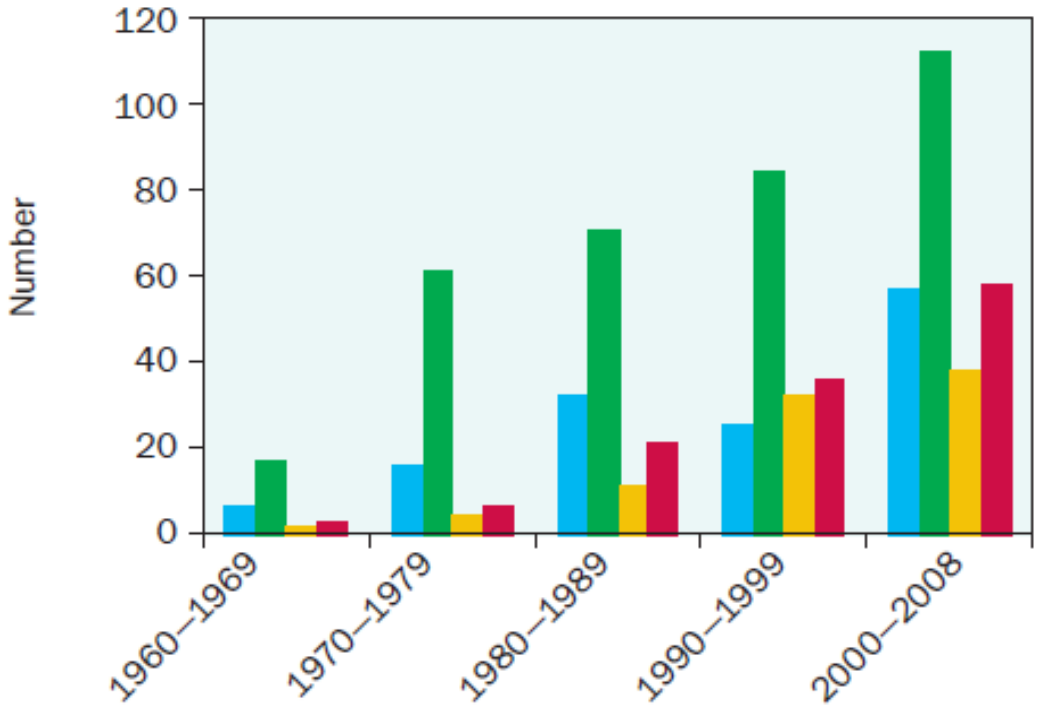


Figure 3: Increasing trend in floods/storms in four countries in South-east Asia (Blue = Indonesia; Green = Phillipines; Yellow = Thailand and Red = Vietnam)[58].

[57] Asian Development Bank. 2009. The Economics of Climate Change in Southeast Asia: A Regional Review.
[58] Ibid.

Episodes of droughts and floods are identified as the two main climate hazards experienced by the majority of provinces within Cambodia[59]. A significant factor in exacerbating the damage is that drought periods have been increasing followed by destructive flooding in the same province in the same year. The agricultural sector is most heavily affected by droughts and floods.

Droughts are less frequent than floods but are geographically widespread and affect a large number of people[60]. The household survey conducted as part of the NAPA report preparation in 2006 found that 71% of villagers nationwide had noticed an increase in the frequency of droughts in recent years. Interviews of local communities conducted within CPAs in the project target area as part of the First CPA Community Survey, undertaken specifically for the purposes of the AF project, indicated that more than 81% of the communities surveyed had experienced increasing droughts relative to the historical norm. These climate fluctuations impacted crop yield in all cases, with more than half of the communities experiencing losses of livestock as well. Communities estimated the costs of such losses as ranging from $200 to $2,000 per family per event; a significant loss in proportion to the annual income of such communities. The direct impact of drought is predominantly in terms of water stress on agricultural crop production, particularly rain-fed rice and vegetables. Nationally, droughts in 1995, 1996, 1998, 2001, 2002 and 2003 led to widespread crop failure and famine. The most severe drought in recent times occurred in 2002 affecting 2 million individuals. Approximately 62,000 ha were affected, resulting in damages and crop losses totalling US$ 21.5 million. From 1987-2007, droughts in Cambodia affected 6,5 million people and resulted in US$ 138 million in damages[61]. The findings of the First CPA Community Survey were confirmed in the Second CPA Community Survey, during which CPA Management Committees were asked more detailed questions about climate change-induced hazards and the impacts these have had on communities. At all sites surveyed, communities, crops and livestock have been impacted by droughts, storms and floods. Crop losses of up to 50% were reported as a result of droughts, floods have resulted in the death of 30% of livestock at some CPAs, and food security has been threatened at all sites.

National rice production losses due to floods and droughts have been significant, contributing to food shortages in numerous provinces[62]. Figure 4 shows the total rice area affected by drought and flood in Cambodia over the period 1982-2000. In 1990 ~1.9 million ha were devoted to rice production in Cambodia, therefore in 1996 floods affected approximately 26% of the area under rice cultivation and in 1997, drought affected 21% of this area.

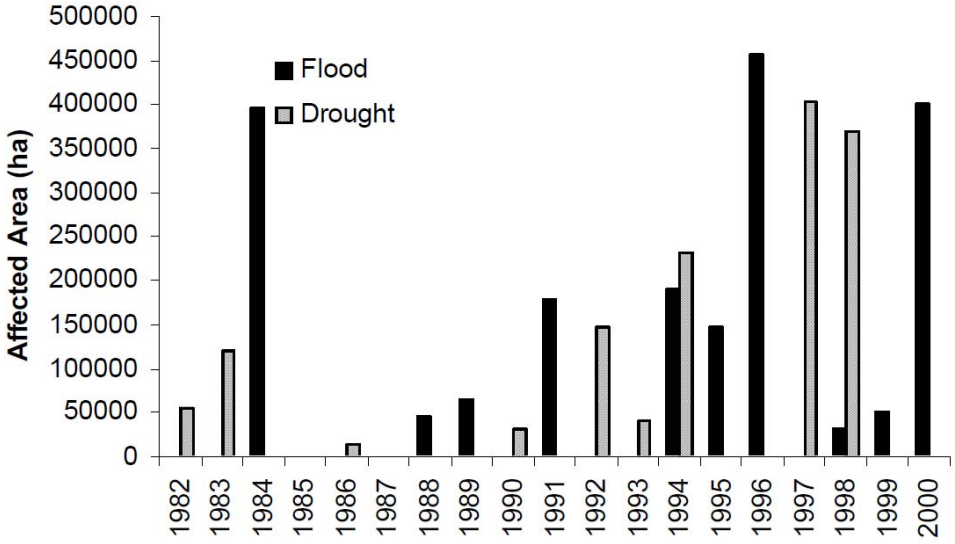


Figure 4: Area of rice affected by droughts and floods in Cambodia[63].

[59] National Committee for Disaster Management and Ministry of Planning. 2008. Strategic National Action Plan for Disaster Risk Reduction 2008-2103.
[60] Ibid.
[61] National Committee for Disaster Management and Ministry of Planning (2008) Strategic National Action Plan for Disaster Risk Reduction 2008-2103.
[62] MoE. 2005. Analysis of Policies to Address Climate Change Impacts in Cambodia.
[63] Ibid.

At the end of 2011, Cambodia experienced a major flooding event. Heavy rainfall began in late September 2011 and persisted to early October 2011. On 4 October 2011, the Prime Minister issued a press release stating that 170,000 families country-wide had been affected, 148 people had died and 800 schools, 364 religious pagoda sites and 75 health care centres had been flooded. Damage estimates to rice fields, roads and rural infrastructure had not been estimated, but was expected to be significant with long lasting impacts on agricultural production. At the time of the press release, rainfall was expected to continue, with a further pulse in flooding anticipated.

Historically major flooding events affecting a significant population occur approximately every five years, notably in 1961, 1966, 1978, 1984, 1991, 1996, 2000, 2001 and 2002. Additionally, the frequency of severe floods has increased since the 1990s. A household survey conducted as part of the National Adaptation Programme of Action to Climate Change (NAPA) preparation in 2006, found that 58% of villagers nationwide had noticed an increase in the frequency of floods in recent years. The most severe floods to date occurred in 2000 and resulted in 347 deaths. The floods affected 3.5 million individuals. The number of damaged houses was 317,975 of which 7,068 were destroyed. The total physical and direct damage was estimated at US$ 150 million. The 2000 floods were immediately followed by severe floods in 2001 causing the death of 62 people and an estimated US$ 20 million in damages. This event was followed by further flooding in 2002 resulting in 29 deaths and damages totalling US$ 14 million. From 1987-2007, flooding in Cambodia affected 9,6 million people resulting in 1,125 deaths and US$ 327 million in damages[64]. The September/October 2011 floods are said to be comparable to the floods of 2000.

Whilst little data is available on the degree of soil erosion in Cambodia and the project target areas, the available literature acknowledges that the extent of soil erosion leading to land degradation is a major concern[65]. Cambodia's forest cover has reduced from an estimated 73% in 1965 to 59% in 2006[66]. Loss and reduction of the vegetation cover leads to intensive runoff and erosion. In Mondulkiri province in the North-eastern Forests area, sheet erosion can be seen as silt which has collected behind cut logs and stumps in the fields, while rill erosion occurs in some fields only three months after clearing and burning the forest for farming. The amount of topsoil being lost, measured from the top of the remaining grass and tree stumps to the soil surface, is an estimated 1-1.5 cm. The fact that rill erosion has already begun in some places suggests that the yearly topsoil loss is a considerable problem. Farmers have reported that agricultural yield decreases about 20-25% in the second year of cultivation, and about 40-50% in the third year onwards as a result of the erosion. Soil loss through erosion can be observed at coffee and *hevea* farms where the natural vegetation cover has been completely cleared, leaving the soil surface uncovered between rows of young seedlings[67].

1.5. Climate change projections and predicted impacts

The lack of long-term climate observations is a constraint on the development of credible climate change projections for Cambodia. For example, although downscaled climate projections are available for neighbouring countries, such projections are not available for Cambodia[68]. Additionally, model simulations provide differing scenarios with regards to the projected changes in the amplitude of future El Niño events. El Niño influences monsoon variability in South-east Asia, a relationship which is also poorly understood, contributing to uncertainty in climate projections for this region. Despite these uncertainties, the following climate change predictions have been made for Cambodia:

- an increase in the frequency and intensity of flooding events due to more frequent episodes of heavy rainfall[69];
- an increase in mean annual rainfall across the country by 3-35% by 2100[70] with the magnitude of change varying spatially and temporally[71];

[64] National Committee for Disaster Management and Ministry of Planning. 2008. Strategic National Action Plan for Disaster Risk Reduction 2008-2103.
[65] Wingqvist, G.O. 2009. Cambodia Environmental Change and Policy Brief. Environmental Economics Unit, University of Gothenburg, Sweden. Available from http://www.sida.se/Global/Countries%20and%20regions/Asia%20incl.%20Middle%20East/Cambodia/Environmental%20Policy%20Brief%20Cambodia.pdf. [Accessed 07 September 2011].
[66] FAO website: http://www.fao.org/docrep/w7710e/w7710e04.htm. [Accessed 01 September 2011].
[67] Cambodia Soil report prepared by: Yang Saing Koma, Lecturer, Royal University of Agriculture of Chamkar Dong and Project Officer in Sustainable Agriculture, Japan International Volunteer Centre,Phnom Penh) (pdf file: 61 kb). Available online at http://www.unescap.org/rural/doc/sads/index.htm. [Accessed 09 September 2011].
[68] WikiADAPT, 2010. Available from: http://wikiadapt.org.
[69] INC, 2002 and the NAPA, 2006.

- an increase in mean annual rainfall along the coast of 2-6% by 2050[72];
- an increase in mean annual temperatures of 0.3-0.6 °C by 2025[73], of 0.7-2.7 °C by the 2060s and of 1.4-4.3 °C by the 2090s[74];
- a considerable increase in the number of 'hot' days and nights[75]; and
- sea level rise (SLR) of 0.18-0.56 m[76] by the 2090s.

The direct impacts of the above changes and knock-on effects on various sectors described will be as follows:

- **Greater variability in rainfall and river flow** leading to: i) decreased productivity in rain-fed agricultural crops; and ii) a greater frequency of droughts and floods.
- **Greater rates of runoff of water from the soil surface** as a result of increases in rainfall intensity. This will increase rates of soil erosion and reduce river flow in dry periods. The predicted increase in temperatures coupled with an increase in inter-annual and seasonal temperature variability will result in increased evaporation rates[77] and consequently, likely desiccation and hard-setting of soils (depending on soil type) and the drying up of freshwater bodies.

The impacts of climate change on key Cambodian sectors are likely to become increasingly significant. Productivity of the **agriculture** sector is likely to decrease as a result of: i) a decrease in rainfall and increase in temperature, leading to a decrease in rain-fed crop production; ii) an increase in topsoil losses via erosion; iii) a decrease in soil water content as a result of increased evaporation from soils; iv) a decline in surface water availability for livestock and irrigation purposes; v) a change in timing of the onset of the wet season resulting in planting of crops at inappropriate times; and vi) an increase in crop losses due to droughts and floods. This will impact negatively on food supply, income streams and livelihoods. Variations in rice production are significantly correlated with climate variability[78], and an increased frequency of droughts and floods considerably reduces rice crop productivity.

Management of the **water** sector will become increasingly difficult as the quality of water in rivers is reduced by erosion, as water supply from rivers is decreased during droughts and low base flows in the dry season and as flooding events increase. The **fisheries** sector may benefit from increased water availability in times of flood, providing higher nutrient levels and extending feeding grounds for fish. However, deterioration in water quality as a result of excessive erosion, or decreased flow in time of drought, will negatively impact this sector. Cambodian fish catches are increasingly being made up of species such as *Henicorhynchus* spp. ("trey riel" in Khmer) which are considered unstable because their abundance is largely driven by the annual flood pattern, as they grow quickly and die young. This emerging boom-and-bust cycle may be amplified by the higher hydrological variability predicted with climate change, bringing high year-to-year fluctuations in fish abundance, with years of high abundance followed by years of shortage[79].

The **energy** sector will be compromised by climate change as planned hydro-electric power generation is hampered through the siltation of dams and damage to turbines[80], by increasingly low

[70] This prediction and that within the second bullet point is based on the global warming scenarios SRESA2 (reference) and SRESB1 (policy) and General Circulation Models (GCM) CCSR and CSIRO (INC, 2002).
[71] For example, lowland areas are likely to experience a greater increase in rainfall than in highlands.
[72] INC, 2002. Cambodia is presently preparing its Second National Communication to the UNFCC but this has not yet been made available. The IPCC projects an increase in temperature of between 1.5 and 3.7 ºC by 2100 for Southeast Asia as a region.
[73] Ibid.
[74] UNDP Climate Change Country Profiles Cambodia. McSweeney, C., New, M., Lizcanol, G. 2009. Available from: http://country-profiles.geog.ox.ac.uk. [Accessed 3 September 2011].
[75] Ibid.
[76] UNDP Climate Change Country Profiles Cambodia. McSweeney, C., New, M., Lizcanol, G. 2009. Available from: http://country-profiles.geog.ox.ac.uk. [Accessed 3 September 2011]. (Taken from the IPCC Working group I (The Physical Science Basis): Chapter 10 (Global Climate Projections) (Meehl et al., 2007). Regional sea-level projections are estimated by applying regional adjustments (Fig 10.32, p813) to projected global mean sea-level rise from 14 AR4 models.) The range represents the results of three different models, namely the SRES B1 (0.18 to 0.43 m), SRES A1B (0.21 to 0.52 m) and SRES A2 (0.23 to 0.56 m).
[77] MoE. 2002. Cambodia's Initial National Communication under the United Nations Framework Convention on Climate Change.
[78] Ibid.
[79] http://www.thefishsite.com/articles/805/climate-change-vulnerability-and-adaption-in-cambodia.
[80] Extensive deforestation and the resultant siltation of the Inga dams in the Democratic Republic of Congo resulted in a 70% decline of hydroelectric capacity. US$500 million was required to dredge and desilt the dams' canals and turbines (N Ligon,

base flows in rivers during dry periods, and as a result of damage to infrastructure during floods. Other impacts on the energy sector are likely to include a reduction in the availability of fuelwood as an energy source due to the effects of climate change. This is as a result of a hotter and drier climate decreasing tree growth in times of drought and topsoil removal, limiting fuelwood availability in times of flood.

The **tourism** sector, which is only recently becoming a significant economic sector, will be negatively impacted by climate change due to *inter alia:* i) reduced water availability for consumption in tourism facilities in drought-prone areas[81]; ii) local extinction of wildlife unable to adapt to the changing climate, resulting in a reduction in wildlife viewing opportunities; and iii) extreme events damaging infrastructure and the reputation of the country as a safe destination.

These climate change-associated problems are expected to increase over time with detrimental impacts on food availability, livelihoods and economic development.

1.6. Non-climate change related threats

The vulnerability of rural Cambodian communities is exacerbated by the following non-climate related threats; i) a strong dependence of communities on rain-fed, unimproved agriculture; ii) a strong dependence of communities on rice; iii) high poverty levels; iv) deforestation; and v) resultant erosion due to land mismanagement.

The majority of agriculture in Cambodia is rain-fed subsistence agriculture, without inputs of water and nutrients, and is therefore vulnerable to extreme climate events, even in the absence of a changed climate. This was confirmed to be of relevance at all CPA intervention sites in the Second CPA Community Survey, undertaken specifically for the purposes of the AF project. Crop cultivation is largely dependent on traditional cultivars i.e. unimproved varieties of rice, maize, sesame, vegetables and sweet potato. New pests and pathogens have recently contributed significantly to lowered productivity. Where modern agriculture has been introduced, this has reduced the diversity of crops planted, with an emphasis on a limited number of commodity crops. This has increased the dependence on rice, which occupies 84% of the total agricultural land area. Widespread poverty further limits the ability of rural communities to pursue alternative livelihoods, which are largely based on intact and functional forests. There has, however, been considerable deforestation in Cambodia since the 1960s[82]. Major drivers of deforestation include: i) expansion of agricultural and urban land as a result of an increasing population; ii) commercial logging; iii) illegal logging which is responsible for up to 94% of the total deforestation[83]; iv) firewood collection; v) forest fires; vi) a lack of transparency in the concession system; vii) unsustainable harvesting by concessionaires; and viii) poor management of forests. This has led to widespread degradation of forest ecosystems, upon which rural Cambodians (and particularly those within CPAs) are reliant for food, NTFPs, timber and fuelwood[84]. As a result, traditional Cambodian agricultural practices and the use of ecosystems as a resource base have become increasingly unsustainable through time. The causal chain of events is as follows:

- The cover of trees and grasses is reduced through degradation. Rates of fuelwood collection and levels of livestock stocking cannot be maintained as plant cover is reduced. As a result, these practices become increasingly unsustainable through time, further exacerbating degradation. A negative cycle of degradation is established.
- Soils are exposed to damage from sunlight and raindrop impact. This speeds up the decomposition rate and decreases the organic matter content in the soil. The process also brings

---

"Congo Colossus: The History, the Potential and the Environmental Impacts of the Grand Inga Hydropower Scheme," *Majani Media*, 2007, http://www.majanimedia.com/media/text/congocolossus.pdf.).

[81] Such as the Angkor Wat temples in the Siem Reap catchment area.

[82] MoE. 2002. Cambodia's Initial National Communication under the United Nations Framework Convention on Climate Change.

[83] EC. 2006. Cambodia – European Community Strategy Paper. http://www.eeas.europa.eu/cambodia/csp/07_13_en.pdf. [Accessed 2 September 2011].

[84] Rural livelihoods and Natural Resources Development Research Programme. 2010. Social Landscapes and Rural Livelihoods: Cambodia Communities in Transition. Phnom Penh: The Learning Institute.

about changes in the physical and chemical properties of soils. Clay dispersion and mineral crusting occur and the water and nutrient retention capacity are reduced[85].

- Surface runoff and soil erosion increase[86,87], and water quality of surrounding streams and rivers decreases with increased sediment load.
- There is less infiltration of rainwater into soil profiles, and consequently the 'sponge effect' of water catchments is reduced. This results in increased surface runoff and increased flow in rivers during wet seasons, but a concomitant reduction in river flow during dry periods.
- Water supply from rivers for domestic and agricultural use is consequently more variable and reduced during dry periods.
- Where riparian vegetation has been lost, the capacity of the river to slow down flood surges is reduced resulting in an increase in the incidence and frequency of floods as a result of deforestation[88].
- The availability of fuelwood as a source of energy for heating and cooking is considerably reduced as a result of deforestation and degradation.
- Agricultural productivity is reduced firstly because less water infiltrates into soils and growth of both crops and pastures is reduced and secondly because agricultural soil fertility is reduced as a result of erosion.
- Similarly, food supply from degraded forests is compromised because of reduced water infiltration and soil fertility. Furthermore, a decrease in agricultural productivity increases dependence on food supply from forests which increases pressure on these resources.

1.7. Description of the problem to be addressed

The problem that the AF project seeks to address is that the **climate change-induced hazard** of **erratic rainfall** is causing a reduction in agricultural productivity and forest-based income as a result of droughts and loss of topsoil during intense rainfall events/floods. This is increasing the vulnerability of rural Cambodian communities, particularly those living in PAs. The problem is exacerbated by the following underlying drivers of vulnerability: i) strong dependence on rain-fed, unimproved agriculture; ii) strong dependence on one crop, namely rice; iii) high poverty levels; iv) deforestation; and v) resultant erosion. The preferred response to addressing the identified problem is detailed below (Section 1.8).

1.8. Preferred response

The preferred response to the identified problem would be to build the climate resilience of rural Cambodian communities living in PAs through both extensive and intensive interventions which will enhance food supply and maintain ecosystem services. This will be achieved by employing the 'ecoagriculture' concept[89] which is defined as "a landscape approach to natural resources management that seeks to sustain agricultural/food production, conserve biodiversity and ecosystems and support local livelihoods". The concept will be implemented using two approaches:

- Extensive – restoring degraded forests in CPAs at a landscape-level by planting predominantly indigenous tree species that provide food and are particularly effective at stabilizing soils i.e. restoring natural capital.
- Intensive – conservation agriculture[90] interventions including: i) enrichment planting of rice paddy boundaries and other cultivated areas with multi-use tree species that will enhance crop

[85] Cambodia Soil report prepared by: Yang Saing Koma, Lecturer, Royal University of Agriculture of Chamkar Dong and Project Officer in Sustainable Agriculture, Japan International Volunteer Centre,Phnom Penh) (pdf file: 61 kb). Available online at http://www.unescap.org/rural/doc/sads/index.htm. [Accessed 09 September 2011].

[86] Mills, A.J. and Fey, M.V. 2004. Effects of vegetation cover on the tendency of soil to crust in South Africa. Soil Use and Management 20: 308-317.

[87] As a result, there is also an increase in flow in rivers during wet seasons, but a concomitant reduced flow in rivers during dry periods.

[88] Bradshaw, C.J. A.,Sodhi, N.S., Peh, K.S.H. and Brooks, B.W. 2007. Global evidence that deforestation amplifies flood risk and severity in the developing world. Global Change Biology, vol 13 no 11 pp 2379-95.

[89] Scherr, S.J., McNeely, J.A. 2008. Biodiversity conservation and agricultural sustainability: towards a new paradigm of 'ecoagriculture' landscapes. Phil. Trans. R. Soc. B. 363, 477-494.

[90] FAO defines 'conservation agriculture' as farming practices which have three key characteristics:

1. minimal mechanical soil disturbance;
2. maintenance of a mulch of carbon-rich organic matter covering and feeding the soil; and
3. rotations or sequences and associations of crops including trees which could include nitrogen-fixing legumes.

These characteristics are cross cutting aspects of the intensive interventions of the AF project.

productivity; ii) trial plots of several drought-tolerant hybrid rice cultivars in order to assess their potential yield and suitability for cultivation; and iii) intensifying and diversifying the cultivation of existing 'homegarden' or '*chamcar*' plots using adaptation farming techniques[91].

The **extensive approach** will restore the natural capital of degraded forests to benefit the surrounding communities. The scale of the forest restoration at the CPA intervention sites will range from 30 – 1,000 ha, and will depend on the extent of degraded forest at each site (see Part II.B Component 2). The AF project will restore 1,875 ha of degraded forest (at an estimate cost of US$ 839 ha^{-1}) within the five CPA intervention sites (see Section I.1.10) to build the climate change resilience of communities dependent on the forests.

The main priority of this intervention is to enhance the climate change resilience of communities reliant on CPA forests for the range of ecosystem services and livelihood opportunities described in Section I.1.1. By enhancing forest cover of degraded CPAs through restoration and establishing multi-use forests, the causal chain of events described in Section I.1.6, which ultimately leads to a reduced flow of food and ecosystem services from forests, will be halted. The multi-use forests will have trees with varying production cycles resulting in relatively uninterrupted supply of food throughout the year. This will reduce the vulnerability of surrounding communities to climate change. Depending on climate and other environmental characteristics, such as soil, there may be high and low seasons for harvesting various NTFPs.

The AF project activities will differ from ordinary restoration/reforestation interventions in Cambodia in that climate change considerations will be taken into account when restoring the degraded ecosystems. The restored multi-use forests will: i) produce more food, principally fruit, than the original forests; and ii) bind soils more effectively and provide more ecological services than, for example, a large-scale agricultural landscape. These services include water flow, timber provision, enhanced biodiversity, carbon sequestration, pollination, pest control and provision of medicine, fibre, resin and other NTFPs. The natural infrastructure established through the AF project will increase the resilience of vulnerable communities to climate change by buffering them from extreme events. The AF project will favour indigenous trees as: i) they are typically more effective at promoting soil regeneration; and ii) a high diversity of indigenous trees will enhance ecosystem resilience and stability over time. Planted trees will be a combination of species requested by the community (e.g. *Pterocarpus macrocarpus, Dipterocarpus retusus, Hopea ferrea Laness*; see Annex III for responses to the Second CPA Community Surveys, including list of trees requested by the community), and those listed in Annex V. This will ensure that trees are planted taking indigenous knowledge as well as the most up to date scientific knowledge into account. A group of particularly suitable trees that provide food and are effective at stablising soils include black-wood cassia (*Senna siamea*), Indian mulberry (*Morus alba*) and Indian lilac (*Azadirachta indica*). Commonly grown exotic fruit trees in Cambodian homegardens include mango (*Mangifera indica*), papaya (*Carica papaya*), cashew (*Anacardium occidentale*) and jackfruit (*Artocarpus heterophyllus*)[92,93]. To provide effective climate change adaptation and respond to an increased risk of soil erosion, damage to infrastructure and decrease in food supply, species with the following attributes will be preferentially selected for planting (see Annex V for a comprehensive list), i.e. species that:

- have very dense root systems and are particularly effective binders of soils[94];
- produce food products such as fruits, spices and nuts, including the valuable malva nut;
- are favoured by bees which produce honey;
- provide multiple other goods such as timber and NTFPs including fibre, resin and medicinal plants for traditional ceremonies which can be used to improve livelihoods;
- produce dense and nutrient-rich leaf litter that increases soil cover and regenerates soils through humus build up;

FAO. 2011. "Climate-Smart" Agriculture – Policies, Practices and Financing for Food Security, Adaptation and Mitigation. Food and Agriculture Organisation, Rome.

[91] Hellen Keller International/Cambodia. 2003. Handbook for Home Gardening in Cambodia: The Complete Manual for Vegetable and Fruit Production.

[92] Hellen Keller International/Cambodia. 2003. Handbook for Home Gardening in Cambodia: The Complete Manual for Vegetable and Fruit Production.

[93] HKI. 2000. Initial findings from the 2000 Cambodia National Micronutrient Survey.

[94] The presence of such species will increase the resilience of soil to erosive forces from an increased intensity of rainfall under a changed climate, and will also reduce the likelihood of climate change-induced extreme events such as landslides.

- provide nutrient-rich leaf litter for compost production as this will provide low-cost inputs into agriculture;
- are drought-resilient and able to persist under reduced soil water availability;
- produce sustainable fuelwood for cooking; and
- produce sustainable fodder as this will increase supply for animal husbandry.

The **intensive approach** of the AF project will focus on the following interventions:
- enrichment planting of rice paddy boundaries and other existing cultivated areas with multi-use tree species that will enhance crop productivity and additionally provide NTFP's to farmers;
- establishing trial plots of several drought-tolerant hybrid rice cultivars in order to assess their yield potential and suitability for cultivation at each intervention site; and
- intensifying and diversifying existing agriculture practices and areas (including 'homegarden' or '*chamcar*' plots) by encouraging the cultivation of various beneficial crop species in combination with the introduction of conservation agriculture adaptation practices such as rainwater harvesting, drip irrigation, green manuring and reduced tillage.

The intensive approach of the AF project will enhance the adaptive capacity of communities to climate change. Currently, climate change adaptation techniques are not widely implemented in Cambodia. It is noteworthy that the 2006-2010 Strategic Agriculture Development Plan does not take climate change adaptation or mitigation into account.

The introduction of beneficial multi-use tree species to existing cultivated areas will: i) improve the fertility, moisture-holding capacity and structure of agricultural soils; ii) protect crops from climate-related hazards such as drought, floods and wind; and iii) provide communities with additional benefits such as food, medicine, firewood and fodder[95,96,97,98]. Suitable tree species will be selected based on community preferences (e.g. *Moringa oleifera* [drumstick tree] which provides fruits, *Pterocarpus indicus* which is a luxury grade wood, and *Albizia lebbek* which provides leaves for fertilizer; see Annex III for further requests from communities) and those listed in Annex VI. Criteria for selecting trees will be similar to that described above for the extensive restoration of degraded forest, such as the ability to fix atmospheric nitrogen, stabilise soils, provide leaf mulch to the soil surface, and to provide diverse products such as food, firewood, timber, medicine and fodder (see Annex VI for a comprehensive description of the preferred method of rice field enhancement). Rice yields in Cambodia are particularly low as a result of a reliance on non-improved rice varieties and low-input farming methods[99]. Rural communities are vulnerable to periodic rice shortages, particularly during periods of drought and flooding[100,101]. Enhancing the productivity of existing cultivated areas by introducing tree species which fix atmospheric nitrogen, reduce siltation and conserve water will reduce pressure on surrounding forests. This is because the practice of abandoning exhausted agricultural areas and clearing new fields will not be necessary if soil fertility and agricultural productivity can be maintained or increased[102,103].

The second intensive aspect of the AF project will focus on introducing drought-tolerant seeds of improved rice cultivars to establish trial plantings of ~300 ha across the five CPA intervention sites. The suitability of these improved cultivars to the field conditions and farming techniques will be assessed at each site relative to traditionally grown varieties, with particular emphasis on the relative yield potential under conditions of water stress. The findings from these field trials and consultations

[95] FAO. 2011. "Climate-Smart" Agriculture – Policies, Practices and Financing for Food Security, Adaptation and Mitigation. Food and Agriculture Organisation, Rome.
[96] Peyre, A, Guidal, A, Wiersum, KF, and Bongers, F. 2006. Dynamics of homegarden structure and function in Kerala, India. Agroforestry Systems (2006) 66:101–115.
[97] Hellen Keller International/Cambodia. 2003. Handbook for Home Gardening in Cambodia: The Complete Manual for Vegetable and Fruit Production.
[98] "Climate change and African forest and wildlife resources" (African Forest Forum, Nairobi, Kenya, 2011).
[99] Simmons, L. and Nuberg, I. .2008. Exploring opportunities for integrating multipurpose trees on farms in Cambodia. *Asia-Pacific Agroforestry Newsletter* 33.
[100] Hellen Keller International/Cambodia. 2003. Handbook for Home Gardening in Cambodia: The Complete Manual for Vegetable and Fruit Production.
[101] McNaughton, A. 2002. Cambodia's experience and opportunities for domestic and international trade in organic agricultural products.
[102] FAO. 2011. "Climate-Smart" Agriculture – Policies, Practices and Financing for Food Security, Adaptation and Mitigation. Food and Agriculture Organisation, Rome.
[103] Scherr, S.J., McNeely, J.A. 2008. Biodiversity conservation and agricultural sustainability: towards a new paradigm of 'ecoagriculture' landscapes. Phil. Trans. R. Soc. B. 363, 477-494.

with farmers will be used to assess the potential to upscale the distribution of improved drought-tolerant rice cultivars, which will increase the resilience of rice production to climate change impacts.

The third intensive aspect of the AF project activities will focus on intensifying and diversifying existing agriculture practices and areas (including 'homegarden' or '*chamcar*' plots) by encouraging the cultivation of various beneficial crop species in combination with the introduction of improved conservation agriculture practices such as green manuring and reduced tillage. Homegardens are common in rural communities. Typical homegardens always have something to harvest on a daily basis. This has resulted in homegardens being labelled as the 'epitome of sustainability'[104]. Additionally, harvesting and maintenance operations in homegardens require less intensive labour from the community[105]. An advantage of homegardens is that they can be adapted to the size of land available[106]. The enhanced homegardens will provide constant and sustained supplies of food to dependent communities. An additional aspect of the project will be water use efficiency[107], with a focus on rainwater harvesting and Affordable Micro Irrigation Technology (AMIT)[108,109]. The AF project will encourage the production of a variety of crops requested by the community in the Second CPA Community Survey such as kangkong (*Ipomoea aquatica*), mung bean (*Vigna radiata*), taro (*Colocasia esculenta*) and peanut (*Arachis hypogaea*) (see Annex VII for a comprehensive description of useful crops). Crops were selected based on criteria such as tolerance to drought or waterlogging, nutritional content, cost of production, market value, seasonality, compatibility with other crops, local familiarity with these crops and requests made in the CPA surveys[110,111,112]. Diversification of cultivated crops will reduce the prevalence of nutrition-related health issues and increase the climate resilience and food supply of subsistence farmers[113]. Nutritional deficiencies such as Vitamin A deficiency are widespread in Cambodia (predominantly affecting women and children) as a result of a heavily rice-dependent diet with insufficient intake of meat and vegetables[114]. The high reliance on rice as a staple crop also makes rural Cambodians susceptible to seasonal food shortages due to climate-linked crop failures, such as periods of drought or floods[115,116]. In diversifying agricultural production, the AF project will increase the resilience of rural Cambodian communities in the selected intervention sites.

The sustainability of the AF project will be ensured by:

- **Collaborating with communities to ensure that their needs with regards to climate change are met.** This will ensure that there is on-the-ground support for the AF project, thereby ensuring sustainability. Communities were questioned in the First CPA Community Survey to identify the major impacts of climate change, and the activities they viewed as necessary to overcome these problems. Impacts of climate variability were identified as: i) shortages of food and water; ii) damage to crop yields; iii) illness; iv) falling standard of living; v) damage to roads; and vi) less resin produced by trees. Communities suggested the following activities would enhance their

[104] Kumar, B.M. and Nair, P.K.R 2004. The enigma of tropical homegardens. Agroforestry Systems 61: 135-152.
[105] Nair, P.K.R. 1984. Fruit Trees in Agroforestry. Working Paper. Environment and Policy Institute, East-West Center, Honolulu, Hawaii, USA.
[106] Peyre, A, Guidal, A, Wiersum, KF, and Bongers, F. 2006. Dynamics of homegarden structure and function in Kerala, India. Agroforestry Systems (2006) 66:101–115.
[107] Pender. 2008. Agricultural technology choices for poor farmers in less-favoured Areas of South and East Asia. Occasional papers, Knowledge for development effectiveness. Asia and the Pacific Division, IFAD.
[108] AMIT can be defined as "slow and regular application of water directly to the root zone of plants through network of economically designed plastic pipes and low discharge emitters". IDE, 2001. Technical Manual for Affordable Micro Irrigation Technology (AMIT). International Development Enterprises, California, USA.
[109] AMIT are typically suitable for use on small and intensively farmed areas of ~0.1 – 0.4 ha. ITC. 2003. Low Cost Micro Irrigation Technologies for the poor. Intermediate Technology Consultants, United Kingdom.
[110] Mey Meyer A, Glaser, S, Hager V. Assessment of neglected and underutilised species (NUS) in Cambodia http://www.agrofolio.eu/agrofolio/uploads/files/final/Agrofolio_assessment_Cambodia.pdf.
[111] See http://ecocrop.fao.org/ecocrop/srv.
[112] Agrifood Consulting International. 2005. Final Report for the Cambodian Agrarian Structure Study. Prepared for the Ministry of Agriculture, Forestry and Fisheries, Royal Government of Cambodia, the World Bank, the Canadian International Development Agency (CIDA) and the Government of Germany / Gesellschaft für Technische Zusammenarbeit (GTZ) by Agrifood Consulting International. Bethesda, Maryland.
http://agrifoodconsulting.com/ACI/uploaded_files/project_report/project_35_1220605826.pdf.
[113] FAO. 2011. "Climate-Smart" Agriculture – Policies, Practices and Financing for Food Security, Adaptation and Mitigation. Food and Agriculture Organisation, Rome.
[114] HKI. 2000. Initial findings from the 2000 Cambodia National Micronutrient Survey.
[115] Hellen Keller International/Cambodia. 2003. Handbook for Home Gardening in Cambodia: The Complete Manual for Vegetable and Fruit Production.
[116] McNaughton, A. 2002. Cambodia's experience and opportunities for domestic and international trade in organic agricultural products.

capacity to adapt to these impacts of climate variability: i) training and assistance in climate-resilient farming techniques; ii) improvement of crop productivity; iii) training on and identification of climate-resilient crop species iv) preparing and delivering training courses on how to improve agricultural output; v) intensifying/diversifying existing agriculture practices and areas (including homegardens); vi) improving irrigation systems; vii) building roads; viii) digging ponds; ix) planting more trees to reduce erosion; x) raising awareness of adaptation benefits of forests; xi) establishing nurseries; xii) protecting and maintaining existing forest resources; xiii) strengthening patrols of CPA forests to stop illegal harvesting of NTFPs and timber; xiv) demarcating CPAs and raising awareness about CPAs; and xv) creating firebreaks to protect forests. The AF project has ensured that the needs of the community have been met by incorporating these activities into the project design.

- **Intensive training of local communities on climate change adaptation responses.** The established CPA Management Committees will be trained to oversee the adaptation interventions. These committees will by the end of the project have the requisite technical skills for expanding the adaptation interventions into other areas.
- **Recommending revisions to policy and legislation**, including recommended budget allocations, that will promote the protection of natural resources and the upscaling of the AF project's adaptation interventions.
- **Establishing multi-use forests that will yield goods** for commercial and domestic use for decades. The value of this new, productive landscape will incentivise protection of trees by the community.
- **Training communities on business plan development to ensure that alternative livelihoods are successfully implemented.** Changes to current land use practices will require implementation of alternative livelihoods such as ecotourism ventures. The AF project will ensure that communities are supported and trained in order to implement these changes sustainably.
- **Existing culture of protecting homegardens in rural areas in Cambodia.** The practice of maintaining homegardens in Cambodia is established in rural communities. The conservation agriculture interventions and restored forests will build on this culture of resource protection.
- **Ensuring effective management and protection of restored landscapes**. A portion of the budget has been dedicated to enhancing management practices in the restored forests and agricultural areas. This will include integrating climate change adaptation concepts into policies/legislation to avoid over-harvesting and illegal logging.
- **Legislative protection afforded by the formal inclusion of the restored forests into the CPA management plans**. The government is committed to protecting CPAs as per the PA Law. The inclusion of the restored forests into the CPA management plans will assist the government to fulfil this mandate. At the same time, collaboration with the government i.e. MoE Park Rangers, will make protection of the restored forests more effective.

The environmental, social and economic benefits of the restored forests are discussed in Section II.B. The cost-effectiveness of the approach is discussed in Section II.C.

1.9. Barriers

Addressing the hazard of erratic rainfall in the context of the non-climate change related root causes will require actions that overcome barriers to implementing the ecoagriculture concept to increase community resilience to climate change-induced impacts. Currently, **limited community awareness regarding climate change impacts and adaptation** represents an important barrier to the uptake of AF project interventions. The concept of restoring natural capital is not widely understood and there have been limited awareness raising activities undertaken within rural communities regarding climate change impacts and adaptation. As a result, rural communities are ill-equipped with the knowledge and tools to overcome worsening climatic conditions. **Limited technical capacity of local and national stakeholders to plan and implement the ecoagriculture interventions** means that there are not currently systems in place to ensure the successful implementation of ecoagriculture interventions. This is partly because adaptation based on natural infrastructure is a complex subject and requires considerable ecological expertise to be mainstreamed into the water, agriculture and environmental sectors. There is currently limited awareness of the benefits of climate change adaptation techniques such as ecoagriculture, and as mentioned in Section 1.8 it is noteworthy that the 2006-2010 Strategic Agriculture Development Plan does not take climate change adaptation or mitigation into account. Existing and emerging agencies are therefore not equipped to lead large-scale monitoring efforts and/or generate coordinated landscape-scale resilient ecosystem projects.

Lack of physical and financial resources to adapt to climate change and climate variability means that without the AF project communities will not be able to alter current practices to ensure successful adaptation to climate change. Rural communities in the target area are poor and lack the financial resources to safeguard themselves against current climate variability and future climate shocks using an ecoagriculture approach. These communities are dependent on ecosystem services and are thus highly vulnerable to the impacts of climate change. There is also limited understanding of the benefits of ecoagricultural approaches as a result of **limited demonstration of ecoagriculture approaches to enhance resilience to climate change**. This necessitates the implementation of the AF project to demonstrate the benefits of an ecoagricultural approach to climate change adaptation. While a limited number of projects are involved in reforestation activities, these projects have not focused specifically on species that provide food and prevent erosion of topsoil. As a result there have been no restoration trials undertaken that focus specifically on increasing the resilience of food supply to local communities and conserving topsoil under climate change conditions. Best practices for restoring species in ecosystems in order to specifically make communities more resilient to climate change are consequently lacking. Without access to replicable demonstrations, government decision-makers and resource users do not have the tools and knowledge necessary to decrease climate change vulnerability. With regards to upscaling the AF project, **the policy, strategy and legislative environment does not specifically support restoration and intensification approaches to increasing resilience of communities to climate change.** Although the NAPA was prepared in 2006, to date there has been little integration of climate change into national development plans. The PA regulations have yet to be implemented because of a lack of financial resources at the national government level. **A lack of climate-related data** limits the effective assessment of climate change impacts in Cambodia, including downscaled projections[117], which in turn limits the planning of effective adaptation activities. The limited collection of climate-related data is a result of years of political conflict. Additionally, reliable forecasts of extreme weather events are not available in Cambodia[118] and thus such events often find communities largely unprepared. Rural communities rely mainly on indigenous communication channels, whereby villagers downstream hear the news of impending weather events from villagers upstream. The final barrier to successful implementation of the AF project is the **lack of secure land tenure**. The proportion of rural households lacking land for cultivation increased from 13% in 1997 to 20% in 2004. This problem is exacerbated by the issue of unclear property rights i.e. 80% of rural households owning land in 2004 were without land titles. Unsecure land titles inhibit investments in restoring natural capital and other measures to increase rural community resilience. This results in reduced agricultural productivity, low food supply and environmental degradation.

To overcome these barriers the project will provide the finance to undertake landscape-level restoration of degraded forests and diversify/intensify agriculture at five CPA intervention sites. In doing so, awareness will be raised (through Components 1, 2 and 3; see Section II.A) of climate change impacts in local communities. The raised awareness, provision of trees, crops and rice for planting, technical training and implementation of the ecoagriculture approach (through Components 1 and 2) will encourage local communities to invest in the conservation of their restored landscapes and agricultural lands that yield multiple benefits and build their climate resilience. The demonstration of multiple benefits (with respect to building climate resilience) of landscape-level restoration and intensification/diversification of agricultural lands using useful species will be used to motivate local and national government to invest in upscaling such practices in other PAs across Cambodia. An upscaling strategy will be developed and policies that support budget allocations for the strategy will be promoted (including revisions where appropriate), addressing the policy, legislative and strategy barrier outlined above (through Component 3). This project will not explicitly address the lack of climate related data, however project activities will cater for an increase in the frequency and intensity of both droughts and floods, and studies will investigate the potential of an early warning system to ensure the ability of communities to prepare for extreme events. The project will work specifically within CPAs, which have been established to provide land tenure security, and will enhance the capacity of communities to protect their natural resources within CPAs through training and awareness raising. CPAs are assigned by the MoE to local communities under a long-term 15 year lease, which is renewable. Only CPA members can access and benefit from the proposed activities within their CPAs. Rights are recognized and stipulated in the PA Law (2008).

1.10. Site selection

[117] WikiADAPT, 2010. Available from: http://wikiadapt.org.
[118] NAPA, 2006.

Broad target areas for the AF project were initially selected based on: i) vulnerability of communities to the impacts of climate change; ii) adaptive capacity of communities; iii) dependence of the communities on ecosystem services; and iv) the number of on-going climate change and development projects in the area. Communities in CPAs were engaged in two separate surveys to ensure a participatory approach to the AF project site selection, and to ensure that the activities and outcomes of the AF project are demand-driven. In the First CPA Community Survey all 33 CPAs in the selected PAs were visited. Based on the results, six CPAs were prioritised and visited in a Second CPA Community Survey to select the final intervention sites for the AF project. The second survey was also used to refine the set of activities proposed in the Project Concept.

The North-eastern Forests and Northern Plains regions, along with the Cardamom Mountains in the south-west, are the areas most vulnerable to the impacts of climate change in Cambodia (see Figure 5)[119]. These results were derived using the vulnerability assessment of the UNFCCC and a combination rating of the following: i) climate hazard; ii) human and ecological sensitivity; and iii) adaptive capability. Without intervention, food supply for rural communities in these regions will remain a major challenge.

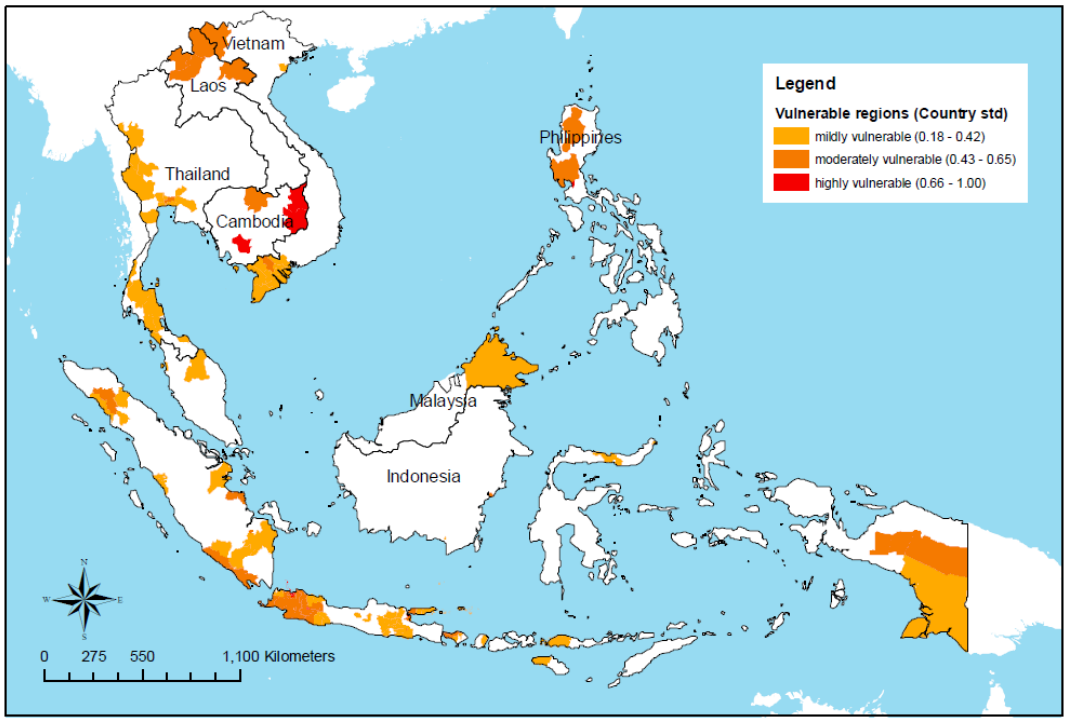


Figure 5: Map of the most vulnerable areas of South-east Asia.

The tribal communities in the North-eastern Forests are among the poorest in Cambodia. They are also highly vulnerable to anticipated climate change-induced increase in drought and flood occurrence as a result of their high dependence on climate-sensitive livelihoods and low adaptive capacities[120,121]. As in the Northern Plains target area, adequate food supply is difficult to attain and communities spend up to 70% of their income on food. Adaptation measures that enhance and sustain food

[119] Yusuf, A.A. & Francisco, H. 2009. Climate Change Vulnerability Mapping for Southeast Asia. Economy and Environment Program for Southeast Asia (EEPSEA), Singapore.
[120] Based primarily on: Yusuf, A.A. & Francisco, H. 2009. Climate Change Vulnerability Mapping for Southeast Asia. Economy and Environment Program for Southeast Asia (EEPSEA), Singapore.
[121] MoE. 2002. Cambodia's Initial National Communication under the United Nations Framework Convention on Climate Change.

supplies from restored forests will reduce the vulnerability of these communities to climate change-induced food shortages. While the Cardamom Mountains region is the focus of numerous development projects, the North-eastern Forests and Northern Plains regions of Cambodia have relatively few on-going projects (see Section II.F).

Climate change adaptation measures in PAs are highlighted as a requirement in Cambodia's Draft SNC, therefore PAs in the North-eastern Forests and Northern Plains regions of Cambodia were selected as target areas for the project. This decision, taken principally by the MoE, was supported by all stakeholders involved in the concept formulation phase of the AF project (see Annex IX). A brief description of the PAs in these target areas is provided in Annex I. The selected PAs (see Figure 6) are:

- North-eastern Forests target area: Virachey NP; Phnom Prech WS; Lomphat WS; and Namlear WS.
- Northern Plains target area: Kulen Promtheap WS; Phnom Kulen NP; and Beung Per WS.

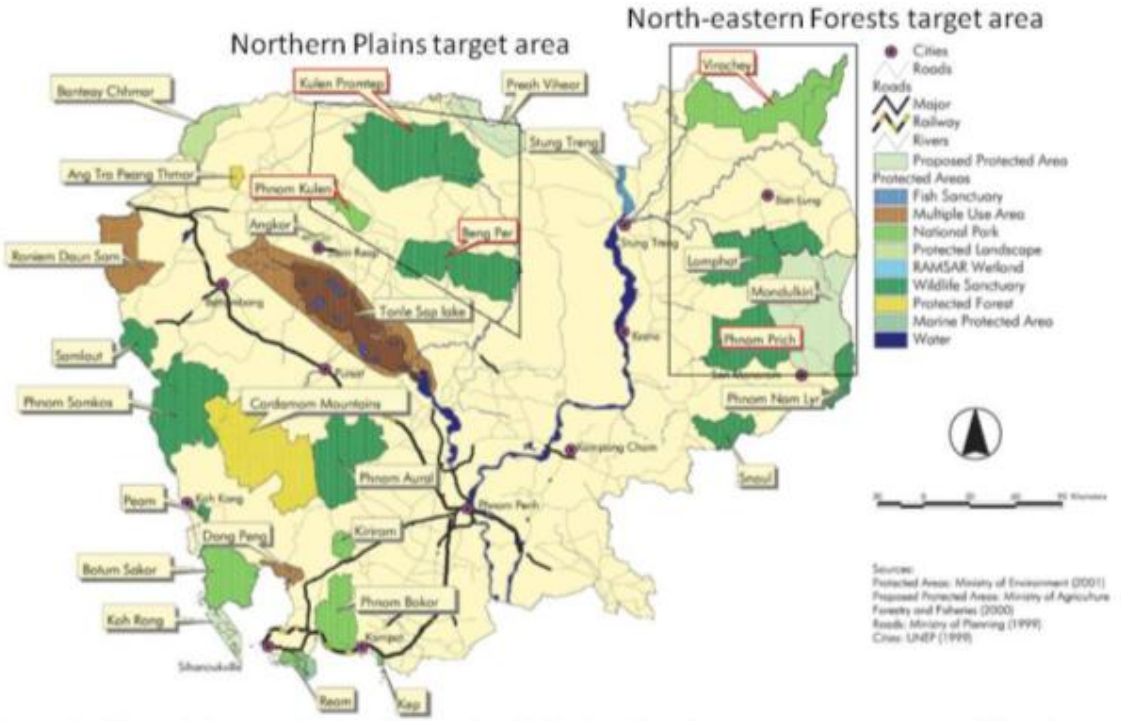


Figure 6: PAs within the AF project target areas[122].

Zonation of PAs is a requirement of the PA Law. This exercise, however, has not been undertaken as a result of a lack of finance at the national government level. All PAs will eventually be zoned into the following:

- Core Zone: A zone of delicate ecosystems and high value for conservation of rare, endangered, vulnerable and threatened animal and plant species.
- Conservation Zone: A zone next to the core zone, which is of conservation value for natural resources, ecosystem, slope, and natural landscape. Entry into this zone shall be by obtaining advance permission from the Natural Protection and Conservation Administration on site. Use of forest by-products for livelihood by the local community and indigenous ethnic minorities, which shall not cause harm to biodiversity, shall be under strict monitoring.
- Sustainable Use Zone: A zone of high value in national economic development that directly serves the purpose of management and conservation of the PA and contributes to promoting the standards of living of the local community and indigenous ethnic minorities.
- Local Community Zone: A zone that serves the economic and social development of the local community and indigenous ethnic minorities who already have on-going activities, including

[122] ICEM, 2003. Cambodia National Report on Protected Areas and Development. Review of Protected Areas and Development in the Lower Mekong River Region, Indooroopilly, Queensland, Australia. 148 pp.

housing, farming and vegetable gardening. Issuance of permit or land title or permission to use the land in this zone shall be certified by the MoE.

Within the Sustainable Use and Local Community Zones, communities may apply to the MoE to have areas designated as CPAs. CPAs are patches of forest deemed valuable by the communities living in the PA. Until zonation of the PAs has been undertaken, any area within the boundary can be designated as an Economic Land Concession (ELC) as stipulated by the PA Law. These areas are used by private companies for commercial plantations. However, once an area has been declared a CPA, it cannot be granted as an ELC due to an agreement signed between the CPA Committee and the MoE. An agreement reached by the stakeholders involved in the concept formulation phase of the AF project was that only CPAs in which a secure land tenure exists will be considered as project intervention sites[123]. Lomphat and Namlear WSs do not have any established CPAs at the time of writing this Project Concept and therefore will not form part of the project. However, these PAs will be eligible for upscaling of activities should CPAs be established. The remaining five PAs contain 33 CPAs, i.e.:

- 5 CPAs in Virachey NP;
- 3 CPAs in Phnom Prech WS;
- 1 CPA in Kulen Promtheap WS;
- 5 CPAs in Phnom Kulen NP; and
- 19 CPAs in Beung Per WS.

The First CPA Community Survey of all 33 CPAs was undertaken from the 17-28 September 2011 by the MoE, with financial and technical support from UNEP. This survey was conducted specifically for the purposes of the AF project. The objective of the survey was to engage with the CPA Management Committees and communities to establish: i) the extent to which the climate hazard of erratic rainfall has affected food supplies; ii) the degree of degradation of forests in the CPAs; and iii) the willingness of the community to support the project's concrete adaptation interventions. Communities were also asked about which species they would like to be planted to enhance food supplies from restored forests. Responses to points (i)-(iii) above, together with: iv) the state of CPA demarcation and CPA Management Plan; and v) ease of access of the CPA, were used to rank each CPA to prioritise those most suitable for inclusion in the AF project. See Annex II for details of the survey, the community responses and the matrix used to rank and prioritise the CPAs.

The AF Initial Technical Review of the Project Concept (31 January 2012) stated that the list of activities presented should be "narrowed down" to a set that are "realistic to be accomplished in the project's lifetime and with the available resources". The Second CPA Community Survey was thus designed to: i) refine, reduce and prioritize the adaptation activities per CPA intervention site to achieve maximum adaptation benefits based on community needs; ii) quantify the problems preventing sustainable resource management, baselines and targets per AF project intervention at each site; and iii) refine the number of CPA intervention sites to allow for effective management of adaptation activities, prioritizing those sites that are most vulnerable to the climate change-induced hazard of erratic rainfall. The survey was conducted by the MoE from 28 March to 03 April 2012, with financial and technical support from UNEP. The areas of degraded forest to be restored using multi-use species (extensive interventions) and land suitable for conservation agriculture activities (intensive interventions) were selected (GPS coordinates taken) and inspected by MoE staff during the survey. CPA Committee Members were asked further, more detailed questions so that the CPAs could be ranked according to the following criteria: i) vulnerability to climate hazard; ii) policies and legislation to support the AF project; iii) participation of the CPA Committee and community in AF project implementation; iv) availability of on-going support in the form of other projects; v) availability of data on the CPA forest and community agriculture; vi) poverty level within the community; vii) gender consideration and potential benefits to women; viii) suitability of extensive interventions; and ix) suitability of intensive interventions. The responses were used to refine, reduce and prioritise the package of activities and interventions proposed in the Project Concept, ensuring appropriate and cost-effective climate change adaptation at each site.

10.1.1 First CPA Community Survey results

[123] Areas zoned as 'Community Zones' also provide a secure land tenure, however, there are no such zoned areas at present.

The First CPA Community Survey consulted 283 CPA Committee Management members over a two week period. Interviews and discussions were facilitated by ten (five teams of two) MoE staff members. This survey was undertaken specifically to gather information for this AF project, and was hampered by excessive rainfall in the PAs making road un-useable. Motorcycles were hired to reach the communities, or the CPA Management Committee members made their way to meeting points accessible to the MoE team members so that the interviews and discussions could be held.

Assessment of climate hazard (erratic rainfall):

The effects of droughts and floods on PA communities are evident in the responses to the survey questionnaires. CPA Management Committee members reported an increase in the number of episodes of these climate change-related events over their lifetimes, as well as in last five years. These events had a range of negative impacts including:

- shortages of food and water;
- damage to crop yields;
- illness;
- falling standard of living;
- damage to roads; and
- less resin produced by trees.

The cost of such events ranged from US$ 200 to US$ 2000 per family per event. The number of families per CPA ranges from 9 to 1,812 with an average of 318 families per CPA. Measures that have been taken to cope with economic losses and impacts of the climate hazard events include:

- migrating to new areas that are perceived to be less affected;
- increasing the collection of NTFPs from the CPA;
- borrowing food;
- selling livestock;
- reporting the impacts to villages or local authorities;
- replanting trees; or
- doing nothing because of a lack of means to intervene.

Assessment of the CPA:

The majority of the CPA Committee members were unable to easily assign values to NTFPs in the CPAs, however, estimates of US$ 279 and 512 per family per year were provided by two committees. The size of the CPAs range from 78 ha to 9,862 ha, with an associated range of degraded areas within the CPAs of 2 ha to 2,000 ha. Committee members suggested, *inter alia,* the following activities inside the CPAs to adapt to the impacts of droughts and floods:

- prevent erosion by planting more trees;
- raise awareness of the benefits of the forest;
- establish nurseries;
- prepare CPA action plan;
- demine the CPA (forests still contain mines from the previous decades of conflict);
- protect and maintain existing resources;
- strengthen patrolling groups to stop illegal harvesting of NTFPs and timber;
- demarcate the CPA so villagers and outsiders know which areas are protected;
- build dams; and
- create fire breaks.

The following were some of the suggested activities for areas outside of the CPAs:

- assistance with farming to increase productivity in agricultural areas in and surrounding villages;
- increase crop production;
- select crop species for villagers;
- prepare and deliver a course on agriculture;
- plant homegardens;
- build health centres;
- establish emergency rescue teams;
- set up irrigation systems;
- build roads; and
- dig ponds.

The community members requested support to restore degraded areas of CPAs with valuable tree species that produce NTFPs and timber, as well as to intensify/diversify homegardens and increase agricultural productivity outside of CPAs. The requested size of homegardens nearby residential areas and on areas designated by the community as farm land (i.e. outside of the CPA) was approximately 0.2 ha to 1 ha per family. This equates to a combined agricultural/homegarden area range of 8 ha to 1,000 ha depending on the number of families supported by the CPA. The revenue from crops and NTFPs that these homegardens would produce was estimated to be US$ 132 to US$ 350 per family per year, or US$ 62 to US$ 3,000 per ha per year. There were requests for training on establishing and maintaining these areas, to ensure maximum benefit in coping with droughts and floods. One CPA Management Committee requested a partner to invest in agriculture and tree planting to increase agricultural yields to adapt to climate change.

Table 1: Summary of results of the First CPA Community Survey.

Cost per family of climate change-induced droughts of floods	200 to 2,000 (US$)
Average number of families per CPA	318 (families)
Total cost to community per climate change-induced drought or flood in CPA survey area	63,600 to 636,000 (US$)
Size of CPA	78 to 9,862 (ha)
Value of CPA per family	279 to 512 (US$)
Area of degradation within CPA	2 to 2,000 (ha)
Requested size of homegardens near residential areas	0.2 to 1 (ha per family)
Requested size of homegardens near residential areas	8 to 1,000 (ha per community)
Value of agricultural produce from homegardens to be established per family per year	132 to 350 (US$)
Value of agricultural produce from homegardens to be established per ha per year	62 to 3,000 (US$)

10.1.2 Second CPA Community Survey results

The Second CPA Community Survey consulted 91 CPA Management Committee members in the six CPAs selected for further consideration after the First CPA Community Survey. The consultations were held over a six day period. Interviews and discussions were facilitated by eight MoE staff members (four teams of two). Based on the results of the survey, the CPAs were prioritised using a vulnerability matrix (see Annex III). The following CPAs and surrounding communities were selected as intervention sites for the AF project:

- Chiork Beungprey (Beung Per WS);
- Ronouk Khgeng (Phnom Prech WS);
- Chom Thlork (Beung Per WS);
- Skor Mreach (Beung Per WS); and
- Chop Tasok (Phnom Kulen NP).

The initial intention of the survey was to reduce the number of CPA intervention sites to four from the six sites prioritized after the First CPA Community Survey. However, based on the results of the second survey and the scale of the adaptation interventions[124], a fifth site was included in the AF project. This will increase the number rural, vulnerable Cambodian community members benefitting from the AF project. The CPA Management Committee of the sixth site (Tropeungprey Thom in Beung Per WS) has been included as observers in the AF project to: i) benefit from the training activities and workshops; ii) build capacity in the community; and iii) facilitate the upscaling of the AF project interventions.

Figure 7 shows the location of the three PAs and five CPAs where the AF project will be implemented. Table 2 below summarizes the problems the communities are experiencing in the five CPA intervention sites, as well as the proposed solutions and adaptation benefits. This information was obtained directly from the results of the Second CPA Community Survey. Further details from the survey are summarized in Part II.A Component 2, where relevant activities per CPA intervention site

[124] The scale of interventions is determined by area of degraded forest to be restored, area of existing homegardens to be intensified/diversified, area of rice paddies to be bordered with multi-use trees, area of drought-tolerant rice paddies to be planted and set of additional activities per site.

are listed. See Annex III as an example of the information collected from each CPA site. Results from Skor Mreach in Beung Per WS are presented including: i) details of the survey; ii) the community responses; iii) letter of support for the AF project from the CPA Management Committee (Khmer and English versions); iv) photographs, GPS co-ordinates and maps showing the location of the photographs taken at each selected CPA intervention site; and v) the matrix used to rank and prioritise the CPAs.

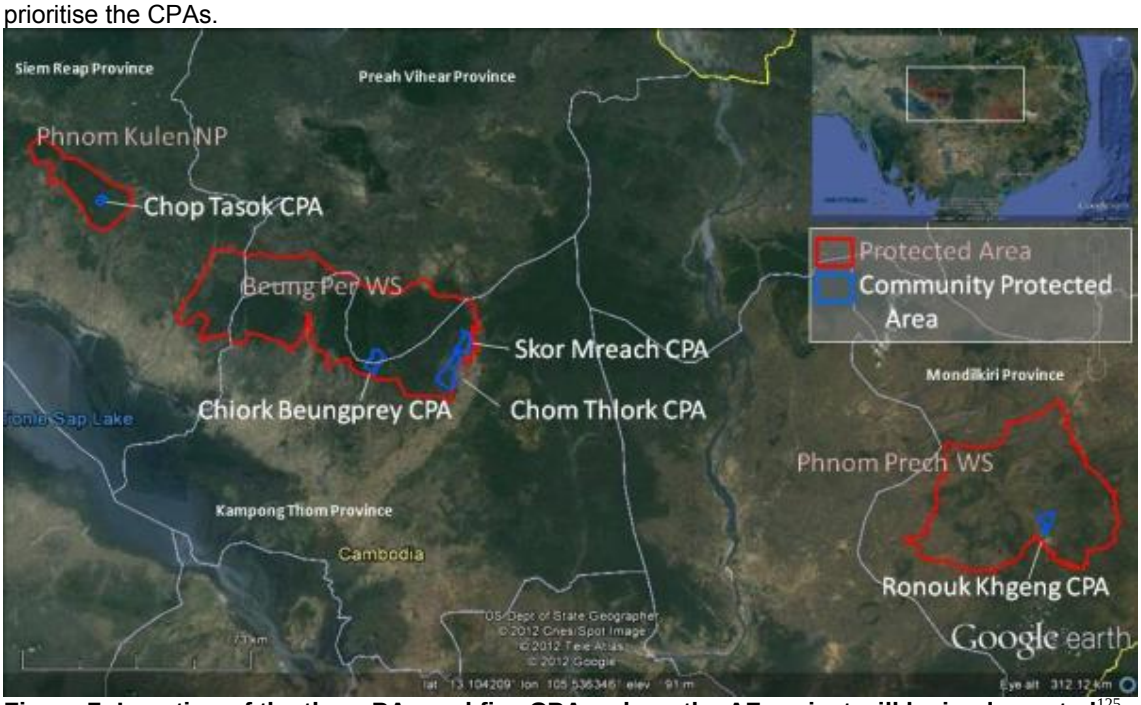


Figure 7: Location of the three PAs and five CPAs where the AF project will be implemented[125].

Table 2: Problems in each CPA site, the solution and adaptation benefits of the AF project.

Problem	**Chiork Beung-prey CPA**	• There has been an increase in droughts and storms over the lifetime of the community members. • Droughts, storms and floods have damaged crops and rice, overturned 4 ha of CPA forest, resulted in health problems and caused food insecurity in the community. • Such impacts are estimated to have cost the community ~US$ 160,000 in total. • Forest in the CPA has been illegally cleared for farming and destroyed by storms, including 1,600 *Dipterocarpus spp. (*resin trees). • Farming and growing produce in homegardens is limited by a shortage of water (due to irregularity in rainfall) and insect damage. • The above-listed points have affected income, which is an insecure average of US$ 20 per person per month. • Community members are unsure of their rights to the CPA. • Patrolling of the CPA needs to be strengthened to prevent illegal activities.
	Skor Mreach CPA	• The frequency and intensity of droughts, storms and floods have increased over the lifetime of the community members. • These climate change-induced events have damaged rice crops, killed livestock, threatened food security, caused the spread of disease in the community, increased poverty and caused community members to migrate to cities to take up work as labourers. • Floods have cost the community ~US$ 7,000 in the time that the committee members could remember. • As a result of rice fields being flooded, forest in the CPA has been illegally cleared to sell timber and create space for farmland. • Farming and growing produce in homegardens is limited by a shortage of water, a lack of seedlings, compost and improved agricultural technique within the community, and insect damage to crops. • Degraded areas have been eroded, resulting in excessive deposition of sediment in rice fields and lower rice yields. • The above-listed points have resulted in a relatively low average income of US$ 6 per person per month, which is insecure particularly in the wet season (summer months of May to October). • Patrolling of the CPA needs to be strengthened to prevent illegal activities.
	Chom Thlork CPA	• Droughts, storms and floods are increasing in intensity and frequency. • These have had a “major” impact on the community, resulting in flood damage to crops, drying out of rice fields with consequent reduction in yields and the death of livestock.

[125] Google Inc. 2012. Google Earth (Version 5.2.1.1588).

		• Damages are estimated to be US$ 6,750 as a result of droughts, and US$ 7,000 in failed crops, death of livestock and damage to CPA forest from floods. • The CPA forest has been illegally logged and cleared for farmland as a result of poverty. • Farming and growing produce in homegardens is constrained by a lack of water for irrigation, degradation and erosion of the available land, insect damage, lack of improved agricultural technique and a limited availability of compost, rice seeds and tree saplings. • Erosion is a problem along rivers and canals. • The above-listed points have resulted in a relatively low, insecure average income of US$ 10 per person per month, and US$ 5-8 during the wet season. • Patrolling of the CPA needs to be strengthened to prevent illegal activities.
	Chop Tasok CPA	• Heavy rains and winds are experienced from May to September every year, which damages 50% of rice crops, reduces crop yields by up to 30% and overturns trees in the CPA forest. • CPA forest has been illegally cleared for farming, resulting in soil being lost (i.e. eroded) in the wet season. • Farming and growing produce in homegardens is constrained by insect and rodent damage, crop/vegetable disease and an unreliable water supply. • The above-listed points have resulted in a relatively low, insecure average income of US$ 7.5 per person per month. • Co-ordination with MoE rangers and patrolling of the CPA needs to be strengthened.
	Ronouk Khgeng CPA	• The intensity of disasters as a result of droughts, floods and storms is increasing (e.g. droughts occur annually). • These impacts have affected community members, livestock and crops. Damages are estimated to be US$ 20,000 for rice loss and US$ 4,000 for livestock loss as a result of droughts, and US$ 17,000 for crop loss due to floods. • Forest in the CPA has been illegally cleared for farming. • Fertile soils have been washed away (i.e. eroded) near rivers and canals. • Farming and growing produce in homegardens is constrained by a shortage of water (the community relies on rainfall, which is increasingly irregular). • The above-listed points have resulted in a relatively low, insecure average income of US$ 10-12.5 per person per month, and virtually no income in the wet summer months of June to August. • Community members have a limited understanding of the PA Law and the CPA Management Plan. • Patrolling of the CPA needs to be strengthened to prevent illegal activities.
		
Solution		• **Knowledge gathering** to inform effective implementation of ecoagriculture interventions through detailed on-the-ground assessments at the CPA intervention sites, including indigenous knowledge. • **Capacity building** of: i) local farmers on maintaining agricultural production under climate change conditions; ii) local authorities, agricultural extension officers and CPA committee members to enable them to guide the communities in implementing the AF project interventions; and iii) local communities to raise awareness on the importance of restoring forests and protecting natural resources. • **Restoring of degraded CPA forests** at an extensive scale using multi-use forest species that supply a diverse range of goods for commercial and domestic use, and are particularly effective at binding and conserving soils. • **Strengthening systems for patrolling** the CPA forests to prevent illegal logging and land clearance by CPA community members as well as outside intruders. • **Intensifying and diversifying agricultural production** by: i) enhancing rice yields by planting multi-use trees around existing rice paddies; ii) improving farming techniques through conservation agriculture practices; iii) trialling drought-tolerant rice varieties; and iv) implementing a suite of additional adaptation interventions to complement the ecoagriculture approach i.e. constructing dams/ponds and canal for increasing water supply, cutting firebreaks, distributing drought-resilient seeds stocks, establishing woodlots, improving post-harvest storage techniques and improving pest and disease management (see Part II. B Component 2 for CPA intervention site-specific details). • **Enhancing livelihoods** by facilitating access to micro-finance, developing business cases/models for alternative livelihood options and facilitating the integration of small-scale farmers into domestic, regional and global markets for goods and crops produced as a result of the AF project. • **Raising awareness** of local communities and of the general public on the predicted impacts of climate change and benefits of the ecoagriculture approach. • **Suggesting revision** to relevant national policies, strategies and legislation to incorporate the ecoagriculture approach and promote restoration as a climate change adaptation measure. • **Upscaling and institutionalisation** of the ecoagriculture approach to benefit all CPAs in Cambodia.
		
Adaptation Benefits		• **Improved and maintained ecosystem services** from restored CPA forests despite the impacts of climate change. Such services include water flow regulation and erosion control (see Table 4 for quantified benefits), as well as increased pollination, carbon sinks and soil fertility, and the provision of food, NTFPs, timber and fuelwood for sustainable use and income generation. • **Enhanced food supply** from homegardens and agricultural areas, including rice paddies, resulting in improved food security despite the impacts of climate change. • **Diversified income streams** from sustainable alternative livelihoods through development of forest

	and agricultural product-based small-scale enterprises, despite the impacts of climate change. The above culminates in: • **Enhanced climate change resilience of rural communities** in PAs in Cambodia despite an increase in the intensity and frequency of droughts and floods, as a result of the ecosystem services provided by the forests and the enhanced food supply from agricultural areas.

PROJECT / PROGRAMME OBJECTIVES:

The AF project seeks to address the vulnerability of rural communities living in selected PAs in Cambodia to the climate change-induced hazard of erratic rainfall which is reducing food supplies as a result of an increased frequency of droughts and loss of topsoil during intense rainfall events and flooding. The overall **goal** of the AF project is to increase food supply and reduce soil erosion in communities surrounding five CPAs in Cambodia by: i) restoring at least 1,875 ha of degraded forests with plant species that are particularly appropriate for this goal; ii) enrichment planting of rice paddy boundaries and other cultivated areas with multi-use tree species that will enhance crop productivity; iii) trialling plots of several drought-tolerant hybrid rice cultivars in order to assess their potential yield and suitability for cultivation; and iv) intensifying and diversifying the productivity of at least 1,907 family agriculture areas (including homegardens ranging in size from 0.2 ha to 1 ha) in communities living around the CPA forest sites. In this way, a new type of natural capital will be produced that is specifically tailored, using ecological and soil science expertise, to adapt local communities to climate change. The increased agricultural productivity from the conservation agriculture interventions will provide communities with food and revenue and reduce the pressure on forests, making the forests and the services they provide more resilient to climate change. The benefits of this landscape management to enhance ecosystem services will extend to downstream communities, beyond the CPA intervention sites. The **objective** of the AF project is consequently to enhance the climate change resilience of communities living around five CPA intervention sites, as well as downstream communities, to the climate change-induced hazard of erratic rainfall.

Selection of the five CPA intervention sites was based on the results of the First and Second CPA Community Survey. This included all 33 CPAs in the target area of the project initially (first survey). See Annexes II and III for more details of the surveys, and Annex I for details of PAs and CPAs in the target area. The AF project has been and will continue to be driven by a consultative and participatory approach meaning local community knowledge will be important for shaping interventions and will be combined with current knowledge of proven technology and approaches for restoring natural capital and intensifying agriculture in PAs aimed at enhancing food supplies to communities in the short term i.e. within five years.

The AF project will deliver on this objective through three components, namely:
- Protocols for ecoagriculture interventions;
- Concrete ecoagriculture adaptation interventions; and
- Institutional capacity, awareness raising and upscaling of ecoagriculture interventions.

Component 1 will use bio-physical, ecological and socio-economic research to develop restoration and conservation agriculture protocols to be implemented in Component 2. This first component is necessary to ensure that the protocols are grounded in a participatory approach and capture indigenous knowledge, as well as being scientifically appropriate for the selected intervention sites. Component 2 will ensure that the restored forests and productive agricultural areas are maintained and the benefits maximised. Alternative livelihoods established through the AF project will increase the resilience of local communities to the effects of climate change. Component 3 will create an enabling environment for the ecoagriculture concept to be implemented in other PAs in Cambodia, through awareness raised at a local and national level, and an upscaling strategy supported by policy revision where required.

PROJECT / PROGRAMME COMPONENTS AND FINANCING:

The AF project **strategy** will be to implement a set of concrete ecoagriculture interventions to increase the resilience of communities living around at least three CPA intervention sites. The **approach** will be one of: i) extensive landscape-level restoration of at least 1,875 ha (in total) of degraded forests to restore natural capital thereby buffering communities from the impacts of climate change-induced

floods and droughts, as well as providing food and stabilizing soils despite an increase in the frequency and intensity of climate change-induced droughts and floods; and ii) intensifying and diversifying agricultural productivity of at least 1,907 families to reduce crop vulnerability and ensure agricultural growth and poverty reduction. Conservation agriculture practices will be based on successful climate change adaptation techniques. The AF project activities will be based on the best available knowledge, technology and proven approaches regarding restoring natural capital and intensifying agriculture in PAs and will enhance food supply and conserve topsoil at the CPA intervention sites. This will be achieved within five years based on the growth of planted trees and crops (see Annexes III and VI). These activities will be supported by measures to build the capacity of local communities to restore and intensify agriculture to increase their climate change resilience as well as allow for replication and upscaling of the approach to other CPAs. This will ensure that benefits are sustained beyond the lifetime of the AF project.

The project's implementing agency currently advocates gender sensitivity and gender equality in all project implementation activities in the country. Gender mainstreaming is important for addressing the Millennium Development Goals (MDGs). All MDGs currently not being achieved in Cambodia[126] have adverse effects for women. In addition, climate change increasingly hampers MDGs achievement and thus is likely to increase these negative effects on women[127]. Women are generally the primary collectors of water and fuelwood. An increase in the frequency of drought can affect time spent collecting water and fuelwood, which could jeopardise livelihoods, workloads and reduce school attendance. The knock-on effect of this is reduced opportunities for women to engage in income generating activities. It is therefore important that the project use a gender-sensitive approach that ensures representation of women within training workshops, demonstration activities and management committees[128].

The following table describes the project components, indicative outputs and outcomes. During the project formulation phase a thorough baseline study will be conducted. This will involve: i) collation of detailed information on climate change vulnerabilities and ecosystem status of the selected CPA intervention sites; ii) identification of knowledge gaps; iii) determination of appropriate community agricultural intervention sites and key adaptive measures; and iv) identification/verification of site specific drivers that undermine resilience and feasible adaptation responses.

PROJECT COMPONENTS	EXPECTED CONCRETE OUTPUTS	EXPECTED OUTCOMES	AMOUNT (US$)
Component 1: Protocols for ecoagriculture interventions.	Output 1.1: Information generated on climate change impacts and preferred ecoagriculture interventions through a consultative and participatory approach.	Technical expertise and a local enabling framework for forest restoration and conservation agriculture interventions that build climate resilience developed at CPA intervention sites through a consultative and participatory process.	150,000
	Output 1.2: Economic assessments undertaken to identify most appropriate ecoagriculture interventions and associated micro-finance and insurance products.		60,000
	Output 1.3: Forest restoration and conservation agriculture protocols developed for CPA intervention sites based on results from Output 1.1 and 1.2.		150,000
Component 2: Concrete ecoagriculture adaptation interventions.	Output 2.1: Capacity of local community for building climate resilience increased, including capacity to plan, implement and maintain ecoagriculture	Multi-use forests established and maintained and agricultural practices diversified/intensified to	319,773

[126] The MDG most likely not to be achieved is MDG 1: eradicate extreme poverty and hunger.
[127] UNDP. 2009. Resource guide on gender and climate change.
[128] Data should identify for example women's and men's roles and responsibilities in the community, their access and control over land/resources/benefits, their inclusions in decision-making processes, as well as their particular capacities/knowledge and vulnerabilities/needs related to adaptation to climate change (UNDP. 2010. Guide book for designing and implementing gender-sensitive community-based adaptation programmes and projects).

	interventions under Output 2.2.	supply a diverse range of food and stabilize topsoil, despite an increase in climate change-induced droughts and floods.	
	Output 2.2: Forest restoration and conservation agriculture protocols implemented to build climate resilience (developed in Component 1) in CPA intervention sites.		2,721,227
	Output 2.3: Local communities' livelihoods enhanced and diversified through sustainable development of NTFPs and the promotion of sustainable alternative livelihood strategies.		220,000
	Output 2.4: Socio-economic and ecosystem monitoring of AF project impacts downstream of CPA intervention sites.		162,000
Component 3: Institutional capacity, awareness raising and upscaling of ecoagriculture interventions.	Output 3.1: Awareness increased at a local level of the importance of ecoagriculture for protecting and enhancing commercial and subsistence activities.	Restoration and conservation agriculture interventions to build climate resilience of local communities mainstreamed into Cambodia's adaptation framework and related sector policies.	271,000
	Output 3.2: Ecoagriculture activities promoted through institutional capacity building and proposed revisions to policies, strategies and legislation.		70,000
	Output 3.3: National ecoagriculture upscaling strategy developed and institutionalised for CPAs in Cambodia.		46,000
Component Total			4,170,000
Project/Programme Execution Cost[129] (see Part III.A and C)			396,150
Total Project/Programme Cost			4,566,150
Project Cycle Management Fee charged by the Implementing Entity (see Annex XIV)			388,123
Amount of Financing Requested			4,954,273

PROJECTED CALENDAR:

The table below indicates milestone dates for the proposed project/programme

MILESTONES	EXPECTED DATES
Start of Project/Programme Implementation	2012
Mid-term Review (if planned)	2014
Project/Programme Closing	2016
Terminal Evaluation	2017

PART II: PROJECT / PROGRAMME JUSTIFICATION

A. Describe the project / programme components, particularly focusing on the concrete adaptation activities of the project, and how these activities contribute to climate resilience.

The AF project will comprise the following components, outputs and activities:

[129] This includes the Monitoring and Evaluation (M&E) costs. See Table 6 in Section III.C for further details.

Component 1: Protocols for ecoagriculture interventions.

Output 1.1: Information generated on climate change impacts and preferred ecoagriculture interventions through a consultative and participatory approach.

This output will focus on strengthening the knowledge base of firstly the effects of climate change on landscapes and production systems within the five CPAs selected as intervention sites, and secondly the appropriate adaptation solutions at each site. These solutions will be informed by a consultative and participatory process which will prioritise ecoagriculture interventions developed in Output 1.2 for implementation under Component 2. This process of identifying and quantifying the baseline and adaptation solutions has been initiated through the First and Second CPA Community Surveys. Output 1.1 will include on-the-ground assessments of the CPA forests and communities in the inception phase of the AF project. These will build on the considerable platform of information generated in this proposal, and will include further detailed technical studies to ensure that appropriate tree and crop species are planted in suitable locations at the optimal densities. The following activities will be implemented in this output:

- Undertake gap analyses and institutional mapping exercises in relevant government departments and research institutions to determine shortfalls in knowledge, planning and implementation of ecoagriculture interventions within CPAs.
- Set up research groups to conduct targeted research to fill the knowledge gaps identified in the above activity.
- Develop and implement PhD and MSc projects in collaboration with Cambodian and international research institutions. These projects should be based on and further develop the findings of Component 1 of the AF project.
- Undertake bio-physical, ecological and socio-economic assessments of the five CPA intervention sites to quantify resource use, agricultural production and adaptive capacity at each site. This information will build on the platform of knowledge generated by the in the First and Second CPA Community Surveys and will further quantify the vulnerability of local communities under future climate change impacts/conditions. Geographical assessments of degraded forests of CPA intervention sites will be used to map erosion-prone areas in order to select site specific locations for ecoagriculture interventions.
- Use short- and medium-term climate forecast information to inform planting schedules in order to reduce the impacts of drought and heat stress on crop yields. This will reduce agricultural production risks. The most appropriate means of communication with farmers e.g. SMS via mobile phone, will be investigated and recommended to appropriate service providers.
- Evaluate the potential of naturally occurring local crop varieties, wild crop relatives as well as neglected and underutilised crops species to provide cultivars with improved tolerance to direct (erratic rainfall) and indirect (pests and diseases) climate change impacts using genetic analyses as well as community surveys.
- Evaluate the potential of drought-tolerant rice varieties for improving germination rates, growing periods, yields and rice quality relative to traditional varieties used by communities.
- Identify indigenous multi-use plant species tolerant to water-stressed soil conditions and suitable for restoring degraded forest areas. Species valuable for: i) consumption; ii) NTFPs; iii) animal husbandry; iv) soil stabilisation; v) increased soil fertility; and vi) cash crops will be prioritised.
- Undertake a hydrological/engineering study of water-catchment areas in CPA intervention sites to identify appropriate ecoagriculture and infrastructural interventions for enhancing water flow regulation and erosion control ecosystem services.
- Undertake geographical and agricultural assessments of rice paddy areas to determine appropriate multi-use tree densities and planting plans for maximising soil stability, nitrogen enrichment and water conservation.

The information collected in the above activities will be used to develop protocols for ecoagriculture interventions under Output 1.3 as well as a local community training course in Output 2.2. The protocols will therefore be driven be a consultative and participatory process. Furthermore, an upscaling strategy developed in Outcome 3 will be based on the information generated from these activities. The socio-economic assessments will use a gender-sensitive approach. Excluding Chop Tasok CPA, there are 4,723 males and 4,724 females within the CPA intervention sites. Therefore, 50% of the people to be consulted in the socio-economic assessments will be women. (Chop Tasok comprises 75 families, however the CPA Management Committee did not know how many males and females there were in the community at the time of the Second CPA Survey). This approach will

ensure that gender equality is maintained through the AF project interventions. These assessments will build on results from the First and Second CPA Community Surveys undertaken for the AF project, which have been used to develop the list of activities detailed in this proposal (see Annexes II and III for descriptions of the community surveys and the results).

Output 1.2: Economic assessments undertaken to identify ecoagriculture interventions and associated micro-finance and insurance products.

This output will focus on prioritising ecoagriculture interventions as well as associated micro-finance and insurance products for implementation under Component 2. This will be based on the results of Output 1.1 as well as economic analyses and market assessments. This output will include the following activities:

- Identify locally available micro-finance and weather index-based insurance products for safeguarding farmers' agricultural productivity. In the Second CPA Community Survey, the Management Committee members of Chom Thlork and Chop Tasok CPAs indicated that the community would like financial credit schemes developed to allow community members to expand their businesses/activities. This activity will be a focus of Output 1.2 in these two CPAs, and will also be undertaken in the remaining three CPAs.
- Undertake an in-depth market assessment, where micro-finance and insurance are not available to determine the commercial viability of such products.
- If micro-finance and insurance are commercially viable, develop business plans based on the results of the above activity and distribute to relevant private sector players.
- Assess the effectiveness of local agricultural markets in all five CPAs. In the Second CPA Community Survey, the Management Committee members of Chom Thlork and Skor Mreach CPAs indicated the community would like their crop products marketed more efficiently. This information will be used to provide recommendations to local authorities regarding investments needed for increasing market efficiency as well as relevant policy changes[130,131].
- Undertake a cost-benefit analysis of individual tree and crop species listed in Annex V and VII, respectively, as well as tree and crop species identified during the First and Second CPA Community survey (Annexes II and III). This will further refine and quantify the activities in Component 2.
- Assess the local socio-economic costs and benefits of ecoagriculture interventions identified in Component 1 through market assessments and other economic analyses.

The results of the above activities will be used for developing local-scale ecoagriculture interventions under Output 1.3, implemented in Component 2. These activities will also be important in guiding the upscaling strategy developed in Component 3.

Output 1.3: Forest restoration and conservation agriculture protocols developed for CPA intervention sites based on results from Output 1.1 and 1.2.

The information collected on natural resources, food supply needs, agricultural output, adaptive capacity and community vulnerability in Output 1.1, as well as the cost-benefit analysis undertaken in Output 1.2, will be used to develop the technical restoration and conservation agriculture protocols. These protocols will establish a local enabling framework implementing the ecoagriculture interventions of the AF project, and will finalise: i) the selection of multi-use trees species as an ecoagricultural intervention for enhancing food supply, NTFPs and soil stabilisation; ii) the selection of suitable crop varieties/species and conservation agriculture techniques; iii) the development of alternative livelihoods which are climate-resilient; and iv) the development of a framework for supporting and training communities in forest restoration and conservation agriculture.

Stakeholder involvement will be an integral part of developing the technical protocols for forest restoration and conservation agriculture interventions. This participatory approach has been initiated through the First and Second CPA Community Surveys which were undertaken specifically for the

[130] Agrifood Consulting International and CamConsult. 2006. Diagnostic Study, Phase 1 of Design, Agricultural Program, Cambodia, 2007-12 – Program Concept Document Final Report. Prepared forAusAID by Agrifood Consulting International. Bethesda, Maryland.

[131] McNaughton, A. 2002. Cambodia's experience and opportunities for domestic and international trade in organic agricultural products.

purposes of the AF project. Throughout the process of developing protocols, regular consultations and meetings will be held with communities to ensure an inclusive and participatory approach which fosters community buy-in.

Component 1: Protocols for ecoagriculture interventions – activities, indicators, baselines and targets.

Activities	Expected concrete outputs	Output indicator	Baseline	Target
Outcome 1: Technical expertise and a local enabling framework for forest restoration and conservation agriculture interventions that build climate resilience developed at CPA intervention sites through a consultative and participatory process.				
Undertake gap analyses and institutional mapping exercises.	1.1 Information generated on climate change impacts and preferred ecoagriculture interventions through a consultative and participatory approach.	Number of reports developed (including gap analysis report; multi-use plant species reports; bio-physical/ecological/socio-economic assessment reports; planting schedule report; crop variety reports; rice variety report; hydrological/ engineering reports).	Limited knowledge of local level baseline conditions.	At least 23 reports (at least 1 report for each of the following activities: gap analysis, planting schedule and rice variety assessments; at least 1 report per CPA intervention site for the following activities: multi-use plant species, bio-physical/ecological/ socio-economic, crop variety and hydrological/engineering assessments.
Set up groups to conduct targeted research to fill the knowledge gaps.				
Identify indigenous multi-use plant species tolerant to water-stressed soil conditions and suitable for restoring degraded forest areas.				
Undertake bio-physical, ecological and socio-economic assessments of CPA intervention sites				
Use short- and medium-term climate forecast information to develop planting schedules.				
Evaluate the potential of naturally occurring local crop varieties and wild crop relatives to provide cultivars with improved tolerance to direct and indirect climate change impacts.				
Evaluate the potential of drought-tolerant rice varieties for *inter alia* improving germination rates and increasing productivity.				
Undertake a hydrological/engineering study of water-catchment areas in CPA intervention sites.				
Develop and implement PhD and MSc projects.		Number of PhD and MSc projects.	No PhD and MSc projects on the ecoagriculture approach in Cambodia.	At least 5 MSc projects and 2 PhD projects initiated.
Identify locally available micro-finance and weather index-based insurance products.	1.2 Economic assessments undertaken to identify most appropriate ecoagriculture interventions and associated micro-finance and insurance products.	Number of reports developed (product report; commercial viability report; business plan; market effectiveness report; cost/benefit report; and socio-economic benefit report).	Information collected based on community preferences (Annexes II and III) and scientific literature (Annexes V-VII). This information, however, needs to be further quantified.	At least 6 reports (at least 1 report for each of the following activities: product availability, commercial viability, business plan, market effectiveness, cost/benefit and socio-economic assessments).
Undertake an in-depth market assessment to determine the commercial viability of such products.				
Develop business plans based on the results of the above activity and distribute to relevant private sector players.				
Assess the effectiveness of local agricultural markets in each CPA.				
Undertake a cost-benefit analysis of planting different tree and crop species.				
Assess the local socio-economic costs and benefits of ecoagriculture.				
Develop the technical restoration and conservation agriculture protocols.	1.3 Forest restoration and conservation agriculture protocols developed for CPA intervention sites based on results from Output 1.1 and 1.2.	Number technical of restoration and conservation agriculture protocols developed.	No such technical protocols.	At least 5 technical restoration and conservation agriculture protocols (at least 1 per CPA intervention site).

Component 2: Concrete ecoagriculture adaptation interventions.

The information generated under Component 1 will be used to implement on-the-ground forest restoration (i.e. establish multi-use forests) and conservation agriculture interventions in the targeted CPA intervention sites. A package of interventions/activities was proposed in the Project Concept. This package has been refined and reduced to those interventions most appropriate for each CPA site. This prioritization was principally based on the results of the Second CPA Community Survey. Capacity building (Output 2.1) and enhancing livelihoods (Output 2.3) will occur at all five implementation sites. The suite of activities to complement the extensive and intensive ecoagriculture interventions (Output 2.2), however, will be implemented according to the CPA site-specific conditions and community requests. This will ensure demand-driven implementation and sustainability of the AF project interventions. Table 3 shows the interventions per CPA site, the area (ha) of the extensive and intensive ecoagriculture interventions, and the additional interventions requested by the communities. The information contained in Table 3 was obtained from the Second CPA Community Survey.

Table 3: Activities per CPA intervention site ('X' indicates the activity will be implemented).

	AF project intervention											
CPA site	**Forest restoration**	**Enrichment planting (families x area)**	**Intensification /diversification (families x area)**	**Improved rice varieties**	**Terracing**	**Dams/ponds and canals**	**Fire breaks**	**Improved seeds to local business**	**Woodlots**	**Improved post-harvest storage**	**Pest/disease management**	**Additional interventions**
Chiork Beung-prey *	~50% x 350 ha	25% x 166 x 1 ha	166 x 0.6 ha	20 ha	X	X	X		X		X	
Ronouk Khgeng	~50% x 51 ha	89 x 1 ha	89 x 1 ha	45 ha	X	X			X	X		Nature tourism
Chom Thlork	~50% x 1,000 ha	935 x 1.5 ha	935 x 0.02 ha	100 ha	X	X	X	X	X	X	X	Marketing of crop products; financial credit schemes
Skor Mreach	~50% x 2,000 ha	642 x 1 ha	642 x 0.02 ha	100 ha	X	X	X		X		X	Financial credit schemes
Chop Tasok	~50% x 330 ha	75 x 1.5 ha	75 x 1.5 ha	35 ha	X	X		X	X		X	Marketing of crop products
Total area (ha)	**1,875**	**2,286**	**337**	**300**								

* Only 25% of families have rice paddies, according to the CPA Management Committee of Chiork Beungprey CPA.

Output 2.1: Capacity of local communities for building climate resilience increased, including capacity to plan, implement and maintain ecoagriculture interventions under Output 2.2.

This output aims to increase the success and sustainability of ecoagriculture interventions implemented under Outputs 2.2 and 2.3. This will be achieved by training local authorities and communities to plan, implement and maintain interventions beyond the lifespan of the AF project at each of the five CPA sites through improved management (relevant to current management practices) of restored (i.e. multi-use forests) and agricultural areas. The Tropeungprey Thom Management Committee will be invited to attend the training workshops in Beung Per WS, although the CPA was not selected as an intervention site. This is because the Tropeungprey Thom CPA community was identified as vulnerable and included in the Second CPA Community Survey, however there were insufficient resources in the budget to include six intervention sites in the AF project. Including the Tropeungprey CPA Management Committee in the training exercises and workshops will allow for the uptake of ecoagriculture practices in the community, and facilitate the AF project upscaling process.

An important aspect of the long-term sustainability of multi-use forests will be protection from degradation through illegal activities. Commercial and small-scale illegal logging for timber and fuelwood, as well as harvesting of food and NTFPs from CPA forests were identified as local community concerns at all five CPA intervention sites during the Second CPA Community Survey. Strengthening patrol systems to prevent degradation will therefore be a vital component of the sustainability of the AF project interventions. This output will include the following activities:

- Develop a training course and adaptation toolkit for local farmers on maintaining agricultural production under climate change conditions. The training course will cover topics such as forest restoration, erosion control, fire management, tree crops and nursery management. It will also have a strong focus on the adaptation benefits of the ecoagriculture interventions. Specific skills to be transferred to local communities will include:
  - soil conservation techniques such as contour planting, ridge construction, reduced and zero-tillage systems for maintaining/improving soil structure and nutrient cycling as well as reducing vulnerability to erosion;
  - management of crop residues as a source of fodder production, or alternatively as a source of green manure to improve soil structure and fertility;
  - techniques for harvesting and storing rainwater for irrigating high-value or water-intensive crops, or alternately to sustain homegarden crops during periods of drought; and
  - maintenance of water-efficient irrigation systems such as AMIT[132] to maximise the production of high-value or water-intensive crops.
- Train local authorities, agricultural extension officers and CPA Management Committee members to implement the conservation agriculture protocols developed in Component 1 and to deliver the training course and use the adaptation toolkit developed by the AF project. Agricultural extension officers will advise farmers on: i) crop choices; ii) appropriate conservation agricultural practices; and iii) use and maintenance of AMIT, as well as transfer skills and communicate lessons learned to communities in areas situated away from intervention sites. Training on management techniques will include how to maintain soil stability, nutrition and water infiltration, and how to select crops in the face of climate change. This will be based on criteria such as compatibility with other species, ease of management, resilience to climate extremes and seasonality of production. Committee and community training will be gender-sensitive to ensure equal opportunities for all community members to learn and benefit from the AF project.
- Train local communities at each CPA intervention site on the importance of protecting natural resources in order to ensure the sustainability of establishing multi-use forests. Communities will also be trained on the benefits of carbon credit schemes such as those under REDD and REDD+ projects, thereby providing motivation through the potential monetary rewards that could be gained from forest protection.
- Strengthen systems for protecting and patrolling multi-use forests and other natural resource areas. This will entail: i) demarcating CPA boundaries at the intervention sites; ii) erecting signs indicating that it is illegal for outsiders (i.e. not CPA community members) to harvest forest products; iii) raising awareness on illegal harvesting activities (by outsiders) that may be taking place; iv) constructing patrol offices; v) strengthening co-ordination between MoE Park Rangers and local communities to promote a partnership to patrol the restored areas; vi) training local communities on relevant laws protecting their natural resources[133]; vii) providing instruction on effective patrolling techniques (these may be based on the lessoned learned from other forest protection initiatives, such as those employed in REDD and REDD+ projects in Cambodia); and viii) providing equipment required for effective law enforcement and patrolling (e.g. radios). These activities are necessary to reduce illegal harvesting of NTFPs and timber. At present, CPA Management Committees co-ordinate patrols using community members of the CPA to prevent illegal activities. Transgressions are mostly from outsiders as opposed to CPA community members.

Output 2.2: Forest restoration and conservation agriculture protocols implemented to build climate resilience (developed in Component 1) in CPA intervention sites.

[132] Clements, R., J. Haggar, A. Quezada, and J. Torres. 2011. Technologies for Climate Change Adaptation – Agriculture Sector. X. Zhu (Ed.). UNEP Risø Centre, Roskilde, 2011.

[133] Such as the Law on Environmental Protection and Natural Resources Management (1996), as well as the National Environmental Action Plan (1998-2002), the National Wetland Action Plan (1997) and the National Biodiversity Strategy and Action Plan (2002).

Within this output the climate change resilience of local communities will be increased by restoring degraded forests and intensifying/diversifying existing agriculture practices. Each CPA intervention site will have a package of adaptation interventions specifically tailored for the local biophysical and socio-economic conditions in the relevant CPA (see Table 3). Communities at all five CPA intervention sites welcomed the AF project support, and noted the importance of the proposed interventions which will improve food security and enhance the climate change resilience of community members (see letters of support in Annex III). This output will include the following activities:

- Establish community-managed local nurseries to supply climate-resilient plant species for intensification/diversification of agricultural production as well as establishment of multi-use forests. Nurseries will be responsible for seed collection, storage and sowing as well as plant propagation and planting. Cuttings will be collected for species that can be propagated vegetatively. For all other species, seeds will be collected. Seedlings and cuttings will be grown in nurseries until saplings are ready for out-planting.
- Train three community liaison planting officers to oversee on-the-ground activities (one in Chop Tasok CPA, one in Ronouk Khgeng CPA, and one in Chiork Beungprey, Chom Thlork and Skor Mreach CPAs).
- Restore degraded areas in CPAs[134] using multi-use forest species that supply a diverse range of goods for commercial as well as domestic use, including timber and NTFPs such as resin, medicine, fibre, nuts and fruit. The final list of species to be planted will be developed in Component 1 of the AF project. This will include species requested by the community, thereby incorporating local preference and indigenous knowledge (e.g. *Pterocarpus macrocarpus, Dipterocarpus retusus, Hopea ferrea Laness*; see Annex III for further community requests), as well as species based on the most up to date scientific knowledge (see Annex V). This combination will ensure that the most appropriate assemblage of species are planted in each CPA intervention site and that there is achievement of maximum climate change adaptation benefits in the most cost-effective way. Species that produce dense soil-binding roots will be planted first. Thereafter fast-growing, sun-tolerant and nitrogen-fixing species will be planted, such as the hairy-leafed apitong (*Dipterocarpus alatus*) and tosp mow lasto (*Flemingia macrophylla*) (see Annex V). These species will provide a dense canopy cover to reduce the erosive action of raindrops. Increased litterfall from the canopy will enrich the soil and further enhance the establishment of other species planted for food supply, NTFPs, timber and fuelwood, such as black-wood cassia (*Senna siamea*), Indian mulberry (*Morus alba*), drumstick tree (*Moringa oleifera*), *Morinda citrifolia and Dasymaschalon lamentaceum* (see Annex V). Terraces will be used in certain areas to prevent soil erosion from extreme rainfall events[135]. Restored multi-use forests will provide an economic buffer against climate change damages. The benefits of this approach have been detailed in Sections I.1.8. and II.B.
- Enhance rice yields and climate resilience by planting multi-use trees around existing rice paddies. Species resilient to drought and water-logging as well as valuable for: i) consumption; ii) increased soil fertility (nitrogen fixing/leguminous species); and iii) NTFPs such as fruits, firewood and fodder will be selected. The final list of species and planting plan will – as in the extensive restoration activities – be developed in Component 1. This will include community preferences (e.g. *Moringa oleifera* [drumstick tree] which provides fruits, *Pterocarpus indicus* [thnong tree which is a luxury grade wood, and *Albizia lebbek* [chres tree] which provides leaves for fertilizer; see Annex III for further requests from communities) and the most appropriate species to achieve climate change adaptation benefits (Annex VI). Potential species include *Leucaena leucocephala*, snaov (*Gliricidia sepium*), kra ngoung (*Dalbergia cochinchinensis*), and *Acacia mangium*. The selection of species to be planted will be finalised based on community consultation. Approximately 40-80 trees will be planted along the embankments of each rice paddy at intervention sites. This will cost ~US$ 84-168[136]. The enrichment planting of rice paddies will

[134] Simmons and Nuberg. 2008. Exploring opportunities for integrating multipurpose trees on farms in Cambodia. Asia-Pacific. Agroforestry Newsletter 33 12-14.

[135] FAO. 2011. "Climate-Smart" Agriculture – Policies, Practices and Financing for Food Security, Adaptation and Mitigation. Food and Agriculture Organisation, Rome.

[136] This assumes a cost of tree establishment of ~$US 839/ha, based on:

- Agroforestry costs ~US$ 960 per ha in Bangladesh. Rahman, S. A., Paras, F. D., Khan, S. R., Imtiaj, A., Farhana, K. M., Toy, M. M., Akhand, M. B., Sunderland, T. 2011. Initiatives of tropical agroforestry to sustainable agriculture: A case study of Capasia Village, Northern Bangladesh. Journal of Horticulture and Forestry 3(4): 115-121
- Agroforestry in Cambodia costs ~US$ 300 - US$ 500 per ha in a 2011 project. Information obtained from the Wildlife Alliance in Cambodia.

provide multiple benefits, such as stabilisation of soils, reduced siltation, increased water infiltration rates, increased protection from floods, reduced evaporation, improved soil structure as a result of increased leaf mulch and improved soil fertility. This will increase the resilience of rice production[137] and strengthen food supply under climate change conditions, as well as provide alternative sources of income for communities[138].The benefits of this intervention are outlined in Annex VI and Section II.B.

- Intensify/diversify farming practices in homegardens and improve technologies for reducing water-use[139] using conservation agriculture protocols developed in Component 1. This will include techniques such as: i) planting of trees to prevent water logging, erosion and nutrient leaching from agricultural fields; ii) planting water-efficient crops and drought-resilient tree crops; iii) constructing terraces; iv) installing water-efficient irrigation systems (e.g. AMIT systems[140], drip irrigation); v) rainwater harvesting; vi) reduced tillage; vi) mulching with vegetation; and vii) green manuring. The final list of species to be planted in the homegardens will – as with the other conservation agriculture activities – be developed in Component 1. This will include community preferences (e.g. cashew trees, kangkong, lime trees; see Annex III for further community requests) and the most appropriate species to achieve climate change adaptation benefits (Annex VII). Crop configurations used will optimise light, water and space. For example, shade-tolerant species (such as kangkong, sweet potato or ginger) will be planted underneath species that require full sunlight (such as tomato, maize, mung bean, or tree species such as mango). AMIT in combination with conservation agriculture techniques such as vegetative mulching will maximise water efficiency and increase the resilience of local agriculture to drought[141,142,143,144]. The conservation agriculture protocols applied will contribute to adapting agricultural production to anticipated impacts of climate change by maintaining soil stability, improving soil organic matter and nitrogen content, conserving soil moisture, and increasing water infiltration resulting in increased crop production, diversity and climate resilience[145].
- Establish field trials of drought-tolerant rice varieties, based on the results of Output 1.1. A consultative process will be undertaken to identify farmers to establish and maintain trial plantings. CPA Management Committee members at Chom Thlork and Skor Mreach advised that there are willing farmers and sufficient land available to trial 100 ha of improved rice varieties at each CPA. At the remaining three CPAs, space under existing cultivation is limited, however, a total of 300 ha will be available for trialling improved varieties of rice over the five CPAs. The field trials will be used to assess the suitability and cost-effectiveness of assorted drought-tolerant rice cultivars for improving rice yields and climate resilience.
- Construct dams/ponds and canals for increasing water supply for irrigation and preventing water logging, erosion and nutrient leaching after extreme rainfall events[146]. The feasibility of using these ponds/dams and canals for small-scale aquaculture projects will be investigated during Output 1.2[147,148,149]. Water-efficient technologies/methods will be designed and developed based

---

- Woodland restoration costs ~US$ 1,750 per ha in Australia. Source: http://fotpin.hussat.com.au/docs/woodland-restoration-implementation-plan%20.pdf.
- Bottomland Forest restoration costs ~US$ 178 - US$ 267 per ha in a USA based project. National Research Council. 1991. Restoration of Aquatic Ecosystems: Science, Technology, and Public Policy. National Academy Press, Washington. DC.
- Spekboom Thicket restoration costs ~US$860 per ha in South Africa.

[137] Lowendor HS. 1982. Biological nitrogen fixation in flooded rice fields. Cornell international agricultural mimeograph. 1982
[138] Hellen Keller International/Cambodia. 2003. Handbook for Home Gardening in Cambodia: The Complete Manual for Vegetable and Fruit Production.
[139] Pender. 2008. Agricultural technology choices for poor farmers in less-favoured Areas of South and East Asia. Occasional papers, Knowledge for development effectiveness. Asia and the Pacific Division, IFAD
[140] For example. AMIT systems such as a Small Baffle Drip Kit can irrigate up to 250m^2 and cost approximately US$ 20 per unit (IDE, 2001. Technical Manual for Affordable Micro Irrigation Technology (AMIT). International Development Enterprises, California, USA). One AMIT kit will be distributed to each of the 1,907 families in the five CPA intervention sites.
[141] FAO. 2011. "Climate-Smart" Agriculture – Policies, Practices and Financing for Food Security, Adaptation and Mitigation. Food and Agriculture Organisation, Rome.
[142] IDE, 2001. Technical Manual for Affordable Micro Irrigation Technology (AMIT). International Development Enterprises, California, USA.
[143] ITC. 2003. Low Cost Micro Irrigation Technologies for the poor. Intermediate Technology Consultants, United Kingdom.
[144] Clements, R., J. Haggar, A. Quezada, and J. Torres (2011). Technologies for Climate Change Adaptation – Agriculture Sector. X. Zhu (Ed.). UNEP Risø Centre, Roskilde, 2011.
[145] FAO. 2011. "Climate-Smart" Agriculture – Policies, Practices and Financing for Food Security, Adaptation and Mitigation. Food and Agriculture Organisation, Rome.
[146] Ahmed and Lorica. 2002. Improving developing country food security through aquaculture development-Lessons from Asia. Food Policy, 27 (2) 125-141.
[147] Dey et al. 2005. Status and economics of freshwater aquaculture in selected countries of Asia. Aquaculture Economics and Management, 9(1-2) 11-37

on a hydrological/engineering study of CPA intervention sites undertaken during Output 1.1. At the five CPA intervention sites water shortages are a problem, and the communities noted that constructing dams/ponds and canal would alleviate these pressures. This activity will be complemented by the AMIT systems and rain water harvesting.

- Establish fire breaks to combat fires in multi-use forests. Fires are predicted to increase in frequency and intensity as a result of drier and warmer conditions[150]. Communities at the larger CPAs (in Beung Per WS) commented on the importance of fire breaks.
- Distribute drought-resilient seed stocks to local businesses that supply seeds to CPA communities. This activity will be trialled at Chom Thlork and Chop Tasok.
- Establish woodlots for supplying fuelwood to local communities. Fuelwood supply has decreased in CPAs as a result of forest degradation related to over-harvesting as well as climate change-induced floods and droughts[151]. All communities expressed the importance of woodlots for firewood, therefore this activity will be implemented at all CPA intervention sites.
- Introduce appropriate post-harvest storage techniques (such as metallic grain silos and three layer hermetic bags) to reduce/prevent fungal infections and pest outbreaks after extreme rainfall events[152]. This activity will be implemented at Ronouk Khgeng and Chom Thlork where communities said improved post-harvest storage techniques would reduce crop loss and improve income from the sale of agricultural produce.
- Improve crop pest and disease management by using integrated pest management systems, and introducing crop varieties/species resistant to pests and diseases[153]. This activity will be implemented at Chiork Beungprey, Chom Thlork, Skor Mreach and Chop Tasok, where communities advised that pests and disease were constraining productivity of agricultural lands.

Output 2.3: Local communities' livelihoods enhanced and diversified through sustainable development of NTFPs and the promotion of sustainable alternative livelihood strategies.

This output will provide the foundation for local communities in the five selected CPA intervention sites to develop sustainable alternative livelihood strategies. This will increase and diversify community income, consequently providing safety-nets and enhancing climate change resilience. As women are largely responsible for post-harvest operations, this output will have a strong emphasis on gender equality. This output will include the following indicative activities:

- Facilitate farmers' access to micro-finance and weather index-based insurance products where local companies or NGOs provide these financial services. This will be based on the results of the activities in Output 1.2.
- Develop business plans for alternative livelihood options identified in Component 1 for CPA intervention sites.
- Facilitate the integration of small-scale farmers into domestic, regional and global markets for high-value agricultural (HVA) products, in particular high value crops and NTFPs, in a sustainable manner. This will entail: i) conducting market chain analyses; ii) linking the CPA communities with NTFP Working Groups[154]; and iii) providing skills training in packaging/storage/post-harvest processing and marketing.
- Train local communities in CPAs where ecotourism is appropriate and desired to establish an enabling environment for the development of ecotourism projects. The Ronouk Khgeng CPA Management Committee expressed an interest in developing an ecotourism based project. This activity will therefore be focussed in this CPA. Potential private sector partners will be engaged, market demand assessed, operational costs determined and potential revenue streams analysed to determine the economic viability of an ecotourism venture.

---

[148] Hishamunda et al. 2009. Commercial aquaculture in Southeast Asia: Some policy lessons. Food policy, 34(1) 102-107

[149] Prein 2002. Integration of aquaculture into Crop-Animal systems in Asia. Agricultural Systems, 71 (1-2) 127-146

[150] Cambodia National Report on Protected Areas and Development. Review of Protected Areas and Development in the Lower Mekong River Region, Indooroopilly, Queensland, Australia. 148 pp.

[151] Guo 2007. Potential of woodlot establishment in meeting the practical and strategic gender needs of women in the upper west region of Ghana. Studies in Gender and Development in Africa (1) 21-42

[152] Antonio Acedo. Postharvest Technology for Fresh Chili Pepper in Cambodia, Laos, and Vietnam. International Cooperators Guide. AVRDC The World Vegetable Centre. Publication number 10-735

[153] Rahman, S. A., Paras, F. D., Khan, S. R., Imtiaj, A., Farhana, K. M., Toy, M. M., Akhand, M. B., Sunderland, T. 2011. Initiatives of tropical agroforestry to sustainable agriculture: A case study of Capasia Village, Northern Bangladesh. Journal of Horticulture and Forestry 3(4): 115-121.

[154] The Cambodia NTFP Working Group was initiated in 2006 to promote networking among community-based organisations and provide support for the development of NTFP-based enterprise and livelihood development.

- Establish sustainable alternative livelihoods, such as ecotourism operations, small-scale craft and vegetable businesses and NTFP enterprises based on products such as honey, resin, rattan and malva nuts.

Livelihood enhancement and diversification will encourage people to move away from unsustainable exploitation and degradation of natural resources and thereby increase social and environmental resilience to climate change. In the Second CPA Community Survey, the link between poverty and degradation was highlighted by the CPA Management Committee members. Additional revenue from sustainable, alternative livelihood strategies will alleviate poverty and thus the pressure on forest resources. This will create a positive feedback cycle, as forests become more productive, and alternative livelihoods based on forest products become more profitable. The majority of the efforts to support livelihood enhancement and diversification so far have tended to be supply-driven and focused on single, "blueprint" solutions[155].

Output 2.4: Socio-economic and ecosystem monitoring of AF project impacts downstream of CPA intervention sites.

Within this output the socio-economic and ecological benefits of the AF project interventions will be monitored downstream of the five CPA intervention sites. The likely benefits accruing in these areas are detailed in Section B. The impacts of the AF project inside the CPA intervention sites will be monitored through the M&E component of the AF project. Activities will include the following:

- Identify target communities and areas for monitoring outside (downstream) the CPA intervention sites. The target communities inside CPA sites will be the five communities of the selected intervention sites, and will be monitored through the M&E activities.
- Develop socio-economic and ecological monitoring protocols, including SMART (Specific Measurable Attainable Relevant Time-bound) indicators and targets.
- Train local communities in target areas to undertake the baseline surveys and data collection activities detailed in the monitoring protocols.
- Conduct baseline surveys of: i) the target communities (socio-economic surveys); and ii) degraded forest ecosystems and agricultural landscapes (ecological surveys). These surveys will use statistically robust methodology to gather data in line with the SMART indicators.
- Develop and implement a tool to measure the impact of the AF project in target downstream community sites. This tool will be implemented three times during the lifespan of the AF project (beginning, middle and end) to track the socio-economic and ecological benefits in community areas inside and outside of the CPA intervention sites. The impact of the AF project at the five CPA intervention sites will be measured through the M&E activities of the project.
- Collect data in a scientifically rigorous and statistically robust way in the target community areas, after implementation of the AF project interventions. Simple monitoring techniques will be used to measure *inter alia*: i) canopy cover of multi-use forest; ii) soil erosion using fixed metal marker stakes; iii) sediment load of local streams; iv) revenue from the sale of NTFPs; and v) revenue from the sale of agricultural products.
- Undertake an economic analysis of the direct and indirect socio-economic, ecological and hydrological benefits in downstream target community areas, linking the benefits to specific AF project interventions. The results of this analysis will be used to guide the upscaling strategy developed in Output 3.3.
- Develop and implement (for the lifespan of the AF project) long-term socio-economic and ecosystem research protocols for multi-use forests and conservation agriculture practices in CPAs to quantify impacts of climate change and adaptation interventions on ecosystem goods and services. Target sites will be those downstream communities selected for Output 2.4, as well as within the five CPA intervention sites.. Information will be used to inform future management decisions as well as the upscaling strategy. Control sites in targeted CPAs will be integrated into these protocols.
- Compile a report of the initial results, motivating for funding to continue the long-term socio-economic and ecosystem research beyond the lifespan of the AF project.

[155] IMM, 2008. Sustainable Livelihoods Enhancement and Diversification – SLED: A manual for Practitioners. IUCN, International Union for the Conservation of Nature.

Component 2: Concrete ecoagriculture adaptation interventions – activities, indicators, baselines and targets[156].

Activities	Expected concrete outputs	Output indicator	Baseline	Target
Outcome 2: Multi-use forests established and maintained and agricultural practices diversified/intensified to supply a diverse range of food and stabilize topsoil, despite an increase in climate change-induced droughts and floods.				
Develop a training course and adaptation toolkit for local farmers.	Output 2.1: Capacity of local communities for building climate resilience increased, including capacity to plan, implement and maintain ecoagriculture interventions under Output 2.2.	Number of people trained (gender disaggregated).	No formal training on ecoagriculture approach at CPA intervention sites.	At least 101 CPA Management Committee, 20 local authority members, 10 agricultural extension officers and 5,000 CPA community members trained (50% of CPA community members to be women)
Train local authorities, agricultural extension officers and CPA committee members to implement the conservation agriculture protocols.				
Train local communities on the importance of protecting natural resources.				
Strengthen systems for protecting and patrolling multi-use forests and other natural resource areas.		Incidence of transgressions.	No formal data, however, communities concerned about illegal activities.	At least a 40-60% reduction in transgressions per CPA intervention site.
Establish community-managed local nurseries.	2.2 Forest restoration and conservation agriculture protocols implemented to build climate resilience (developed in Component 1) in CPA intervention sites.	Number of nurseries established.	No large-scale nurseries at the CPA intervention sites.	At least 5 nurseries established (at least 1 per CPA intervention site).
Community liaison planting officer to oversee on-the-ground activities		Number of qualified individuals contracted.	At present there is no dedicated expert overseeing ecoagriculture interventions.	3 community liaison planting officers (1 in Chop Tasok CPA, 1 in Ronouk Khgeng CPA, and 1 in Chiork Beungprey, Chom Thlork and Skor Mreach CPAs).).
Restore degraded areas in CPAs using multi-use forest species.		Ha of degraded forest restored.	3,730 ha of degraded forest in the five CPA intervention sites.	At least 1,875 ha of degraded forest restored.
Enhance rice yields and climate resilience by planting multi-use trees around existing rice paddies.		Ha of rice paddies bordered with multi-use trees.	Communities are aware of the benefits of this activity, but lack resources to implement it.	At least 2,286 ha of rice paddies bordered with multi-use trees.
Intensify/diversify farming practices and improve technologies for reducing water-use.		Ha of intensified/ diversified homegardens.	Farmers complain of lack of water and seedlings (see Annex III).	At least 337 ha of intensified/ diversified homegardens.
Establish field trials of drought-tolerant rice varieties.		Ha of drought-tolerant rive varieties.	Only 1 of the 5 CPA intervention sites currently uses improved varieties of rice.	At least 300 ha of paddies planted with drought-tolerant rice varieties.

[156] The baseline and target information for Component 2 was gathered in the Second CPA Community Survey.

Construct dams/ponds and canals. Establish fire breaks to combat fires in multi-use forests. Distribute drought-resilient seed stocks to local businesses. Establish woodlots for supplying fuelwood to local communities. Introduce appropriate post-harvest storage techniques. Improve crop pest and disease management.		Number of additional activities to complement intensive conservation agriculture interventions .	Communities requested various additional interventions to increase productivity of homegardens and rice paddies (see Annex III).	At least 31 additional activities implemented (see Table 2) in total at the five CPA intervention sites.
Facilitate farmers' access to micro-finance and weather index-based insurance products. Develop business plans for alternative livelihood options. Facilitate the integration of small-scale farmers into domestic, regional and global markets for high-value agricultural (HVA) products. Train local communities in CPAs where ecotourism is appropriate. Establish sustainable alternative livelihoods.	2.3 Local communities' livelihoods enhanced and diversified through sustainable development of NTFPs and the promotion of sustainable alternative livelihood strategies.	Number of sustainable alternative livelihood strategies.	Income ranges from US$ 5-75 per month in the five CPA intervention sites.	At least 10 sustainable alternative livelihood strategies developed for the 5 CPA intervention sites (50% of beneficiaries to be women).
Identify target communities and areas for monitoring outside the CPA intervention sites. Develop socio-economic and ecological monitoring protocols. Train local communities to undertake the baseline surveys and data collection. Conduct baseline surveys. Develop and implement a tool to measure the downstream impact of the project. Collect data in a scientifically rigorous and statistically robust way. Undertake an economic analysis of the direct and indirect socio-economic, ecological and hydrological benefits in target community areas. Develop and implement long-term socio-economic and ecosystem research protocols for multi-use forests and conservation agriculture practices in CPA intervention sites and downstream community sites. Compile a report of the initial results.	2.4 Socio-economic and ecosystem monitoring of AF project impacts downstream of CPA intervention sites.	Number of monitoring reports and research protocols .	No knowledge of downstream impacts of ecoagriculture interventions in Cambodia.	At least 5 monitoring reports and research protocols (at least 1 each per CPA intervention site).

Component 3: Institutional capacity, awareness raising and upscaling of ecoagriculture interventions.

This component aims to: i) raise public awareness of the effectiveness of ecoagriculture interventions for adapting to climate change; ii) increase institutional capacity to implement ecoagriculture interventions; and iii) build on the enhanced capacity and awareness in order to develop a successful upscaling strategy.

Output 3.1: Awareness increased at a local level of the importance of ecoagriculture for protecting and enhancing commercial and subsistence activities.

This output will be focused on increasing awareness at local and national levels of the importance of ecoagriculture approaches and ecosystem services for protecting economic communities against climate variability. Activities include:

- Raise public awareness of the impacts of climate change and the benefits of adaptive agricultural techniques. This will be achieved using signboards, posters, booklets and pamphlets that describe the importance of restored forests and diversified/intensified agricultural practices for enhancing community resilience to climate change.

- Produce a documentary film to promote the ecoagriculture approach implemented within CPA intervention sites.
- Design and implement an awareness raising campaign focused on climate change adaptation and the advantages of the ecoagriculture approach. This campaign will specifically target rural, isolated communities outside of PAs.
- Establish demonstration gardens, farmer field days and workshops as teaching tools. Link farmers from the five CPA intervention sites to Farmer Field Schools[157] where appropriate.
- Target local communities situated in CPAs away from intervention sites for an additional awareness raising campaign to ensure that the results of ecoagriculture interventions implemented in Component 2 filter through CPA communities. Activities under this step will include school/university as well as local community (i.e. older generation) field trips to sites where ecoagriculture interventions have been demonstrated in Component 2.
- Undertake education initiatives at schools and universities. These initiatives will be focused on raising awareness of climate change and how multi-use forests and agricultural practices which enhance ecosystem services can reduce the negative impacts of climate change.
- 'Train the trainers' - professionals (*inter alia* teachers and lecturers) will be trained to present information about climate change impacts and adaptive solutions.
- Develop a web-based data network portal to supply information about the ecoagriculture interventions to local government agencies responsible for policy and planning development as well as local stakeholders e.g. management committees and user groups. Public reports will be compiled and disseminated through this website to raise general awareness regarding the project and restoring natural capital. The website will be linked to appropriate learning networks such as the Climate Change Adaptation Knowledge Platform for Asia, UNEP's Global Adaptation Network (GAN), UNEP's regional adaptation network for Asia and Pacific; the Adaptation Learning Mechanism[158] (ALM) and WikiAdapt[159].
- Use a social networking site to promote: i) information generated in the project, and ii) the documentary film.
- Promote the ecoagriculture activities and species used in the AF project through Reducing Emissions from Deforestation and Forest Degradation (REDD) as well as sustainable management of forests, forest conservation and the enhancement of forest carbon stocks (REDD+). A REDD+ feasibility assessment will be undertaken of the AF project concept (and a Project Idea Note developed if appropriate) to determine: i) if REDD+ could be an avenue to upscale the AF project interventions; and ii) if the AF project approach (including the adaptation activities resulting in decreased forest degradation; as well as multi-use tree species planted in the extensive forest restoration activities) can be incorporated into other REDD+ projects in Cambodia. Correspondence will be maintained between REDD+ project managers involved in the Cambodia UN-REDD National Programme and the AF project manager to ensure that the AF project builds on the successes of the UN-REDD National Programme.

Project summaries and concept notes will be distributed by the DRCPAD to the CPA Committee network. This will enable CPA communities to learn of the successes of the AF project as well as how these successes can be replicated in other CPAs.

Output 3.2: Ecoagriculture activities promoted through institutional capacity building and proposed revisions to policies, strategies and legislation.

This output will focus on building stakeholder capacity to incorporate ecoagriculture interventions into CPA management plans, as well as proposing revisions to policies, strategies and legislation where appropriate. Activities will include:

- Undertake capacity-building needs assessments to gauge the level of understanding of restoring natural capital and conservation agriculture amongst stakeholders at national and provincial levels. The assessments will use a gender-sensitive approach in which 50% of those consulted will be women. A set of training needs will be identified. Training course material and long term national and provincial training strategies will be developed and delivered to national and provincial institutions to increase their capacity to plan and manage ecoagriculture interventions.

[157] Farmer Field School approach is a group-based learning process first implemented by FAO. The goal is to increase agricultural productivity and empower principally small-scale farmers.
[158] See: http://www.adaptationlearning.net/.
[159] See: http://www.weadapt.org.

- Conduct Participatory Rural Appraisals (PRAs) of local communities at all CPAs (100) in Cambodia to inform the upscaling strategy undertaken in Output 3.3. Information will be collated to determine the appropriateness of the AF project interventions and the specific adaptation needs of other CPAs. This will build the MoE database and raise awareness about the importance of restoring natural capital and implementing conservation agriculture practices to build climate change resilience in all CPA communities. CPA management plans of the selected CPA intervention sites will be updated to include climate change adaptation activities implemented in Output 2.1, ensuring long-term adaptation benefits.
- Propose revisions to relevant national policies, strategies and legislation to incorporate the ecoagriculture approach and promote restoration as an adaptation measure for sustainable management of degraded ecosystems. Proposed revisions will promote upscaling of the project's adaptation interventions, and propose altering budgets where appropriate. This will be undertaken in collaboration with local authorities, management committees, water user groups, NGOs and local forest user groups. Policies that support the strengthening of CPA Management Committee mandates will be promoted. Such policies will provide support for on-the-ground activities and contribute towards ensuring the sustainability of AF project interventions.
- Encourage co-ordination and collaboration with other restoration projects at national and provincial levels. Collaboration between projects will contribute to the replication and upscaling of ecoagriculture activities as well as the effective use of financial and human resources.
- Conduct multi-stakeholder consultations on land tenure to generate a report with recommendations on how to encourage local communities to invest in the ecoagriculture approach. This will be achieved through the Participatory Rural Appraisals (PRAs) in all 100 existing CPA communities, as well as in communities surrounding areas identified by the Ministry of Environment as potential CPAs.

Output 3.3: National ecoagriculture upscaling strategy developed and institutionalised for CPAs in Cambodia.

This outcome of the AF project will focus on creating a national level strategy for upscaling the ecoagriculture approach. This will align with the MoE's goal to increase the number of CPAs in Cambodia from 100 to 120 by the end of 2015, and ultimately to 150. The project will integrate interventions and knowledge developed in Components 1 and 2 into national policies and development planning to create an enabling policy and strategy environment. On the basis of this, a strategy (additional to that developed in Output 3.2) to ensure integration of the lessons learned into national policy will be developed. This will be achieved through the following activities:

- Undertake a gap analysis of national development plans and policy to determine the extent to which ecoagriculture approaches are included.
- Identify existing entry points for proposed revisions which incorporate ecoagriculture approaches at a national scale.
- Establish an inter-ministerial (incorporating MoE, MAFF, MRD, MLMUPC, MoT, NCDM and CDC) and multi-partner (NGOs, private sector & local representatives) task group to facilitate the development of the upscaling strategy.
- Engage with the private sector to promote the upscaling of the ecoagriculture approach in other CPAs in Cambodia. The potential for commercial enterprise development of NTFPs and other natural resource-based businesses will be investigated and presented to appropriate private sector players. Commercially viable interventions will be promoted and additional business models developed for the private sector in order to capitalize on the AF investment.
- Investigate additional sources of funding for upscaling the AF project interventions to other CPAs.
- Identify successful ecoagriculture adaptation interventions from Components 1 and 2, and ensure that these are incorporated into the proposed national strategy revisions.
- Prepare a summary report and policy briefs promoting the AF project and ecoagriculture approaches.
- Distribute the summary report and policy briefs to ministries, including the MoE, MAFF, MRD, MLMUPC, MoT and NCDM.
- Institute a national education programme to promote lessons learned from demonstrations in intervention sites. This will be done using appropriate media (radio, television, websites, printed media, agricultural extension officers and websites).

Technical guidance provided by the AF project in combination with the leveraging capacity of the adaptation task group will support policies that secure budget allocations for the strategy (including revisions where appropriate). This will assist replication of successful project adaptation interventions at a national scale. Replication of appropriate interventions could, for example, be facilitated by ministerial declarations and revision of the legislation of PAs where barriers to replication are identified.

There are certain requirements which will influence the identification of suitable PA sites in which to implement the ecoagriculture interventions at a national scale. The suggested characteristics of target areas that are needed for successful upscaling are:

- sites with secure land-use rights;
- sites in which communities will be able to enjoy immediate benefits in the short term;
- sites in which farm inputs such as machinery and crop chemicals are available;
- sites which have access to the facilities required for training and capacity building; and
- communities which have established pathways for the dissemination of knowledge.

Component 3: Institutional capacity, awareness raising and upscaling of ecoagriculture interventions – activities, indicators, baselines and targets.

Activities	Expected concrete outputs	Output indicator	Baseline	Target
Outcome 3: Restoration and conservation agriculture interventions to build climate resilience of local communities mainstreamed into Cambodia's adaptation framework and related sector policies.				
Raise public awareness of the impacts of climate change and the benefits of adaptive agricultural techniques.	3.1 Awareness increased at a local level of the importance of ecoagriculture for protecting and enhancing commercial and subsistence activities.	Number of 'events' to raise awareness (including documentary films, campaigns, workshops, initiatives, network portals).	Very little awareness of the benefits of the ecoagriculture approach in Cambodia.	At least 28 'events' to raise awareness.
Produce a documentary film to promote the ecoagriculture approach.				
Design and implement an awareness raising campaign.				
Establish demonstration gardens, farmer field days and workshops as teaching tools.				
Target local communities situated in CPAs away from intervention sites for an additional awareness raising campaign.				
Undertake education initiatives at schools and universities.		Number of community members/farmers aware of conservation agriculture interventions.		At least 40% of community members/farmers at intervention sites adopting ecoagriculture practices.
'Train the trainers'.				
Develop a web-based data network portal to supply information about the ecoagriculture interventions to local government agencies.				
Use a social networking site to promote: i) information generated in the project; and ii) the documentary film.				
Promote the ecoagriculture activities and plant species used in the AF project in other REDD as well as REDD+ projects.		Number of REDD(+) feasibility studies and Project Idea Notes developed.	REDD(+) projects in Cambodia are not promoting ecoagriculture activities or species from multi-use forests.	At least 1 REDD+ feasibility study and Project Idea Note (if appropriate).
Undertake capacity-building needs assessments.	3.2 Ecoagriculture activities promoted through institutional capacity building and proposed revisions to policies, strategies and legislation.	Number of proposed revision of policies, strategies and legislation.	Climate change and the ecoagriculture approach has not been integrated into key agricultural, forestry and development policies, strategies and plans e.g. Strategic	At least 3 revisions to key policies, strategies and legislation documents proposed.
Conduct PRAs of local communities at all CPAs in Cambodia.				
Propose revisions to relevant national policies, strategies and legislation to incorporate the ecoagriculture approach and promote restoration as an adaptation measure.				
Encourage co-ordination and collaboration with other restoration projects at national and provincial levels.				

Conduct multi-stakeholder consultations on land tenure to generate a report with recommendations on how to encourage local communities to invest in the ecoagriculture approach.			Agriculture Development Plan.	
Undertake a gap analysis of national development plans and policy. Identify existing entry points for proposed revisions which incorporate ecoagriculture approaches at a national scale. Establish an inter-ministerial and multi-partner task group to facilitate the development of the upscaling strategy. Engage with the private sector about the commercial viability of AF project interventions. Investigate other sources of funding for the upscaling of AF project interventions. Identify successful ecoagriculture adaptation interventions from Components 1 and 2, and ensure that these are incorporated into the proposed national strategy revisions. Prepare a summary report and policy briefs promoting the AF project and ecoagriculture approaches. Distribute the summary report and policy briefs to ministries. Institute a national education programme to promote lessons learned from demonstrations in intervention sites.	3.3 National ecoagriculture upscaling strategy developed and institutionalised for CPAs in Cambodia.	Number of upscaling strategies developed.	No such strategy exists.	1 national ecoagriculture upscaling strategy developed.

B. Describe how the project / programme provides economic, social and environmental benefits, with particular reference to the most vulnerable communities.

Climate variability is already reducing agricultural productivity as well as the flow of food supplies from forests and agricultural fields. This situation is likely to be exacerbated by predicted climate change-induced increases in drought and flood occurrence. This AF project aims to remedy this situation through its ecoagriculture approach focussed on restoring degraded areas to multi-use forests, planting multi-use tree species along rice paddy boundaries and other existing cultivated areas, establishing trial plots of drought-tolerant hybrid rice cultivars, and intensifying/diversifying existing agricultural areas. The AF project approach (extensive and intensive ecoagriculture interventions) has been specifically designed to address community problems related to resource management and underlying drivers of vulnerability. These problems have been identified through extensive consultations in the First and Second CPA Community Surveys and include: i) a strong dependence of communities on rain-fed, unimproved agriculture; ii) a strong dependence of communities on one crop, namely rice; iii) high poverty levels in all communities surveyed; iv) deforestation; and v) erosion due to land mismanagement. See Table 2 in Section I.1.10 for a summary of the problems related to resource management experienced by the community at each CPA intervention site, as well as the proposed solutions and adaptation benefits which will be achieved through the AF project. The results of the Second CPA Community Survey were used to prioritise the CPA intervention sites (see vulnerability matrix in Annex III) to: i) allow effective management of AF resources; and ii) ensure that the

maximum possible benefits of the AF project are realised in the most vulnerable communities. The complimentary, additional set of adaptation activities, presented in the Project Concept have been prioritized and specifically tailored to each CPA intervention site. This prioritization was based on the community responses to the Second CPA Community Survey. The complementary activities are designed to maximise the adaptation benefits of the conservation agriculture activities (intensive approach) in each CPA community. The achievement of these benefits is deemed to be realistic given: i) the cost effective approach (see Part II.C); ii) the training components of the project (see Part II.A); and iii) the commitment of the communities to maintaining the sustainability of the adaptation interventions. This commitment has been fostered by the participatory approach adopted in developing the AF project (see Part I.1.8 and Annex III for an example of a letter from CPA Management Committee).

The specific benefits of the AF project approach are detailed below.

Benefits to communities within target CPAs

Direct benefits from the AF project will include: i) improved food supply; ii) an enhanced safety net (in terms of natural resources) during times of hardship (drought, flood and death)[160]; iii) reduced soil erosion; iv) increased NTFPs from multi-use forests; v) increased, timber and fuelwood; vi) enhanced recreation and tourism opportunities; vii) improved post-harvest storage techniques; viii) improved crop pest and disease management; ix) increased awareness and understanding of ecoagriculture practices; and x) training on how to maintain the multi-use forests and agricultural areas. Indirect benefits will include: i) pollution reduction; ii) watershed protection (flood control); iii) improved soil fertility; iv) nutrient cycling; v) micro-climatic regulation (long-term); vi) carbon storage and vii) protection of biodiversity[161]. Communities within CPA intervention sites will immediately perceive the short-term benefits of an intensified multi-crop system, which will include:

- enhanced and diversified food supply as well as benefits such as improved health;
- improved livelihoods and diversified income sources including access to markets and facilitation to micro-finance and weather index-based insurance information;
- decreased loss of crops due to climate-related hazards; and
- decreased impact of climate-related hazards such as floods as a result of decreased run-off.

Direct and indirect use values will support economic activity and human welfare within communities. These factors are important for the quality of life of rural communities.[162] The social, economic and environmental benefits of the this project will reach at least 1,907 families within the five CPA intervention sites situated in areas identified as most vulnerable to the impacts of climate change in Cambodia's PAs (see target area selection in Section I.1.10).

Benefits to areas outside of the immediate target CPAs

Benefits of the AF project interventions to communities outside the CPA intervention sites include:

- improved water quality for downstream water users as a result of interventions that reduce soil erosion (e.g. tree planting and the establishment of multi-use forests, terracing, pond/dam construction);

[160] Fiona Paumgarten. The role of non-timber forest products as safety-nets: A review of evidence with a focus on South Africa. GeoJournal (2005) 64: 189–197

[161] Camille Bann 2003. An Economic Analysis of Tropical Forest Land Use Options, Ratanakiri Province, Cambodia http://203.116.43.77/publications/research1/ACF4B.html

[162] Balmford, Andrew, et al., 2002. "Economic reasons for conserving wild nature." *Science* 297: 950-953.

- increased water flow in rivers and streams for downstream water users as a result of interventions that increase infiltration into soil properties (e.g. tree planting and fire management);
- enhanced awareness of local communities and local authorities of the role of secure land tenure provided by CPAs in promoting long term adaptation investments;
- enhanced public awareness of climate change and appropriate adaptation interventions through a public awareness raising campaign, as well as training of local authorities and agricultural extension officers;
- increased adoption of adaptation interventions (e.g. introduction of drought-resilient crop species) by communities outside CPA intervention sites as a result of information sharing between CPA communities resulting from community field visits to CPA intervention sites as well as general public awareness raised by the AF project; and
- greater trade in agricultural produce and natural resource products generated by the AF projects' intensive agriculture activities and establishment of multi-use forests.

Increased watershed protection and increased carbon storage will benefit 5,000 to 9,000 families[163] outside of the targeted CPAs. Benefits will contribute to improving socio-economic wellbeing and building resilience of CPA communities to the impacts of climate change. Without the project's proposed interventions, food supply for rural communities in these areas will remain a major challenge which will be further exacerbated by climate change.

Participation will be a key factor during the planning and implementing phases of the AF project. A participatory and livelihoods approach involving the community will create awareness and knowledge sharing. Effective participation in the project will form the basis of long-term consensus building.

Gender equality will be a focal point of training and skills development in this project. Women will gain the skills and exposure needed to increase their representation in community structures such as CPA Management Committees and local user groups. At a national level, the socio-economic benefits to be delivered by the AF project will include increased awareness and technical capacity of policy-makers and government institutions with regards to forest restoration, conservation agriculture and alternative climate change adaptation approaches.

Benefits from the project will accrue at different timescales. For example, certain tree species used for NTFPs, timber and resin will only produce fruit or harvestable timber 10-20 years after restoration implementation. Alternatively, fast growing fodder and vegetable crops will produce more immediate benefits. Specific short (1 year), medium (5 years) and long-term (>10 years) expected benefits of this project for Component 1 – 3 are described below:

Table 4: Short, medium and long-term social, economic and environmental benefits of the AF project.

Component	Social benefits	Economic benefits	Environmental benefits
Component 1: Protocols for ecoagriculture interventions.	**Short- to long-term:** • Increased knowledge and technical expertise on forest restoration, conservation agriculture and additional climate change adaptation	**Short- to long-term:** • Increased profit margins will be realized as a result of increased and resilient crop, NTFP and rice yields resulting from increased	**Short- to long-term:** • Increased protection of natural resources as a result of increased awareness of climate change impacts.

[163] Cambodia National Report on Protected Areas and Development. Review of Protected Areas and Development in the Lower Mekong River Region, Indooroopilly, Queensland, Australia. 148 pp.

	approaches. • Increased technical and managerial capacity for developing and implementing plans for efficient adaptation approaches to climate change. • Increased gender equality and representation by women within community structures (50% of those selected for skills development will be women). • Increased skills in resource economics focused on cost-benefit analyses of different climate change adaptation approaches.	forest stewardship and restoration as well as intensified conservation agriculture areas and practices. • Increased financial returns as a result of business plans developed to facilitate establishment of alternative livelihoods. • Further increases in household incomes will be realized as a result of diversified livelihoods. • Increased financial stability during times of hardship (drought, floods or deaths). • It is likely that these benefits will only be fully realized during component 2 (see below). • Reduced agricultural risk through the provision of short- and medium-term climate forecast information.	• Increased security around forest areas as a result of buy-in from the community. • Increased number of management committees focused on promoting sustainable/conservation agriculture approaches. • Increased knowledge of forest and agricultural ecosystems through PhD and MSc projects.
	Medium-to long-term: • Increased potential to diversify livelihood strategies.		
Component 2: Concrete ecoagriculture adaptation interventions.	**Short- to long-term:** • Enhanced food supply. • Improved livelihoods through adoption of multiple livelihood strategies and diversified incomes, food sources, skills and social institutions[164]. • Increased knowledge through training provided on the ecoagriculture approach. • Increased supplies of NTFPs such as medicinal plants and fodder. • Increased resilience of animal husbandry as a result of increases in fodder production. • Increased utilization of priority crops with multiple health and particularly nutritional benefits. • Decreased flooding intensity as a result of decreased water runoff.	**Short- to long-term:** • Increased profit margins as a result of increased yields and resilience of NTFPs (medicinal and aromatic plants) as well as increased crop yields[165]. • Facilitation of micro-finance to farmers to increase agricultural production. • Increased household incomes through increases in NTFPs (fodder, medicinal and aromatic plants) from restored forests. Benefits include US$ 17 ha^{-1} yr^{-1} resulting in a net present value of US$ 697 over 90 years (discounted at 6%) and a value of US$ 1,530 (not discounted)[166]. • Benefits from intensified/diversified conservation agriculture includes US$ 930 per ha per crop cycle averaged over 17 different crop species (ranging from US$ 204 for	**Short- to long-term:** • At least 1,875 ha of degraded forest will be restored. • Reduced deforestation and overutilization of forest resources through the i) provision of NTFPs from multi-use trees; ii) intensified/diversified production within agricultural areas; and iii) provision of fuelwood from woodlots. • Protection and sustainable use of the forest and its resources resulting in enhanced biodiversity. • Reduced erosion through the use of terracing. • At least 337 ha of existing agriculture areas (including homegardens) intensified/diversified and restored as functioning conservation agriculture croplands using ~17 crop species.

[164] Fiona Paumgarten. The Role of non-timber forest products as safety-nets: A review of evidence with a focus on South Africa. GeoJournal (2005) 64: 189–197.
[165] Dumanski, J., R. Peiretti, J. Benetis, D. McGarry, and C. Pieri. 2006. The paradigm of conservation tillage. Proc. World Assoc. Soil and Water Conserv.P1: 58-6.
[166] Camille Bann. 2003. An Economic Analysis of Tropical Forest Land Use Options, Ratanakiri Province, Cambodia http://203.116.43.77/publications/research1/ACF4B.html.

		coconut to US$ 4,968 for citrus per ha per year) (see Annex VII). • Provision of water for irrigation using adaptation techniques such as drip irrigation, AMIT and through the construction of dams, ponds and canals. • Reduced loss of harvest through improved post-harvest storage techniques and improved crop pest and disease management.	• At least 2,286 ha of rice paddies will be bordered with nitrogen-fixing trees. • At least 300 ha of drought-tolerant rice will be trialled.
	Medium- to long-term: • Decreased number of malnourished families. • Increased cultural, recreational and tourism opportunities. • Strengthened forest safety nets providing forest resources during events such as droughts, floods or death[167].	**Medium- to long-term:** • Sustained and resilient crop yields in dry years where conventional agricultural approaches would have limited success[168] as well as sustained and resilient crop yields in wet years, comparable to conventional agricultural approaches. This is achieved with less fertilizer and other inputs and therefore reduced costs[169]. • Reduced production costs within 3 to 5 years as a result of increased organic matter and nitrogen fixing bacteria[170]. Nitrogen fixers can save a farmer US$ 20-48 (and up to US$ 200 in the case of *Leucaena leucocephala*) (see Annex VI). • Increased forest services including watershed benefits of US$ 76 ha^{-1}, biodiversity benefits of US$ 511 ha^{-1} and carbon storage of US$ 7 ha^{-1} over 90 years (discounted at 6%)[171]. • Increased soil carbon by 5-15%. An increase of one tonne of soil carbon in degraded cropland soils may increase crop yield by 10 to 20 kg ha^{-1} for maize[172].	**Medium- to long-term:** • Increased maintenance and provisioning of ecosystem services such as carbon sinks, water flow regulation, erosion control, pollination and soil fertility[173]. Within five years, forest restoration can result in a decrease in soil erosion by 6-30%[174] as well as a reduction in surface run-off by 20%[175]. After five years, converted agricultural plots may reduce surface runoff by 75-85% and soil erosion by 85-95%[176]. • Increased amount and quality of habitats for animals and plants. • Increased organic matter in agricultural areas as a result of reduced soil erosion, increased crop yields and plant growth[177]. • Increased soil carbon sinks as a result of decreased erosion and increased crop yields[178]. • Enhanced carbon sequestration contributing to mitigation of climate change[179]. • Increased soil quality in terms of organic matter, and nutrients (N, P, K, Ca,

[167] Fiona Paumgarten. The Role of non-timber forest products as safety-nets: A review of evidence with a focus on South Africa. GeoJournal (2005) 64: 189–197.
[168] Dumanski, J., R. Peiretti, J. Benetis, D. McGarry, and C. Pieri. 2006. The paradigm of conservation tillage. Proc. World Assoc. Soil and Water Conserv.P1: 58-6.
[169] Ibid.
[170] Ibid.
[171] Camille Bann. 2003. An Economic Analysis of Tropical Forest Land Use Options, Ratanakiri Province, Cambodia http://203.116.43.77/publications/research1/ACF4B.html.
[172] Sodhi and Ehrlich: Conservation Biology for All. http://ukcatalogue.oup.com/product/9780199554249.do
[173] Dumanski, J., R. Peiretti, J. Benetis, D. McGarry, and C. Pieri. 2006. The paradigm of conservation tillage. Proc. World Assoc. Soil and Water Conserv.P1: 58-6.

			and Mg) resulting from feedback mechanisms associated with increases in plant biomass and grain yields[180,181] related to nitrogen-fixing trees and conservation agricultural practices.
	Long-term: • Increased supplies of timber, fuelwood and NTFPs such as resin, malva nuts and fibres. • Increased health as a result of decreased flooding, reduced soil erosion and increased soil fertility. • Increased water availability from sustained river flow during dry periods resulting from improved water infiltration. • Increased resistance and resilience to the impacts of climate change.	**Long-term:** • Increased profit margins as a result of increased and resilient NTFPs such as malva nuts, timber and crop yields[182]. After 15 to 20 years fruit can be harvested from malva nut trees resulting in benefits of US$ 131 per household per harvest[183]. Collection of other long-term products such as rattan and resin can contribute US$ 600 and US$ 300 respectively per household after >10years[184]. Sustainable timber harvesting from restored communities will result in long term (10-30 yrs) benefits of US$ 24 ha^{-1} yr^{-1} resulting in net present value benefits of US$ 247 ha^{-1} over 90 years (discounted at 6%) and US$ 2,160 ha^{-1} (not discounted). Overall for a range of NTFPs including malva nuts, rattan and resin, benefits of US$ 366 ha^{-1} yr^{-1} resulting in a net present value of US$ 3,922 over 90 years (discounted at 6%) and US$ 32,940 over 90 years (not discounted) will be gained[185]. • Increased rice production and yields from watershed	**Long-term:** • Increased forest and crop species diversity creating resilience to climate change and sustained ecosystem functioning and services[187].

[174] Liu, J., Li, S., Ouyang, Z., Tam, C., & Chen, X. 2008. Ecological and socioeconomic effects of China's policies for ecosystem services. Proceedings of the National Academy of Sciences of the United States of America, 105(28), 9477-82. doi: 10.1073/pnas.0706436105.
[175] Brauman, K.A., Daily, G.C., Duarte, T.K., Mooney, H.A., 2007. The nature and value of ecosystem services: An overview highlighting hydrologic services. Annual Review of Environment and Resources 32, 67-98.
[176] Ibid.
[177] Dumanski, J., R. Peiretti, J. Benetis, D. McGarry, and C. Pieri. 2006. The paradigm of conservation tillage. Proc. World Assoc. Soil and Water Conserv.P1: 58-6.
[178] Ibid.
[179] Ibid.
[180] Sae-Lee S, Vityakon P, Prachaiyo B. 1992. Effects of trees on paddy bund on soil fertility and rice growth in Northeast Thailand. Agroforestry Systems 18 (3) 213-223.
[181] FAO http://www.fao.org/DOCREP/006/Y4751E/y4751e0k.htm.
[182] Dumanski, J., R. Peiretti, J. Benetis, D. McGarry, and C. Pieri. 2006. The paradigm of conservation tillage. Proc. World Assoc. Soil and Water Conserv.P1: 58-6.
[183] Rural Livelihoods and Natural Resources Development Research Programme, 2010. Social Landscapes and Rural Livelihoods. Cambodian Commmunities in Transition. Phnom Penh: The Learning Institute.
[184] Tola et al., 2010. Economic Importance of Non-Timber Forest Products.
[185] Camille Bann 2003. An Economic Analysis of Tropical Forest Land Use Options, Ratanakiri Province, Cambodia. Available from: http://203.116.43.77/publications/research1/ACF4B.html. [Accessed 4 November 2011].
[187] Isbell, F. 2010. High plant diversity is needed to maintain ecosystem services. Nature Letters doi:10.1038/nature10282

		benefits such as protection from flooding and soil erosion resulting from restored forests and conservation agriculture lands. • Reduced costs associated with flood damage (infrastructural damage and livelihood losses). A 10% increase in natural forest area can lead to a decrease in flood frequency between 4% and 28%, and to a decrease in flood duration at the country scale of between 4 % and 8%[186].	
Component 3: Institutional capacity, awareness raising and upscaling of ecoagriculture interventions.	**Short- to long-term:** • Increased awareness and technical capacity of policy-makers and government institutions regarding forest restoration and conservation agriculture. • Increased capacity of professionals (*inter alia* teachers and lecturers) to present information about climate change. • Increased public climate change awareness through education initiatives at schools and universities. • Increased gender equality at a national level (50 % of participants involved will be women). • Increased capacity of local authorities to develop and implement restoration and agriculture plans using evidence-based protocols. • Increased awareness on the importance of improving resistance and resilience to climate change in the target CPA communities as well as in other rural communities through an awareness raising campaign including *inter alia* a documentary film on the success of the ecoagriculture approach.	**Medium-to long-term:** • Sustainable and resilient yields of crops, NTFPs, timber and fuelwood for the medium- and long-term income generation.	**Long-term:** • Further long-term reductions in deforestation and forest degradation associated with increases in ecosystem services.

C. Describe or provide an analysis of the cost-effectiveness of the proposed project / programme.

The selected adaptive measures contained in the AF project consist mainly of a series of targeted activities designed to restore natural capital and achieve a sustainable and resilient increase in agricultural productivity as a means to reduce

[186] Brauman, K.A., Daily, G.C., Duarte, T.K., Mooney, H.A., 2007. The nature and value of ecosystem services: An overview highlighting hydrologic services. Annual Review of Environment and Resources 32, 67-98.

the vulnerability of rural Cambodian communities. The identified activities are no-regret[188], low cost and concrete with tangible benefits. As part of the development of the INC and the NAPA, analyses were undertaken to prioritize adaptation interventions. Multi-criteria analyses were undertaken as part of the NAPA process in order to prioritize actions according to their potential for positive effects on economic development, social capital and environmental management. Cost-effectiveness was a criterion used to measure economic development. As such, the actions proposed by the NAPA are not only the most urgent and most pressing, but have also been assessed to be cost-effective. The activities undertaken in the AF project are prioritised in the NAPA (see Section II.D below) and as such are already identified as cost-effective by the RGC.

The targeted interventions are based on recognised best practices from the ecological sciences and known to be cost-effective. The interventions are also based on those listed among the 400 different adaptation measures identified in the UNEP-GEF McKinsey Report[189] on the Economics of Climate Change Adaptation. The conservation agriculture interventions are low-input, high value activities that will reduce the vulnerability of rural communities[190]. Importantly, these are compatible with PAs as they are highly intensive without further impacting on natural ecosystems. Together these two approaches will contribute to the Green Economy[191] which is of global importance. Additionally, the AF project approach will build on the existing climate change structures set up under the Least Developed Country Fund (LDCF) projects, further enhancing cost-effectiveness.

Cost-benefit analyses undertaken in the UNEP-GEF McKinsey Report demonstrate clearly that a country can prevent much of its expected losses through relatively low cost measures. The expected benefits of restoration and intensification included in Components 1 and 2 are inversely proportional to the costs of such activities i.e. they are low cost but have high benefits. Ecosystem services provided by restored ecosystems are difficult to value, however, there is growing evidence of the cost-effectiveness of these measures. Restoring the natural capital of forests has multiple benefits for communities. It is anticipated that the benefits will greatly exceed the costs and help prevent climate change-induced losses (see section II.B). Training on the maintenance and improved management (relative to current management practices) of multi-use forests and agricultural areas will further ensure the cost-effectiveness of the AF project adaptation interventions.

Table 5 below presents a summary of the costs and benefits of the AF ecoagriculture interventions and alternative interventions for adapting to the hazard of erratic rainfall (which is resulting in a decrease in food supplies and an increase in soil erosion). The AF project interventions have been reduced, refined and prioritized from the package presented in the Project Concept. The results of the Second CPA Community Survey were used to confirm the scale of the extensive and intensive ecoagriculture interventions, and tailor the additional adaptation activities to the specific needs of each CPA intervention site. This was undertaken to ensure that the maximum benefits of the AF project are achieved in the most cost-effective manner possible whilst at the same time addressing the problems experienced by the respective communities. A breakdown of the costing and justification of forest restoration activities is provided in Annex V. A breakdown of the costing and justification of each of the additional activity per CPA intervention site, as well as the scale of the intensive and extensive ecoagriculture approach interventions, is provided in Annex IX. It is evident from the information in Table 5 below that the interventions selected for implementation in the AF project are the lowest cost interventions.

[188] No-regret options are those that are justified by current climate conditions and further justified when climate change is considered, e.g. pollution reduction in water supplies will be beneficial if water supplies decrease as a result of climate change. Lim. B, and E. Spanger-Siegfried. 2004. Adaptation policy frameworks for climate change: developing strategies, policies and measures. Cambridge University Press, Cambridge, UK pp 253.

[189] The McKinsey Group, 2010. Shaping Climate-Resilient Development. http://www.mckinsey.com/App_Media/Images/Page_Images/Offices/SocialSector/PDF/ECA_Shaping_Climate%20Resilent_Development.pdf. [Accessed 2 September 2011].

[190] FAO. 2011. "Climate-Smart" Agriculture – Policies, Practices and Financing for Food Security, Adaptation and Mitigation. Food and Agriculture Organisation, Rome.

[191] UNEP, 2011. Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication - A Synthesis for Policy Makers. http// www.unep.org/greeneconomy. [Accessed 4 November 2011].

Table 5: Costs and benefits of the AF project and alternative interventions.

AF Project interventions	AF Project cost	Tangible Adaptation Benefits	Loss averted	Alternative interventions and trade-offs
Restoring natural capital to increase food supplies from forests and reduce soil erosion – i.e. establish groves and forests[192,193,194,195,196] that provide food and are particularly effective at stabilizing soils. Enrichment planting of the border of rice paddies and other existing cultivated areas with multi-use tree species and legumes to fix atmospheric nitrogen and enhance crop productivity[197]. Drought tolerant rice varieties trialled at each intervention site[198,199,200,201]. Conservation agricultural practices which intensify and diversify agriculture practices and areas (including 'homegarden' or '*chamcar*' plots) by encouraging the cultivation of various	US$ 1,573,125 (1,875 ha x US$ 839 ha^{-1}) [203] US$ 244, 602 (2,286 ha x US$ 107 ha^{-1}) US$ 29,400 (300 ha x US$ 98 ha^{-1})[204] US$ 201,561 (337 ha x US$ 153 ha^{-1} + US$ 150,000 for irrigation[205])	• Increased food supply. • Additional benefits such as increased NTFPs, fuelwood and fodder. • Increased agricultural production. • Reduced loss of harvest through improved post-harvest storage techniques and improved crop pest and disease management. • Hundreds of years of sustainable supply of food, NTFPs and timber. • Reduced erosion[206]. • Reduced water use as a result of drought-tolerant species and efficient irrigation techniques. • Increased soil moisture content. • Additional benefits such as decreased river siltation and	• Food insecurity. • Health problems associated with malnutrition. • Erosion of topsoil. • Water losses as a result of excessive runoff and minimal infiltration into the soil profile. • River siltation.	• ***Intensify agricultural production through increased inputs of pesticide, herbicide and fertilizer.*** <u>Trade off</u> i) Agricultural input of pesticides, herbicides and fertilizer: - has high costs; - requires agricultural extension support which has a cost implication to government; - has negative environmental impacts; and - can still result in crop failure from climate change hazards. ii) Agricultural input of overhead irrigation (as opposed to AMIT): • has high costs[207,208]; • requires agricultural extension support which has a cost implication to government; • requires maintenance[209]; and • can still result in crop failure from climate change hazards. • ***Import staple foods***

[192] Agroforestry costs **~US$ 960** per ha in Bangladesh. Rahman, S. A., Paras, F. D., Khan, S. R., Imtiaj, A., Farhana, K. M., Toy, M. M., Akhand, M. B., Sunderland, T. 2011. Initiatives of tropical agroforestry to sustainable agriculture: A case study of Capasia Village, Northern Bangladesh. Journal of Horticulture and Forestry 3(4): 115-121.
[193] Agroforestry in Cambodia costs **~US$ 300** - **US$ 500** per ha in a 2011 project. Information obtained from the Wildlife Alliance in Cambodia.
[194] Woodland restoration costs **~US$ 1,750** per ha in Australia. Source: http://fotpin.hussat.com.au/docs/woodland-restoration-implementation-plan%20.pdf. [Accessed 4 September 2011].
[195] Bottomland Forest restoration costs **~US$ 178** - **US$ 267** per ha in a USA based project. National Research Council. 1991. Restoration of Aquatic Ecosystems: Science, Technology, and Public Policy. National Academy Press, Washington. DC.
[196] Spekboom Thicket restoration costs **~US$860** per ha in South Africa.
[197] See Annex V.
[198] Cost of establishing rice plantations in Kenya: **~US$ 35** per ha. Source: http://www.agribusinessweek.com/tips-on-growing-hybrid-rice/. [Accessed 4 November 2011].
[199] Cost of establishing rice plantations in Philippines: **~US$ 181** per ha. Source: http://www.agribusinessweek.com/tips-on-growing-hybrid-rice/.
[Accessed 4 November 2011].
[200] Cost of establishing rice plantations in Philippines: **~US$ 112** per ha. Source: http://rbvergara.files.wordpress.com/2008/06/hybrid-rice-research.pdf
. [Accessed 4 November 2011].
[201] Cost of establishing rice plantations in Philippines: **~US$ 65** per ha. Source: http://www.asiarice.org/sections/whatsnew/Philippines86.html. [Accessed 4 November 2011].

beneficial crop species[202] in combination with improved irrigation. Additional adaptation activities to complement the conservation agriculture interventions in order to maximise the adaptation benefits of the AF project (activities include terracing, constructing dams/ponds/canals, fire breaks, distributing seeds to local businesses, establishing woodlots, improving post harvest storage, improving pest and disease management, as well as other activities requested by the community).	US$ 407,475 (Chiork Beungprey US$ 32,328; Ronouk Khgeng US$ 36,918; Chom Thlork US$ 187,494; Skor Mreach US$ 101,545; and Chop Tasok US$ 49,190) See Annex VIII for a breakdown of the cost of additional adaptation activities per CPA intervention site.	increased river flow. • Long-term sustainable livelihood strategies for vulnerable communities. • Increased climate change knowledge at the community level (on maintaining agricultural productivity under a changed climate) as well as general public levels (through an awareness raising campaign).		***such as rice.*** Trade off i) Importing food has high costs with increasing risks of further hikes in prices. ii) A strong reliance on imported staple food results in limited national and local food security. • ***Set up new manufacturing industries to provide alternative livelihoods.*** Trade off i) Potential reduction in food producers and food supplies. ii) Reliance on very robust global markets. iii) Costly to implement. iv) Negative environmental impacts. **These options were rejected** because of high costs or limited impacts in isolation. In addition, some options presented negative environmental impacts or had limited long-term sustainability under future climate change conditions. This is in comparison to restoring natural capital and intensifying/diversifying agriculture using conservation agriculture principles, which is a relatively low cost option, is compatible with PAs and will provide benefits to vulnerable communities after the project lifetime.

[203] See Annex IV
[204] Average value taken from references in footnotes 198-201. Research costs included in Output 1.1.
[205] Based on providing 1,907 families with an AMIT package (**US$ 79**; US$ 20 for the kit consisting of plastic pipes and low discharge emitters; US$ 59 for water tank and maintenance.
[206] 27% of Drylands in Africa are affected by soil degradation of different degrees. In Madagascar, average loss from soil erosion is estimated at **US$ 143 – US$ 215** per [ha] per year (year equivalent), whilst in Zimbabwe the financial cost of erosion is **US$ 29 –US$ 71** per ha per year on arable land and **US$ 80** per year on grazing land. Darkoh, M.B.K., 1996. The Human Dimension of Desertification in the Drylands of Africa. Journal of Social Development in Africa 11 (2): 89-106.
[207] The cost of irrigation system development varies according to the type of irrigation technology. For surface irrigation the cost ranges from **~US$ 1,000** - **US$ 1,500** per ha, and for sprinkler irrigation from **~US$ 1,500** - **US$ 2,000** per ha. The rehabilitation cost of irrigation, depending on the condition of the old system, can vary between **US$ 500** - **US$ 1,500** per ha. Source: http://www.fao.org/nr/water/aquastat/countries_regions/mozambique/index.stm. [Accessed 4 November 2011].
[208] [Investment] costs for new irrigation schemes in Africa are substantial, varying between **~US$ 5,000** - **US$ 25,000** per ha, and are on average much more expensive than similar investments in Asia. IAC Report. 2004. Realising the promise and potential of African Agriculture. Chapter 3 African agriculture production systems and productivity in perspective.
[209] Maintenance costs are **~US$ 500** per ha per year. Available from: http://www.fao.org/nr/water/aquastat/countries_regions/mozambique/index.stm. [Accessed 4 November 2011].
[202] See Annex VI.

D. Describe how the project / programme is consistent with national or sub-national sustainable development strategies, including, where appropriate, national or sub-national development plans, poverty reduction strategies, national communications, or national adaptation programs of action, or other relevant instruments, where they exist.

Addressing food supply is a high-priority under Cambodia's sustainable development strategies. The AF project will contribute towards achieving the objectives of the following strategies and plans:

- **National Sustainable Development Strategy (NSDS, 2009),** particularly the objectives on: i) poverty alleviation and food security; ii) gender equality; and iii) sustainability use of natural resources and the environment. The AF project will contribute to nine of the 15 **Environmental Quality Objectives** for Cambodia contained in the NSDS, i.e. Productive Land Resources; Rich Forest Resources; High Quality Ground- and Surface Water Resources; Rich Biodiversity; Limited Influence on the Climate; Non-Toxic Environment; Good Living Environment; Efficient Use of Natural Resources and Limited Waste Generation; and Limited Impact from Natural Disasters.
- **National Strategic Development Plan (NSDP, 2006-2010)**. The NSDP is a broad framework that aims to harmonise sustainable development efforts and the effectiveness of aid. The NSDP has been updated (2009-2013) to address Cambodia's main priorities, including climate change. The NSDP's main purpose is to implement the **Rectangular Strategy (RS)** for Growth, Equity and Efficiency adopted by the RGC in which the Government's priority goals and strategies are aimed at the reduction of poverty and the achievement of **Cambodia's Millennium Development Goal (CMDG)** targets. The AF project will contribute to the achievement of Goal 1 (extreme poverty and hunger eradication) and Goal 7 (environmental sustainability).
- **National Adaptation Programme of Action to Climate Change (NAPA, 2006),** specifically the priorities 2b (Rehabilitation of Upper Mekong and Provincial Waterways), 3a (Vegetation Planting for Flood and Windstorm Protection) and 3f (Promotion of Household Integrated Farming). Priority 2b will be partially achieved through the restoration of forests in the catchment of the Upper Mekong River. Priority 3a will be partially achieved through the restoration of forests in a number of degraded CPA sites, which will stabilize soils and contribute to reducing the impact of floods. Priority 3f will be partially achieved though the intensification and diversification of existing agriculture practices and areas (including homegardens and green manuring methods). The AF project will therefore create an enabling environment for the full achievement of the NAPA goals.

In addition, the AF project is consistent with the following legal, policy, planning and institutional efforts directly linked to sustainable development:

- 1994-95 "National Programme to Rehabilitate and Develop Cambodia" (NPRD);
- 1996-2000 "First Five Year Socio-Economic Development Plan" (SEDP-I);
- 2001-2005 "Second Five Year Socio-Economic Plan" (SEDP-II);
- 1998-2002 "National Environmental Action Plan" (NEAP);
- Interim Poverty Reduction Strategy Paper;
- Article 59 of the Constitution of Cambodia;
- establishment of the MoE in 1993;
- Royal Decree on the Creation and Designation of Protected Areas;
- Law on Environmental Protection and Natural Resource Management; and
- Sub-decrees on Pollution Control, Environmental Impact Assessment (EIA), Land Law, Mineral Law and Forestry Law.

The AF project is well aligned with the national **Strategic Agriculture Development Plan** and the **Strategy for Agriculture and Water** (2006-2010), particularly the following objectives:

- mobilize natural resources: water, land, soil;
- mobilize human and financial resources;

- empower people and communities; and
- increase productivity of agriculture.

Cambodia's food security strategies are captured within the **RS**, the corner stone of the **NSDP**. The AF project aligns well with the first pillar i.e. Enhancement of the agricultural sector: improving agricultural productivity and diversification. The AF project will therefore contribute to achieving Cambodia's agricultural and food security goals.

Whilst not development plans, the AF project interventions are in line with the following programmes related to forestry and degradation:

- **National Forest Program** (Forestry Administration, MAFF); and
- **National Action Plan to Combat Land Degradation and Desertification** (MAFF).

The project will be aligned with the National Adaptation Plans (NAPs) processes as approved by the Durban Decision[210] on the NAPs for LDCs adopted in December 2011, which will enable LDCs, including Cambodia, to set up a continuous, long-term, progressive and iterative planning process for adaptation. This alignment will increase the long term sustainability of project interventions. Finally, the MoE has sent endorsement for the UNEP umbrella programme to support the preparation of the 3rd National Communication to the UNFCCC. The AF project will support this process through the knowledge generation activities.

E. Describe how the project / programme meets relevant national technical standards, where applicable.

There are no relevant national technical standards for tree planting, forest restoration or conservation agriculture related to climate change in Cambodia. As such, international best practice standards will be followed throughout the AF project. All intervention activities will be implemented in strict adherence with the requirements of the Environmental Impact Assessment (EIA) process. According to the August 1999 sub-decree following the December 1996 Law on Environmental Protection and Natural Resource Management (11 Chapters, 27 Articles, Approved 24 December 1996), EIAs are required for projects of varying type and scale. Of relevance to forestry is the clearing of land for: i) concession forestry; ii) logging; and iii) agricultural and agro-industrial land. The clearing of > 500 ha of any land covered by forest and the clearing of any coastal or flood forests requires an EIA (Annex of Sub-decree No 72 ANRK.BK. Date 11, August 1999). As the land on which AF project activities will be implemented is degraded, and these degraded forests will be restored, the AF project will not require an EIA. The MoE is the government department assigned to review all EIAs and will therefore ensure that all relevant regulations are adhered to. A "Checklist of Environmental and Social Safeguards" was completed as a form of preliminary EIA, as per UNEP standards (see Annex X). No items requiring significant mitigation measures were noted. Interventions designed to provide technology transfer, training or that include local community participation will be conducted in adherence with Cambodia's labour codes and gender equality targets.

F. Describe if there is duplication of project / programme with other funding sources, if any.

There is no duplication of project funding with other sources. Table 6 describes the on-going initiatives in the five CPA intervention sites. This information was collected in the Second CPA Community Survey. Communities were asked questions about previous and ongoing support received from government and non-government organizations. 'On-going support' was one of the categories used to prioritize the CPA intervention sites, as collaboration with on-going projects will assist in achieving the

[210] See: http://unfccc.int/files/meetings/durban_nov_2011/decisions/application/pdf/cop17_nap.pdf.

maximum possible benefits of the AF project per intervention site. The AF project will not duplicate efforts, but rather capitalize on lessons learned and platforms created for uptake of the ecoagriculture approach. Table 7 provides a brief description of climate change-related projects in Cambodia with a focus on PAs. Opportunities for creating synergies for achieving cost reductions have been noted. The sharing of knowledge generated by the AF project and the projects noted below will be an important component of the close working relationships (between the respective Project Managers) established. Additionally, a project managers' coordination working group will be established comprising managers from the other ongoing projects/programmes in order to coordinate efforts and avoid overlap between similar endeavours (further details are provided in Section III.A). Communications are ongoing with the following projects in particular:

- Wildlife Alliance Southern Cardamoms Reforestation Programme;
- Wildlife Conservation Society (WCS) Tmatboey Community-based Ecotourism project; and
- United States Agency for International Development (USAID) Helping Address Rural Vulnerabilities and Ecosystem Stability (HARVEST) project.

Table 6: On-going activities in the five CPA intervention sites.

Group working in CPA	Service provided to community	Potential Synergies
Chiork Beungprey CPA		
World Wildlife Fund (WWF)	Growing rattan for community benefits.	The AF project will build on the successes of the WWF programme. WWF will be consulted on successes and failures of the rattan growing operation, and invited to provide input into Components 1 and 2 of the AF project, i.e. the development and implementation of planting protocols. The AF project will in return upscale the WWF operation and introduce multi-beneficial species to the community.
USAID Cambodia Micro, Small and Medium Enterprise (MSME) Project	CPA training.	SMSE will be invited to participate in all aspects of community training in Chiork Beungprey, particularly Output 2.1. A thorough review of the training provided by SMNSE to date will be undertaken, to allow the AF project to further the capacity built within the community.
Ronouk Khgeng CPA		
World Wildlife Fund (WWF)	CPA patrolling and administration support.	Activities related to patrolling in Output 2.2 will build on the support WWF is providing the Ronouk Khgeng community. The AF project will therefore upscale the WWF support.
TRAFO	Raise funding for CPA patrolling and management support.	Activities related to patrolling in Output 2.2 will build on the support TRAFO is providing the Ronouk Khgeng community. The AF project will therefore upscale the TRAFO support.
Strengthening Cambodia's Protected Area System and Demonstrating Integrated Landscape Management for the Eastern Plains Dry Forest (CAMPAS)	Empowerment of community groups and CPA Management Committees, as well investment into Alternative Income Generation.	Activities relating to micro-financing in Output 1.2 will complement the feasibility assessments and micro-credit schemes on Income Generating Activities under the CAMPAS project. Furthermore, activities relating to forest restoration in Output 2.2 will expand the geographical extent of restored forest in the North-eastern Forest Area following reforestation activities of the CAMPAS project. The synergies between the projects will improve the implementation and cost effectiveness for the AF project interventions as they will build on the existing CAMPAS project interventions.
Chom Thlork CPA		
Indigenous Community Support Organization (ICSO)	Supporting ethnic minority groups in community.	The AF project will further the efforts of ISO by enhancing the climate change resilience of the Chom Thlork community.
Ministry of Rural Development	Repairing of roads.	Activities related to developing markets for crops/vegetables and NTFPs (Output 2.3) will be aided by the efforts of the Ministry of Rural Development.

Skor Mreach CPA		
Ministry of Rural Development	Repairing of roads.	Activities related to developing markets for crops/vegetables and NTFPs (Output 2.3) will be aided by the efforts of the Ministry of Rural Development.
Water and Sanitation (WS)	Digging pit latrines and wells.	The AF project will work with WS to improve community hygiene and access to clean water. This will be through activities related to protecting watersheds, reducing erosion and enhancing food supplies (Output 2.2).
Chop Tasok CPA		
Partnership for Development in Kampuchea (PADEK)	Supporting a macro-saving group and poultry farming.	Activities related to finance in Output 1.2 will build on the platform created by PADEK. The AF project will complement the poultry farming activities, by diversifying agricultural production and community income streams.
Khmer Women	Providing water filter baskets, supporting macro-saving group and pig farming.	Activities related to promoting microfinance in Output 1.2 will build on the platform created by Khmer Women. Activities in Output 2.2 of the AF project will complement the efforts of Khmer Women to provide clean water. This will be through a reduction in erosion of degraded area and watershed protection created by the extensive restoration interventions.
CARITAS (social development arm of the Catholic Church in Cambodia)	Providing food and nutrition to children.	The AF project will further the efforts of CARITAS by providing additional sources of food and nutrition to the community, including to children.

Table 7: Climate change-related projects in Cambodia.

Project & Funding Institution	Objective	Potential Synergies
Cambodia Community Based Adaptation Programme (CCBAP). Funded by Swedish International Development Agency (Sida) and launched in January 2011.	This program is intended to minimise the impacts of climate change on poverty reduction targets in Cambodia. This will be accomplished by reducing the vulnerability of the rice-farming sector to climate-induced changes in water availability. The project also aims to increase the capacity of NGOs, CBOs, and local communities to implement community adaptation measures.	**No duplication.** The AF project will capitalise on capacity building achieved through CCBAP as well as the resulting increase in awareness in the importance of climate change adaptation.
UNDP Cambodia - Establishing Conservation Areas Landscape Management (CALM) in the Northern Plains.	This project aims to address the loss of biodiversity in the Northern Plains of Cambodia through: • raising awareness of biodiversity considerations into provincial land use and management processes; • demonstrating specific interventions at four sites; and • strengthening institutional capacity for biodiversity management at the four sites. The project thus aims to integrate biodiversity objectives into the tourism, forestry, agriculture and fishing sectors.	**No duplication.** While this project has the same regional focus as one of the AF project target areas, intervention sites will not overlap. The awareness of the importance of biodiversity will be capitalised on in the AF project, which will contribute indirectly to biodiversity of the Northern Plains region.
UNDP Cambodia - Sustainable Forest Management (SFM) and the Development of Bio-energy Markets	This project aims to integrate sustainable community-based forest management into national policy and to create an infrastructure for sustainable bio-energy technologies that reduce CO_2 emissions. Rate of deforestation will be reduced by strengthened community-based	**No duplication.** The AF project will capitalise on the capacity building in strengthening policy related to sustainable community-based forestry.

to Promote Environmental Sustainability and to Reduce Green House Gas Emissions in Cambodia.	management and by reducing demand for fuelwood.	
Cambodia Climate Change Alliance (CCCA).	The CCCA is the leading climate change facility in Cambodia. The two main aims of the CCCA are: • to support capacity development and institutional strengthening in climate change adaptation and mitigation; and • to offer direct assistance to vulnerable or affected communities by enhancing resilience to climate change.	**No duplication.** The AF project will capitalise on the capacity being built through the CCCA.
Pilot Programme for Climate Resilience (PPCR), funded by the Strategic Climate Fund (SCF).	The PPCR aims to facilitate the integration of climate risk and resilience into developmental planning and implementation and to strengthen capacity within relevant national and regional bodies. The Programme is currently developing two agricultural adaptation related projects, namely: i) Promoting climate-resilient agriculture, forestry, water supply and coastal resources in Koh Kong and Mondulkiri provinces; and ii) Climate Proofing of Agricultural Infrastructure and Business-focused Adaptation (ADB).	**No duplication.** The AF project will capitalise on the adaptation activities implemented in the first PPCR project, such as rainwater harvesting to enhance the resilience of community water supplies. The projects will occur in the same geographical area (Mondulkiri province in the North-eastern Forest), allowing for direct benefits for the communities in the AF project Ronouk Khgeng CPA intervention site. The AF project will also capitalise on components of the second PPCR project which will develop business-focused adaptations, such as crop insurance interventions. The focal points of the PPCR projects differ from those of the AF project, but provide ideal opportunities for synergies to be created to complement the AF project, thus contributing towards implementation and cost effectiveness of interventions.
UNDP- IFAD Promoting climate-resilient water management and agricultural practices.	This project aims to reduce the vulnerability of Cambodia's agriculture sector to climate-induced changes in water vulnerability and to enhance food security by strengthening the sector's adaptive capacity. This will be accomplished by enhancing public and institutional awareness of climate change, demonstrating climate-resilient practices in agriculture and water management and by mainstreaming climate change responses into provincial and communal plans.	**No duplication.** The AF project is focussing on PAs, however there will be synergies with the agriculture-based activities as well as the raising of awareness of food security issues with relevance to climate change.
Regional Climate Change Adaptation Knowledge Platform for Asia and Asia Pacific Adaptation Network.	The Climate Change Adaptation Knowledge Platform is an initiative which supports and shares research on climate change adaptation, policy making, capacity building and information sharing to assist Asian countries to adapt to climate change impacts. The initiative also facilitates capacity strengthening and climate change adaptation at local, national and regional levels and works in partnership with existing networks and initiatives.	**No duplication.** The AF project will use the Climate Change Adaptation Knowledge Platform to share knowledge gained and best practice guidelines at local, national and regional levels.

UNEP Least Developed Countries Fund Project, partnering with MoE.	The LDCF project aims to reduce coastal vulnerability to climate change impacts on agricultural systems and natural ecosystems within the coastal zone. The project will include institutional capacity strengthening, adaptation planning, increasing coastal resilience and improving the livelihoods of coastal communities.	**No duplication.** The LDCF project is being implemented in the coastal zone. The AF project will build on the capacity strengthening and climate change adaptation awareness raising.
The Cambodia UN-REDD National Programme.	The Cambodia UN-REDD National Programme aims to support Cambodia to be ready for REDD+ implementation including development of necessary institutions, policies and capacity.	**No duplication.** The AF project will provide restoration protocols and results to be used in the REDD+ programmes. The feasibility of using REDD+ to upscale the AF project interventions will be investigated and a Project Idea Note on the AF project concept will be developed if appropriate.
WWF Srepok Wilderness Area Project (SWAP).	This project aims to protect biodiversity and provide sustainable livelihoods to local communities by developing an eco-tourism initiative in the Srepok wilderness area in north-eastern Cambodia. This will be accomplished by: • developing sustainable management regimes for the harvest and utilisation of natural resources in partnership with local communities; and • developing a small pilot site for protection and restoration of biodiversity which will be used as a site for ecotourism initiatives. Successful models can be upscaled and replicated in other parts of Cambodia.	**No duplication.** The SWAP was implemented in Protected Forests in the Mondulkiri Province, but was completed in 2010. The AF project will build on the successes of the WWF project, including the raised awareness of the importance of biodiversity and sustainable harvesting of NTFPs.
Forest Carbon Partnership Facility (FCPF).	In 2011 Cambodia submitted a REDD Readiness Preparation Proposal (R-PP) to the FCPF. This proposed initiative would use REDD+ finance and incentives to conserve extensive areas of forested land as an alternative to the granting of Economic Land Concessions (ELC).	**No duplication.** The AF project will provide restoration protocols and results to be used in the REDD+ programmes. The feasibility of using REDD+ to upscale the AF project interventions will be investigated and a Project Idea Note on the AF project concept will be developed if appropriate.
Asian Development Bank Greater Mekong Subregion Core Environment Program and Biodiversity Conservation Corridors Initiative (CEP-BCI).	The project will enhance transboundary cooperation for preventing and mitigating fragmentation of biodiversity rich forest landscapes of the Cardamom Mountains and Eastern Plains Dry Forest in Cambodia, Triborder Forest areas located in southern Lao PDR, and the Central Annamites in Vietnam.	**No duplication.** The AF project, depending on the location of the intervention sites, will contribute towards the objectives of the CEP-BCI by enhancing biodiversity at the restoration sites.
Fauna & Flora International (FFI) projects.	FFI is implementing numerous projects in Cambodia including: • Cambodian Elephant Conservation Group; • Cambodian Crocodile Conservation Programme; • University Capacity Building Project; • Coastal and Marine Conservation Project; • Cardamom Mountains Wildlife Sanctuary Programme; and These projects focus on primarily on biodiversity conservation, and secondly on landscape restoration.	**No duplication.** The AF project intervention sites will not overlap with the FFI projects sites, will are generally in the Cardamom Mountains or at the coast.

USAID HARVEST project.	The project aims to increase food availability and access by bolstering productivity of agriculture, fisheries and forestry; strengthening value-added chains; and creating private-sector led rural employment. The program will benefit 70,000 households and will maximize working relationships with the government, private sector allies, CBOs and NGOs.	**No duplication.** The HARVEST project is being implemented on the northern slopes of the Cardamom Mountains, with plans to expand north of Tonle Sap Lake in the Northern Plains region. Agricultural aspects of the HARVEST project will be used to guide the AF project.
WCS Tmatboey Community-based Ecotourism Project.	The project aims to conserve the globally threatened large waterbirds found at Tmatboey, using the ibises as 'flagships', by establishing a local community-based tourism enterprise that directly links revenue received to long-term species conservation.	**No duplication.** While the Tmatboey Community-based Ecotourism Project is being implemented in the Kulen Promtep Wildlife Sanctuary, the AF project will be focused on restoration in CPA. Additionally, Thmatbeutheun krosinm CPA is not one of the selected AF project intervention sites. However, awareness raised through the WCS project will be capitalised on at a national level.
Wildlife Alliance Southern Cardamoms Reforestation Programme.	The programme aims to reverse the cycle of poverty by helping poor landless farmers gain access to land, capital, skills and markets. The goal of the community agriculture and ecotourism projects is to help farmers achieve stable food security while at the same time generating enough cash so that they can raise their standard of living and have access to health care and education.	**No duplication.** The AF project will not be implemented in the Cardamom Mountains. The community agriculture component of the project, however, will be used to guide the conservation agriculture aspects of the AF project.
Conservation International Cardamom Conservation Landscape Programme.	The Cardamom Mountains Protected Area Network is composed of the Phnom Samkos Wildlife Sanctuary, the Phnom Aural Wildlife Sanctuary, and the Central Cardamoms Protected Forest. The focus of the programme is: i) maintaining and enhancing conservation values; ii) conducting research; and iii) enhancing community livelihoods.	**No duplication.** The AF project will not be implemented in the Cardamom Mountains. Lessons learned from the CI project will be incorporated into the implementation of the AF project, particularly those pertaining to patrolling, community training/education and establishing enabling conditions to foster community support for interventions.
Technology Needs Assessment (TNA).	The project aims to produce Technology Needs Assessments and Technology Action Plans including for Adaptation which will be used as roadmaps for policy making for specific priority sectors and to access international sources of funding for the implementation of priority activities.	**No duplication** The AF project will link with the TNA project to facilitate the knowledge management components of the project.
Cambodian Farmers Association Federation of Agricultural Producers (CFAP Cambodia).	The project aims to adapt the farming practices of 8,000 families in the South and South East of Cambodia, as well as Kampong Speu in the highlands. Interventions will include improving farming structures and methods, raising awareness of climate change in rural communities, building capacity and introducing risk management tools to farmers.	**No duplication** The AF project will be implemented in different areas to the CFAP, but the two projects will share lessons learned on adaptation practices and capacity building. The applicable aspects of the ecoagriculture approach will be introduced to farmers in the CFAP target area.

G. If applicable, describe the learning and knowledge management component to capture and disseminate lessons learned.

Lessons learned will be captured and disseminated through Outcome 3.1. Reports detailing the lessons learned will be compiled and will target: i) the general public; ii) CPA Committees and communities; and iii) relevant government ministries. The AF project will build partnerships with national and regional centres of excellence in socio-economic and ecological research through the

PhD and MSc projects, to obtain information regarding international best practices in the field of restoration targeting climate change adaptation. The AF project will thus generate knowledge based on international best practices and indigenous practices that will be transferable to other parts of Cambodia through the activities in Outcome 3.3.

Awareness will be increased at a local community level of the importance of ecoagriculture for protecting and enhancing commercial and subsistence activities. Local communities, community leaders and decision-makers will be informed of the urgent need to take concrete adaptation measures that are low cost and no-regret. This will be achieved using signboards, posters, booklets and pamphlets. A documentary film will be produced to promote the concrete interventions implemented under Component 2, in an attempt to promote these interventions across the country. Demonstration gardens, farmer field days and workshops will be established as teaching tools. Communities away from the intervention sites will also be targeted to ensure a broader awareness of interventions. Education activities at schools and universities will be undertaken, focused on raising awareness of climate change and how multi-use forests and agricultural practices which enhance ecosystem services can reduce the negative impacts of climate change. University and school field trips to intervention sites will be used to demonstrate the success of interventions.

The project will disseminate lessons learned electronically via a web-based data network portal, which will supply information about the ecoagriculture interventions to local government agencies responsible for policy and planning development as well as local stakeholders. This may also be extended to international learning platforms such as the Climate Change Adaptation Knowledge Platform for Asia, the ALM, UNEP's GAN, UNEP's Regional Adaptation Network for Asia and the pacific and WikiAdapt. Disseminating project results is useful to: i) inform future projects in best practices; ii) effectively overcome information barriers to the uptake of adaptation measures; and iii) prevent duplication of efforts. The project is likely to be a valuable global case study for restoring natural capital and enhancing agricultural practices to increase food supplies and decrease soil erosion in restored forests. The AF project will use a social networking site to promote information generated in the project as well as to promote the documentary film.

To facilitate the management of knowledge management components of the AF project, a close working relationship will be established with the Technology Needs Assessment implemented by UNEP. This will ensure effective and efficient sharing of lessons learned on the benefits of the ecoagriculture approach.

H. Describe the consultative process, including the list of stakeholders consulted, undertaken during project preparation.

A mission to Cambodia was undertaken from 20 June to 03 July 2011 to collect information for the development of the AF project. Relevant stakeholders were consulted regarding the adaptation interventions most appropriate for the PAs identified as being most vulnerable to the impacts of climate change. Guidance and information generated as a result of the consultations was utilised to develop the AF project. Consultations were held with the following stakeholders (see Annex IX for the mission report):

- MoE, including the departments of Research and Community Protected Area Development (RCPAD), Climate Change (CCD), Wildlife Sanctuary, and National Parks;
- Ministry of Agriculture Forestry and Fisheries (MAFF);
- Ministry of Planning (MoP);
- Ministry of Rural Development (MRD);
- Ministry of Water Resources and Meteorology (MoWRM);
- National Committee for Disaster Management (NCDM);
- National Mekong Committee;
- Cambodia Development Resource Institute;
- World Wildlife Fund for Nature (WWF);
- Clinton Foundation;
- Wildlife Conservation Society (WCS);
- International Union for Conservation of Nature (IUCN);

- Fauna and Flora International (FFI);
- Wildlife Alliance;
- Cambodia Non-Timber Forest Working Group;
- Cambodia Rural Development Team (CRDT); and
- Centre for People and Forests (RECOFT).

As a result of the above consultations, agreements were concluded with MoE on the regional focus of the AF project. A field survey was undertaken within three CPAs in three PAs in the Northern Plains target area. Based on discussions with the three CPA Committees, it was decided that wider consultation of all CPA Committees in the project target area was required. Two separate CPA Community Surveys were undertaken (see Annexes II and III) to ensure a participatory approach in developing the AF project. In the first survey 283 CPA Management Committee members were consulted in 33 CPAs, and the responses to a questionnaire were used to prioritize six potential CPA intervention sites. In the second survey, 91 CPA Management Committee members were consulted, and their responses to questions were used to finalize the selection of the five CPA intervention sites, as well as to refine the activities of the AF project. The communities have therefore had substantial input into the AF project design, which will ensue that the restored forests become valued community assets. See Section I.1.10 for a summary of the two CPA Community Surveys, and the site selection process.

A meeting between UNEP and MoE representatives was held in Phnom Penh on 14 March 2012. At the meeting the selection of the six CPA sites for the Second CPA Community Survey was endorsed by all parties, and the criteria for final CPA intervention site selection was finalised. See Annex IX for minutes of the meeting.

I. Provide justification for funding requested, focusing on the full cost of adaptation reasoning.

Funding is being requested for the implementation of interventions to restore natural capital and achieve a sustainable and resilient increase in agricultural productivity as a means to reduce climate change vulnerability of rural Cambodian communities. The total funding required for this project is US$ 4,954,273 including project management and project execution fees. Sustainable transformation of the agriculture sector necessitates combined action on food supply, development and climate change, and will require large-scale investments to meet the projected costs. Uncertainties about potential losses, catastrophic risks and increased costs of inaction associated with climate change indicate that immediate and more aggressive transformative action is needed. Financing is thus urgent[211]. The recent flood mentioned in Section I.1.4 highlights this point. The interventions are divided into three components described below.

Component 1: Protocols for ecoagriculture interventions.

***Baseline (without AF Resources)*:**

Rural Cambodian communities are highly dependent on natural resources. The adaptive capacity of these communities is low, which is largely attributable to high poverty levels. Poverty limits the ability of communities to change present behaviour and adopt new approaches to overcome climate change impacts. The poorest communities in Cambodia are the highland tribal groups located in the provinces of Ratanakiri, Mondulkiri, Kratie and Stung Treng[212], which form part of the North-eastern Forests target area. The Ronouk Khgeng CPA is located in this region.

[211] FAO. 2011. "Climate-Smart" Agriculture – Policies, Practices and Financing for Food Security, Adaptation and Mitigation. Food and Agriculture Organisation, Rome.
[212] National Institute of Statistics. 2004. Cambodia Socio-Economic Survey. Royal Government of Cambodia, Phnom Penh, Cambodia. CITED in the World Bank, 2006, Cambodia : Poverty Assessment

Attaining adequate food supply for these communities is difficult. Up to 70% of children in the province of Ratanakiri are stunted, implying chronic malnutrition[213]. In order to provide adequate climate change adaptation measures, namely enhanced food supply and erosion control from restored forests and conservation agriculture practices to intensify and diversify food production, effective planning is required to ensure that projects are not vulnerable to climate change-induced impacts. This necessitates the need to develop planting protocols to guide implementation of climate change ecoagriculture adaptation interventions. Presently such protocols are not being developed. CPA management plans do not include restoration (largely due to a lack of finance), and where trees are being planted, this is not being directed by a cost-benefit analysis to ensure that benefits are maximised. There is a general weak knowledge base of climate change impacts on landscapes and production systems, and a lack of studies being implemented to better understand how to adapt to the expected changes. There are few projects on which local and national stakeholders can build on and design restoration and conservation agriculture protocols, even though vegetation planting for flood protection is called for in the NAPA.

***Additional (with AF Resources of US$ 360,000)*:**
The first component of the AF project will comprise research and activities that result in the development of technical protocols and a local enabling framework that will guide the implementation of activities in Component 2. These protocols will be community-driven and developed through a consultative and participatory process, ensuring that the resource utilization and community needs are taken into account, considering the impact of an increase in the frequency and intensity of climate change-induced droughts and floods. They will be evidence-based through the inclusion of indigenous knowledge and best practice activities aimed at restoring natural capital. Research will be undertaken to ensure that the most appropriate measures are developed. This will include gap analyses and institutional mapping exercises in relevant government departments and research institutions to determine where there are shortfalls in knowledge and capacity which will aid implementation of interventions. Targeted research to address the identified gaps and shortfalls will be undertaken through the development and implementation of PhD and MSc projects in collaboration with Cambodian and international research institutions. Vulnerability assessments will ensure that interventions are ecologically appropriate and will counter the climate change-induced impacts of droughts and floods. Studies on: i) the use of climate forecasting information to alter crop planting times[209]; ii) the use of new, locally occurring crop varieties; iii) climate-resilient rice varieties; iv) the availability of micro-finance and weather index-based insurance for farmers; v) hydrology/engineering of water catchment areas; and vi) geographical/agricultural assessments of agricultural areas will be undertaken. Additional research activities under this component include economic studies to assess the feasibility of ecoagriculture interventions and associated micro-finance and insurance products. Finally, the results of this research will be used to develop the most appropriate conservation agriculture and forest restoration protocols. Gender sensitivity will be an important aspect of the development of the protocols, ensuring that women are consulted and their needs taken into account. These activities will ensure that the restored forests and agricultural homegardens are beneficial to the communities and increase their resilience to the impacts of climate change.

[213] Hamade, P. 2003. Indigenous Peoples Food Diary: Ratanakiri, Cambodia, 2002–2003. Health Unlimited, United Kingdom.

Component 2: Concrete ecoagriculture adaptation interventions.

***Baseline (without AF Resources)*:**

Presently, communities across Cambodia employ a range of different coping mechanisms in response to climatic hazards and variability. However, these mechanisms are limited in their effectiveness. During the preparation of the NAPA, villagers were interviewed regarding their coping mechanisms. It was found that approximately 17% of the 684 households interviewed do not adjust their planting regimes in response to flooding and drought events. During drought events, 24% of interviewees organise religious ceremonies in the hope that such ceremonies will bring rain and 17% reduce the amount of water they use for personal hygiene purposes. Most of the existing coping mechanisms have proved to be unsuccessful such as shifting planting dates. The success of shifting planting dates is restricted as a result of limited weather forecasts at a local scale.

Cambodia is seeking to increase overall food supplies through agricultural development which will reduce vulnerability to climate change through enhanced food supply. However, without ensuring adaptation measures to attenuate floods, control soil erosion and enhance drought resilience rural communities will still be at risk from such climate hazards which will decrease the availability of food supplies. Whilst CPAs are afforded protection through the PA Law, there are few efforts to restore degraded areas. Outside CPAs, where restoration is being implemented, it is not being undertaken with specific purposes of increasing food from the restored sites. The current interventions will not be sufficient to address the impacts of climate change-induced erratic rainfall on food supplies.

Additional (with AF Resources of US$ 3,423,000):

The AF project will increase local community capacity to build climate resilience, as well as plan, implement and maintain ecoagriculture interventions. This will be achieved through the development of a training course and adaptation toolkit for use by local farmers on maintaining agricultural production under climate change conditions. Training will include: i) soil conservation techniques; ii) management of crop residues as fodder or green manure; iii) irrigation techniques; and iv) rainwater management. This training will be delivered by local authorities, agricultural extension officers and CPA committee members, who will be trained through the AF project. The trained individuals will then have the capacity to train further individuals. Through this training local communities will become aware of the importance of protecting natural resources which will help to ensure the success and sustainability of the AF project interventions. Systems for patrolling and protecting the multi-use forests established through the AF project will be strengthened, which will reduce illegal harvesting of NTFPs and timber. The funding required for Output 2.1 is US$ 319,773.

The AF project will restore natural capital and incorporate conservation agricultural practices to reduce the vulnerability of rural Cambodian communities to climate change-induced declines in food supplies. Interventions will be implemented at sites with the greatest vulnerability to climate change impacts and greatest potential for successful forest restoration and diversified agricultural activities. These selection matrices used to select the five CPA intervention sites are shown in Annexes II and III. The interventions will focus on sustainable crop management, soil management, forest restoration, conservation agriculture systems and capacity building. The AF project will be separated into extensive and an intensive approaches.

The extensive approach will entail restoring degraded forests in CPAs at a landscape-level by planting predominantly indigenous tree species that provide food and are particularly effective at stabilizing soils. These restored multi-use forests will supply a diverse range of goods for commercial use as well as domestic use, including timber and NTFPs such as resin, medicine, fibre, nuts and fruit. While the full benefits of this approach will not be immediate, the long term social and ecological

benefits of planting and trees to restore natural capital are numerous. Trees can enhance water infiltration rates and decrease soil erosion. In Cambodia, where food insecurity is high, the availability of NTFPs during periods of low agricultural output will ensure increased food supply and resilience to climate change for communities. Increased availability of NTFPs will also diversify income sources which will improve livelihoods and build climate change adaptation capacity[214]. While the comprehensive social and environmental benefits of reduced vulnerability to floods and improved soil fertility are difficult to quantify, the long term increased financial benefits from increased availability of NTFPs have been estimated[215] at US$ 366 ha^{-1} yr^{-1}. Considering that the cost of establishing trees to restore natural capital has been estimated[216,217,218,219,220] at only US$ 839 ha^{-1}, this approach is a highly cost-effective adaptation plan. The communities involved in the AF project will be trained on the restoration of forests in order to increase climate change resilience. This will include the development of horticultural skills necessary to propagate tree seedlings in nurseries as well as techniques of planting and establishing seedlings in degraded ecosystems. To ensure the success and sustainability of the AF project, local communities will be involved in all aspects of the forest restoration implementation. This will foster a sense of participation which will result in the trees being valued by community members, increasing the sustainability of AF interventions. CPA Management Plans will be updated with the appropriate management practices to maintain the multi-use forests. Patrols will be enhanced to prevent over-harvesting of restored forests by intruders. The funding required for this aspect of Output 2.2 (the restoration of 1,875 ha of degraded forest to multi-use forest) is US$ 1,573,125.

The intensive approach will include three approaches. Firstly, enrichment planting of rice paddies to increase availability of soil nitrogen by introducing multi-use and leguminous species which fix atmospheric nitrogen, which will enhance agricultural yield and soil fertility. In addition to nutritional benefits for rice paddies, communities will also benefit from the various ecological services that trees provide (as outlined in the extensive approach above). The estimated cost of planting tree borders around rice paddies is ~US$107/ha (see Annex VI), which is a cost effective measure if the long-term benefits to soil structure and nutrition and agricultural yield are considered. Beneficiary communities at the five CPA intervention sites will be involved in all stages of the AF project. An understanding of the potential benefits of trees on soil quality and agricultural yield will ensure the sustainability of AF interventions. Training on maintenance of the trees will strengthen sustainability. The AF project is more likely to achieve success because it adds to, rather than alters, common local agricultural practices. The funding required for this aspect of Output 2.2 (planting multi-use tree species along 2,286 ha of rice paddy boundaries and other existing cultivated areas to enhance crop productivity) is US$ 244,602.

Secondly, intensifying and diversifying crop production in homegardens will enhance community resilience to erratic rainfall as shortfalls in food supply due to failure of specific crops will be buffered by food sources from other species. Planting highly nutritious crops that have various environmental benefits such as soil improvement (see Annex VII for suggested crops) will increase productivity per ha, ensure a more nutritious and diverse diet for communities, and increase food supply during times of erratic climate. A participatory investigative approach has been initiated through the First and Second CPA Community Surveys, and will ensure that only crops which communities currently cultivate or which they eager to begin cultivating will be promoted by the AF project. This will ensure local buy-in of the concept. Rural

[214] FAO. 2010 "Climate-Smart" Agriculture: Policies, Practices and Financing for Food Security, Adaptation and Mitigation.
[215] Camille Bann 2003. An Economic Analysis of Tropical Forest Land Use Options, Ratanakiri Province, Cambodia http://203.116.43.77/publications/research1/ACF4B.html. [Accessed 4 November 2011].
[216] Agroforestry costs **~US$ 960** per ha in Bangladesh. Rahman, S. A., Paras, F. D., Khan, S. R., Imtiaj, A., Farhana, K. M., Toy, M. M., Akhand, M. B., Sunderland, T. 2011. Initiatives of tropical agroforestry to sustainable agriculture: A case study of Capasia Village, Northern Bangladesh. Journal of Horticulture and Forestry 3(4): 115-121.
[217] Agroforestry in Cambodia costs **~US$ 300** - **US$ 500** per ha in a 2011 project. Information obtained from the Wildlife Alliance in Cambodia.
[218] Woodland restoration costs **~US$ 1,750** per ha in Australia. Source: http://fotpin.hussat.com.au/docs/woodland-restoration-implementation-plan%20.pdf. [Accessed 4 September 2011].
[219] Bottomland Forest restoration costs **~US$ 178** - **US$ 267** per ha in a USA based project. National Research Council. 1991. Restoration of Aquatic Ecosystems: Science, Technology, and Public Policy. National Academy Press, Washington. DC.
[220] Spekboom Thicket restoration costs **~US$860** per ha in South Africa.

Cambodian women and children are particularly affected by nutrient deficiencies[221] and would benefit from diverse and nutritious homegardens. The introduction of beneficial multi-use species to existing cultivated areas will improve the fertility, moisture-holding capacity and structure of agricultural soils, protect crops from climate-related hazards such as drought, floods and wind, and provide communities with additional benefits such as food, medicine, firewood and fodder. Communities will be educated on maintenance techniques and the benefits of diversified and improved farming practices to ensure the sustainability of the intervention. The intensification and diversification of existing homegardens is estimated to cost between US$ 70 and US$ 280 per ha. The mean market value of diversified crops has been estimated at US$ 930 (see Annex VII) per ha per crop cycle. Communities will also benefit from increased food supply and climate resilience of systems. To ensure the success of these interventions, and to ensure that communities are able to adapt to climate change, various additional activities will be necessary. The project will construct dams/ponds and canals to increase water supply, and prevent erosion, waterlogging and nutrient leaching after extreme events. The AF project will also establish fire breaks, distribute drought-resilient seed stocks to businesses, establish woodlots to reduce illegal timber-harvesting, introduce appropriate post-harvest storage techniques, and introduce improved crop pest and disease management systems. The funding required for these aspects of Output 2.2 is US$ 609,036 (US$ 51,561 for the intensification/diversification of 337 ha of existing agricultural areas; US$ 150,000 for cost-effective irrigation of the crops (i.e. AMIT); and US$ 407,475 for the package of additional conservation agriculture activities[222] tailored to each CPA intervention site).

Thirdly, new strains of climate-resilient rice will be trialled in all CPA intervention sites. In the Second CPA Community Survey CPA Management Committees indicated local farmers would be willing to trial improved rice varieties. This consultative process will be continued through Component 1 to identify farmers to establish and maintain trial plantings, and a total of 300 ha will be planted. These field trials will be used to assess the suitability and cost-effectiveness of assorted rice cultivars for improving rice yields and climate resilience. The funding required for this aspect of Output 2.2 (trialling drought-resilient varieties of rice) is US$ 29,400.

Local community livelihoods will be enhanced and diversified through sustainable development of NTFPs and the promotion of sustainable livelihood strategies. This will be achieved through: i) facilitation of farmers access to micro-finance and weather index-based insurance products; ii) development of business plans for alternative livelihood options; iii) integration of small scale farmers into domestic, regional and global markets for high-value agricultural products; iv) in areas which are conducive to ecotourism, training of local communities to establish an enabling environment for the development of ecotourism projects; and v) development, promotion and establishment of sustainable alternative livelihood strategies. The funding required for Output 2.3 is US$ 220,000.

The final aspect of this component will require monitoring of the impacts of the AF project outside of the five CPA intervention sites. This will entail: i) identifying target communities and areas for monitoring; ii) developing socio-economic and ecological monitoring protocols; iii) training of communities to conduct baseline surveys; ii)

[221] Available from: http://www.who.int/nutrition/publications/WHO_WFP_UNICEFstatement.pdf.
[222] Including terraces, dams/ponds/canals, firebreaks, stock, small scale woodlots, post-harvest storage facilities and pest and disease management.

undertaking of baseline surveys; iii) development of tools to measure the downstream project impact; iv) collection of data in a scientifically rigorous way and v) undertaking an analysis of the socio-economic and ecological benefits in the target community areas. This monitoring is required to evaluate the indirect benefits of the AF project to communities outside of the target areas, which will strengthen the uptake of the ecoagriculture approach at a national level. The funding required for Output 2.4 is US$ 162,000.

Component 3: Institutional capacity, awareness raising and upscaling of ecoagriculture interventions.

***Baseline (without AF Resources)*:**
Since Cambodia ratified the Kyoto Protocol in 2003, the government has taken considerable steps towards the implementation of the UNFCCC by implementing activities designated in the INC and the NAPA. As a result, there has been an increase in awareness among decision-makers that climate change risks to Cambodia are substantial and will impact all sectors of the economy. The government has recognised restoration and reforestation of degraded land as an important adaptation measure for the country. However, no Cambodian climate change adaptation project has yet fully adopted this approach. Reforestation projects in the country are being implemented with a view to achieve mitigation rather than adaptation. As a result, existing sectoral policies need to be strengthened to include benefits arising from natural capital restoration approaches.

There is presently inadequate knowledge about climate change in Cambodia. This particularly applies to restoration activities aimed at adaptation, which have yet to be implemented in the country. Knowledge regarding cost-effective adaptation is currently weak, partly because information and knowledge management systems have yet to be developed to learn from project experiences.

Additional (with AF Resources of US$ 387,000):

With additional AF funding of US$ 387,000, resilient forest restoration and conservation agriculture as a means of climate change adaptation will be promoted for mainstreaming into sectoral policies and strategies through the Climate Change Strategy and Action Plan, which is currently being developed. This plan will engage with many sectors and policies and therefore be an effective avenue for mainstreaming natural capital restoration principles. Technical expertise will be provided to propose the incorporation of climate change adaptation into those policies where budget allocations are provided. To facilitate this, a multi-party and inter-ministerial task force will be formed to develop a national strategy for upscaling of restoration and conservation agriculture interventions.

As there is limited climate change adaptation awareness in the country, particularly in rural areas, awareness raising on the benefits of restoring natural capital and sustainable and diversified agricultural practices will be undertaken. Awareness will be increased at a local community level of the importance of ecoagriculture for protecting and enhancing commercial and subsistence activities. Local communities, community leaders and decision-makers will be informed of the urgent need to take concrete adaptation measures that are low cost and no-regret. This will be achieved using signboards, posters, booklets and pamphlets. A documentary film will be produced to promote the concrete interventions implemented under Component 2, in an attempt to promote these interventions across the country. Demonstration gardens, farmer field days and workshops will be established as teaching tools. Communities away from the intervention sites will also be targeted to ensure a broader awareness of interventions. Education activities at schools and universities will be undertaken, focused on raising awareness of climate change and how multi-use forests and agricultural practices which enhance ecosystem services can reduce the negative impacts of climate change. University and school field trips to intervention sites will be used to demonstrate the success of interventions. The project will disseminate lessons learned electronically via a web-based data network portal, which will supply information about the ecoagriculture interventions to local government agencies responsible for policy and planning development as well as local stakeholders. This may also be extended to international learning platforms such as the Climate Change Adaptation Knowledge Platform for Asia, the ALM, UNEP's GAN, UNEP's Regional Adaptation Network for Asia and the Pacific and WikiAdapt. Disseminating project results is useful to: i) inform future projects in best practices; ii) effectively overcome information barriers to the uptake of adaptation measures; and iii)

prevent duplication of efforts. The project is likely to be a valuable global case study for restoring natural capital and enhancing agricultural practices to increase food supplies and decrease soil erosion in restored forests. The AF project will use a social networking site to promote information generated in the project as well as to promote the documentary film. Correspondence will be maintained between REDD+ project managers and the AF project manager to facilitate the uptake of appropriate ecoagriculture interventions and tree species used in the AF project by REDD+ projects.

Within this component ecoagriculture activities will also be promoted through institutional capacity building. To achieve this, a capacity building needs assessment will be undertaken to gauge the level of understanding of restoring natural capital and conservation agriculture amongst stakeholders at national and provincial levels. Participatory Rural Appraisals (PRAs) of local communities will be conducted at all CPAs in Cambodia to inform an upscaling strategy devised by the AF project. Revisions to relevant national policies, strategies and legislation will be proposed which will incorporate the ecoagriculture approach and will promote adaptation via restoration. These proposed revisions will promote the upscaling of the project's adaptation interventions. The AF project will also encourage co-ordination and collaboration with other restoration projects at national and provincial levels. This will contribute to the replication and upscaling of project interventions, as well as the effective use of financial and human resources. To generate recommendations on how to encourage local communities to invest in the ecoagriculture approach, multi-stakeholder consultations on land tenure will be conducted.

The final aspect of this component will be to develop and institutionalise a national ecoagriculture upscaling strategy for CPAs in Cambodia. The private sector will be engaged to potentially invest in commercially viable business opportunities (i.e. development of NTFP markets) to facilitate the upscaling of AF project interventions to other CPAs. A strategy to ensure integration of the lessons learned into national policy will be developed by: i) undertaking a gap analysis of national development plans and policy to determine the extent to which ecoagriculture approaches are included; ii) identifying existing entry points for proposed revisions which incorporate ecoagriculture interventions at a national scale; iii) establishing an inter-ministerial (incorporating MoE, MAFF, MRD, MLMUPC, MoT, NCDM and CDC) and multi-partner (NGOs, private sector and local representatives) task group to facilitate the development of the upscaling strategy; iv) identifying successful ecoagriculture adaptation interventions from Components 1 and 2, and ensure that these are incorporated into the proposed national strategy revisions; v) preparing and distributing a summary report and policy briefs promoting the AF project to relevant ministries (including MoE, MAFF, MRD, MLMUPC, MoT and NCDM); and finally vi) instituting a national education programme to promote lessons learned from demonstrations in the intervention sites, using appropriate media such as radio, television, websites, printed media, agricultural extension officers, and websites.

PART III: IMPLEMENTATION ARRANGEMENTS

A. Describe the arrangements for project implementation.

As requested by the Royal Government of Cambodia (RGC), UNEP will be the Multilateral Implementing Entity (MIE) for the AF project. UNEP has significant experience in implementing projects of this nature, and has expertise in ecosystem-based adaptation, terrestrial ecosystems and agroforestry with dedicated groups in Climate Change Adaptation and Terrestrial Ecosystems. UNEP has a regional office for Asia and the Pacific, which will have regular contact with the Executing Agency (MoE) over the course of the AF project implementation. The following implementation services under the MIE modality will be provided by UNEP for the AF project:

- overall coordination and management of UNEP's MIE functions and responsibilities, and the facilitation of interactions with the AFB and related stakeholders;
- oversight of portfolio implementation and reporting on budget performance;
- quality assurance and accountability for outputs and deliverables at the project development phase, during implementation and on completion;
- receipt, management and disbursement of AF funds in accordance with the financial standards of the AF;
- information and communication management, including maintaining Management Information Systems and specific project databases to track and monitor progress (financial and substantive) of project implementation;

- oversight and quality assurance of evaluation processes for project performance and ensuring that lessons learned/best practice are incorporated to improve future projects; and
- general administration and support costs including legal services, procurement and supply management, IT, and human resource management.

In accordance with its standards and procedures, UNEP will enter into a contractual agreement with the lead national executing partner, the MoE, towards the delivery of AF project activities and outputs. The MoE hosts the National NCCC and the CCCD. The NCCC was established in 2006 and is responsible for *inter alia*: i) coordinating the implementation of climate change activities in Cambodia; ii) developing climate change policies, strategies, legal instruments, plans and programs; and iii) integrating climate change concerns into relevant government policies, strategies and legal instruments. The Committee is cross-sectoral and multidisciplinary and is composed of high-level government representatives (Secretaries and Under-Secretaries of State) of 19 Ministries, including the Ministry of Finance (MOF), and government agencies. The CCCD is responsible for *inter alia*: i) planning and policy formulation; iii) implementation of the UNFCCC; iii) assessment of new technologies on climate change adaptation and greenhouse gas emission mitigation; and iv) capacity building and awareness raising. Together with the Department of Research and Community Protected Area Development (DRCPAD) of the General Department of Administration for Nature Conservation and Protection (GDANCP), the NCCC and CCCD will be ultimately responsible for the timely delivery of inputs and outputs and for coordinating the activities of the other responsible parties in the AF project. An organogram depicting the AF project management arrangements is shown in Figure 8.

The **Project Board (PB)** will be responsible for making management decisions for the AF project. In addition, the board will: i) undertake project assurance (monitoring and evaluation); ii) ensure performance improvement; and iii) ensure accountability and learning. The PB will comprise of designated senior technical representatives (Director Generals) from relevant ministries (e.g. MoE and MAFF), and representatives from local District Administrator offices. The Project Manager will serve as secretary to the PB. The PB will approve annual work plans and procurement plans, and review project periodical reports as well as any deviations from the approved plans.

The **Project Manager (PM)** will be responsible for the overall management of the AF project. The PM will ensure that the project is run transparently and effectively in accordance with AF and UNEP guidelines and approved work plans and budgets. The PM will receive project support from a national financial manager as well as additional staff members within MoE. The key functions of the PM will be:

- facilitating the day-to-day functioning of the project staff;
- managing human and financial resources in consultation with the PB to achieve results in line with the outputs and activities outlined in the project document;
- leading the preparation and implementation of annual results-based work plans and logical frameworks as endorsed by the management;
- coordinating project activities with related and parallel activities;
- monitoring project activities, including financial matters, and preparing monthly and quarterly progress reports, and organising monthly and quarterly progress reviews;
- supporting the PB in organizing PB meetings;
- coordinating the distribution of responsibilities amongst team members and organising the monitoring and tracking systems;
- reporting and providing feedback on project strategies, activities, progress, and barriers to UNEP, PB and project partners; and
- managing relationships with project stakeholders including donors, NGOs, government agencies, and others as required.

A **Chief Technical Advisor (CTA)** will be hired to assist the PM and provide technical guidance on the implementation of the AF project. The CTA will:

- develop the technical restoration and conservation agriculture protocols (Output 1.3);
- conduct quality assurance and technical review of project outputs (e.g. studies and assessments);
- assist in drafting TORs for technical consultancies and supervision of consultants work;
- assist in monitoring the technical quality of project M&E systems, including annual workplans, indicators and targets;

- provide advice on suitable approaches and methodologies for achieving project targets and objectives;
- provide a technical supervisory function to the work carried out by any other technical consultants hired by the AF project; and
- assist in knowledge management, communications and awareness raising.

The CTA position will be filled through a transparent and competitive recruitment process that will commence as soon as the Full Project Proposal is approved. The CTA will be part of a project managers' coordination working group, comprising managers from the other ongoing projects/programmes, detailed in the Section II.F, to coordinate efforts and avoid overlap between similar endeavours. It is anticipated that the working group will meet during the inception phase and biannually during project implementation. The head of the group will be changed every 6 months and will have a position on the PB.

See Annex XII for abbreviated Terms of Reference for the PM and CTA.

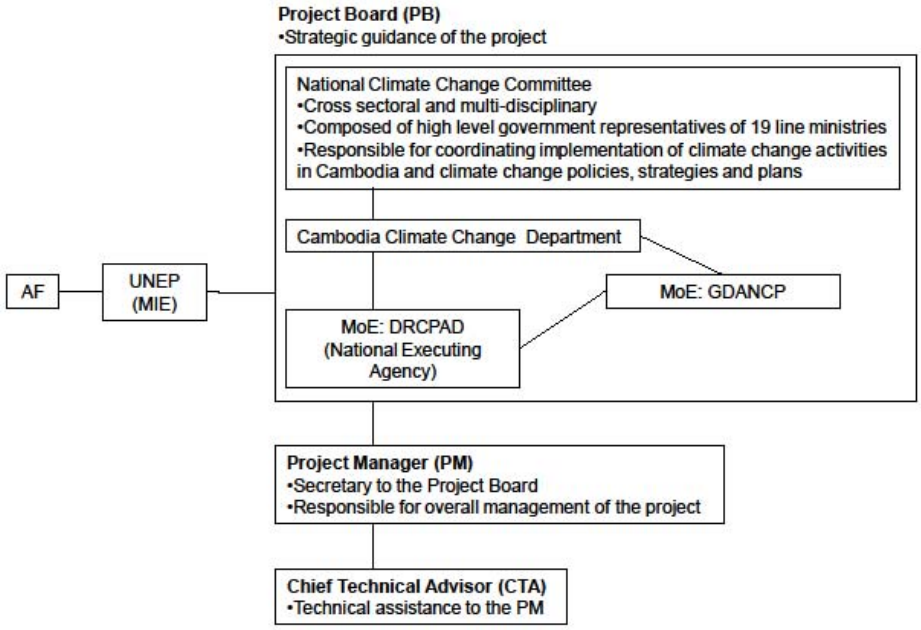


Figure 8: AF project management arrangements.

Anticipated execution costs

The execution costs of this project include standard project management planning and budgeting. This involves the hiring of personnel whose responsibility will be to coordinate and oversee the daily tasks of project implementation. Because many of the activities of the project involve procurement and sub-contracting, the recruitment of a dedicated financial manager will be necessary in order to ensure that the PB has the required capacity to monitor financial standards as per UNEP and AF requirements.

Table 8: Project execution costs.

Execution activity	Role	US$

Project personnel	Project coordinator	80,000
	National financial manager	60,000
	Administrative support	45,000
Travel		71,150
Monitoring & Evaluation	Baseline	40,000
	Evaluations	60,000
	Audit	20,000
Inception and steering meetings		20,000
TOTAL		**396,150**

B. Describe the measures for financial and project risk management

The risks to the AF project are identified and rated in Table 9 below.

Table 9: Risks to the AF project.

Identified Risks	Risk rating	Mitigation Measures
Current climate and seasonal variability and/or hazard events result in poor restoration results or agricultural yields.	Medium	• Current climatic variability will be taken into account in the planning of the restoration process. • Drought- and flood-resilient species will be used. • Techniques to assist plant growth particularly in the seedling/sapling phases and to reduce risk of damage from climate change hazard impacts will be used. • Species will be planted in appropriate seasons to reduce risk of hazard impact. • Diversity in planted crops will reduce this risk,
Intervention sites may be sold for Economic Land Concessions.	Low	• Intervention sites will be in CPAs which are protected under the PA Law.
Disagreement amongst stakeholders with regards to demonstration site selection.	Low	• Intervention sites will be selected using an agreed upon list of criteria to ensure the selection is transparent and equitable. • There will be a participatory approach to the AF project, particularly with regards to intervention site selection.
Communities may not adopt activities during or after the AF project.	Medium	• The interventions will be institutionalised within MoE to ensure sustainable delivery post-project implementation. • Capacity building and training of the CPA communities will be undertaken to improve their awareness and understanding of the benefits of the activities.
Loss of government support may result in lack of prioritisation of AF project activities.	Low	• Regular stakeholder consultation and involvement will be undertaken to ensure that government maintains its commitment and considers the AF project as a support to its forestry and agriculture programmes.
Institutional capacities and relationships are not sufficient to provide effective solutions to climate problems that are complex and multi-sectoral.	Medium	• Project design will include the development of institutional capacity. This will ultimately lead to the development of an appropriate institutional framework for analysing climate change impacts on food supply, altering policy and implementing interventions.
Capacity constraints of local institutions may limit the ability to undertake the research and interventions.	Medium	• Human resource capacity will be developed as required. • Collaboration and exchange between local institutions and international research institutes

		will be initiated. • A CTA will work closely with the AF PM to ensure timely delivery of project outputs.
Priority interventions implemented are not found to be cost-effective.	Low	• Cost-effectiveness is a core principle in the implementation of adaptation measures. Detailed information will be recorded regarding cost-effectiveness. This will be widely disseminated and will be of use to future adaptation initiatives in Cambodia.
Lack of commitment/buy-in from local communities may result in failure of intervention sites.	Medium	• A stakeholder engagement plan will be developed during the inception phase. • Community stakeholders have been consulted during the CPA surveys leading into the Full Project Proposal development to ensure their buy-in into the AF project. • A bottom-up approach integrating the community into the AF project's development and implementation phases will be followed.

C. Describe the monitoring and evaluation arrangements and provide a budgeted M&E plan.

The AF project will comply with formal guidelines, protocols and toolkits issued by the AF, UNEP and the RGC. UNEP will develop a **Supervision Plan** during the project's inception phase which will be distributed and presented to all stakeholders during the Inception Workshop. The emphasis of the Supervision Plan will be on outcome monitoring, learning and sustainability and financial management. Project risks and assumptions will be regularly monitored by UNEP. Risk assessment and rating is an integral part of the Project Implementation Review (PIR). The quality of the project's M&E will also be reviewed and rated as part of the PIR. Appropriate financial parameters will be monitored annually to ensure the cost-effective use of financial resources.

The AF project will undergo an independent **Mid-Term Evaluation** at the mid-point of project implementation. The Mid-Term Evaluation will determine progress being made toward the achievement of outcomes and will identify corrective actions if needed. It will: i) focus on the effectiveness, efficiency and timeliness of project implementation; ii) highlight issues requiring decisions and actions; and iii) document initial lessons learned about project design, implementation and management. Findings of this review will be incorporated as recommendations for improved implementation during the final half of the project's term.

An independent **Final Evaluation** will take place three months prior to the project's end date in accordance with UNEP guidance. The Final Evaluation will focus on the delivery of the project's results as initially planned (and as corrected after the Mid-Term Evaluation, if any such correction took place). The Final Evaluation will assess the impact and sustainability of results, including their contribution to capacity development and the achievement of adaptation benefits.

An **Annual Project Review/Project Implementation Review** (APR/PIR) will be prepared to monitor progress made since the project's start and in particular for the previous reporting period. The APR/PIR includes, but is not limited to, reporting on the following:

- progress on the project's objective and outcomes – each with indicators, baseline data and end-of-project targets (cumulative);
- project outputs delivered per project outcome (annual);
- lessons learned/good practice;
- annual Work Plan and expenditure reports; and
- project risk and adaptive management.

Periodic monitoring will be conducted through visits to the intervention sites undertaken by relevant staff from UNEP. Visits will be jointly conducted based on the agreed schedule to assess project progress first hand. A summary of the M&E costs is provided in Table 10:

Table 10: Monitoring and evaluation costs of the AF project.

Type of M&E activity	Responsible parties	Budget US$ (Excluding project team time)	Time Frame
Measurements of means of verification (baseline assessment). A methodology for quantifying the baseline and vulnerability of CPA communities, as well as an associated Terms of Reference for hiring a consultant, are provided in Annex XI. This methodology has been successfully used in other UNEP projects.	Oversight by Project Manager; Project team; CTA	40,000	First quarter of year 1
Direct Project Monitoring and Quality Assurance including progress and financial reporting, project revisions, technical assistance and risk management	Project Manager and Project team; UNEP; External consultants (i.e. evaluation team)	(supported from staff costs included in Project execution, and from MIE fee)	Quarterly, half-yearly and annually and as needed
Evaluations (Mid-term review and Independent terminal evaluations)	Project Manager and Project team; UNEP.	60,000	At midpoint and at end of project implementation
Audit	Project Manager and Project team; UNEP.	20,000	Annually at year end
Inception meeting, field visits and steering committee meetings	Project Manager and Project team; UNEP.	20,000	Inception meeting within first 2 months and bi-annual PB meetings (and sub-committee meetings)
TOTAL indicative cost		US$ 140,000	

Note: The costs indicated here do not include the costs associated with UNEP staff. Such costs will be covered by the MIE fee.

D. Include a results framework for the project proposal, including milestones, targets and indicators.

A detailed results framework with Specific, Measurable, Achievable, Realistic and Time-based (SMART) indicators, their baseline and targets and estimated costs is provided below.

	Activities	EXPECTED CONCRETE OUTPUTS	*Output Budget*	Output indicator	Baseline	Target	Inputs	EXP Y1	EXP Y2	EXP Y3	EXP Y4	EXP Y5	TOTAL EXP
COMPONENT 1.Protocols for ecoagriculture interventions													
OUTCOME 1. Technical expertise and a local enabling framework for forest restoration and conservation agriculture interventions that build climate resilience developed at CPA intervention sites through a consultative and participatory process													
	Undertake gap analyses and institutional mapping exercises.	1.1 Information generated on climate change impacts and preferred ecoagriculture interventions through a consultative and participatory approach.	150000	Number of reports developed (including gap analysis report; multi-use plant species reports; bio-physical/ecological/socio-economic assessment reports; planting schedule report; crop variety reports; rice variety report; hydrological/engineering reports).	No reports related to gap analyses; multi-use plant species; bio-physical/ecological/socio-economic assessments; planting schedules; crop varieties; rice varieties; and hydrological/engineering.	At least 23 reports (at least 1 report for each of the following activities: gap analysis, planting schedule and rice variety assessments; at least 1 report per CPA intervention site for the following activities: multi-use plant species, bio-physical/ecological/socio-economic, crop variety and hydrological/engineering surveys).	National institutional expert	10000					**10000**
	Set up groups to conduct targeted research to fill the knowledge gaps.						National research group	5000	5000				**10000**
	Identify indigenous multi-use plant species tolerant to water-stressed soil conditions and suitable for restoring degraded forest areas.						International botanist (adaptation expert)	10000					**10000**
	Undertake bio-physical, ecological and socio-economic assessments of CPA intervention sites.						International bio-physical, ecological and socio-economic expert	40000					**40000**
	Use short- and medium-term climate forecast information to develop planting schedules.						National agricultural expert (climate forecasts)	10000					**10000**
	Evaluate the potential of naturally occurring local crop varieties and wild crop relatives to provide cultivars with improved tolerance to direct and indirect climate change impacts.						National agricultural expert (adaptation)	10000					**10000**
	Evaluate the potential of drought-tolerant rice varieties for *inter alia* improving germination rates and increasing productivity.						National rice expert	10000					**10000**
	Undertake a hydrological/engineering study of water-catchment areas in CPA intervention sites.						National hydrological/engineering expert	10000					**10000**
	Develop and implement PhD and MSc projects.			Number of PhD and MSc projects.	No PhD and MSc projects on the ecoagriculture approach in Cambodia.	At least 5 MSc projects and 2 PhD projects initiated.	National academics		10000	10000	10000	10000	**40000**
	Identify locally available micro-finance and weather index-based insurance products.	1.2 Economic assessments undertaken to identify most appropriate ecoagriculture interventions and associated micro-finance and insurance products.	60000	Number of reports developed (product report; commercial viability report; market effectiveness report; cost/benefit report; socio-economic benefit report; and business plan).	No formal reports related to products; commercial viability; market effectiveness; cost-benefit analyses; socio-economic benefits and business plans.	At least 6 reports (at least 1 (of each) product, commercial viability, business plan, market effectiveness, cost/benefit and socio-economic report).	National finance/insurance expert	10000					**10000**
	Undertake an in-depth market assessment to determine the commercial viability of such products.						National finance/insurance expert (product development)	10000					**10000**
	Develop business plans based on the results of the above activity and distribute to relevant private sector players.						National business consultant	10000					**10000**

Assess the effectiveness of local agricultural markets in each CPA.						National agricultural expert (market assessment)	10000					**10000**
Undertake a cost-benefit analysis of planting different tree and crop species.						National agricultural expert	10000					**10000**
Assess the local socio-economic costs and benefits of the ecoagriculture approach.						National socio-economic expert	10000					**10000**
Develop the technical restoration and conservation agriculture protocols.	1.3 Forest restoration and conservation agriculture protocols developed for CPA intervention sites based on results from Output 1.1 and 1.2.	150000	Number technical of restoration and conservation agriculture protocols developed.	No such technical protocols.	At least 5 technical restoration and conservation agriculture protocols (at least 1 per CPA intervention site).	International adaptation expert (CTA)	30000	30000	30000	30000	30000	**150000**
	TOTAL component 1	**360000**					**195000**	**45000**	**40000**	**40000**	**40000**	**360000**
COMPONENT 2. Concrete ecoagriculture adaptation interventions												
OUTCOME 2. Multi-use forests established and maintained and agricultural practices diversified/intensified to supply a diverse range of food and stabilize topsoil, despite an increase in climate change-induced droughts and floods												
Develop a training course and adaptation toolkit for local farmers.	2.1 Capacity of local community for building climate resilience increased, including capacity to plan, implement and maintain ecoagriculture interventions under Output 2.2.	319773	Number of people trained (gender disaggregated).	No formal training on ecoagriculture approach at CPA intervention sites.	At least 101 CPA Management Committee, 20 local authority members, 10 agricultural extension officers and 5,000 CPA community members trained (50% of CPA community members to be women)	National adaptation expert (training course)	40000					**40000**
Train local authorities, agricultural extension officers and CPA committee members to implement the conservation agriculture protocols.						Group training (local authorities, extension officers, CPA Management Committee)	23773	51000	20000	20000	10000	**124773**
Train local communities on the importance of protecting natural resources.						Group training (local communities)	30000	30000	20000	20000	10000	**110000**
Strengthen systems for protecting and patrolling multi-use forests and other natural resource areas.			Number of incidences of transgressions.	A high-rate of incidences of transgressions. At present, no quantitative figures exist as a result a lack of monitoring and recording. Quantitative figures will be determined during the inception phase.	At least a 40-60% reduction in transgressions per CPA intervention site.	National law enforcement expert	5000	25000	5000	5000	5000	**45000**
Establish community-managed local nurseries.		2721227	Number of nurseries established.	No large-scale nurseries at the CPA intervention sites.	At least 5 nurseries established (at least 1 per CPA intervention site).	Forestry inputs (nursery establishment, maintenance and equipment)	22564	10000	10000	10000	10000	**62564**

Community liaison planting officers to oversee on-the-ground activities	Number of qualified individuals contracted.	At present there is no dedicated expert overseeing ecoagriculture interventions.	At least 3 community liaison planting officers (1 in Chop Tasok CPA, 1 in Ronouk Khgeng CPA, and 1 in Chiork Beungprey, Chom Thlork and Skor Mreach CPAs).	National forestry/agricultural expert (community liaison planting officers)		40000	30000	30000	22500	**122500**
Restore degraded areas in CPAs using multi-use forest species.	Ha of degraded forest restored.	3,730 ha of degraded forest in the five CPA intervention sites.	At least 1,875 ha of degraded forest restored.	Forestry inputs (forest restoration)		800000	500000	273125		**1573125**
Enhance rice yields and climate resilience by planting multi-use trees around existing rice paddies.	Ha of rice paddies bordered with multi-use trees.	Zero ha of rice paddies bordered with appropriate multi-use trees.	At least 2,286 ha of rice paddies bordered with multi-use trees.	Agricultural inputs (multi-use trees around rice paddies)		120000	70000	54602		**244602**
Intensify/diversify farming practices and improve technologies for reducing water-use.	Ha of intensified/ diversified homegardens.	Zero hectares of intensified/ diversified homegardens.	At least 337 ha of intensified/ diversified homegardens.	Agricultural inputs (intensify/diversify homegardens)		126561	25000	25000	25000	**201561**
Establish field trials of drought-tolerant rice varieties.	Ha of drought-tolerant rice varieties.	Only 1 of the 5 CPA intervention sites currently uses improved varieties of rice. The area in hectares of this CPA site will be quantified during the inception phase.	At least 300 ha of paddies planted with drought-tolerant rice varieties.	Agricultural inputs (drought-tolerant rice seed)		29400				**29400**
Terracing	Number of additional activities to complement intensive conservation agriculture interventions.	No additional activities to complement intensive conservation agriculture interventions.	At least 31 additional activities implemented (see Table 2) in total at the five CPA intervention sites.	Agricultural inputs (additional suite of interventions)		20000	18359			**38359**
Construct dams/ponds and canals.						60000	43125			**103125**
Establish fire breaks to combat fires in multi-use forests.						3073	2500	2500	2500	**10573**
Distribute drought-resilient seed stocks to local businesses.							20000			**20000**
Establish woodlots for supplying woodfuel to local communities.						30000	20000			**50000**
Introduce appropriate post-harvest storage techniques.						28672				**28672**
Improve crop pest and disease management.						41000	10000	10000	10000	**71000**
Purchase project vehicle	Number of project vehicles.	No project vehicles,	At least one project vehicle.		30000					**30000**
Maintain project vehicle	Annual maintenance reports	No maintenance reports.	Maintenance reports written annually.		10000	10000	10000	10000	10000	**50000**

Additional community requests (nature tourism, marketing of crop products, financial credit schemes)								50000	35746			**85746**
Facilitate farmers' access to micro-finance and weather index-based insurance products.	2.3 Local communities' livelihoods enhanced and diversified through sustainable development of NTFPs and the promotion of sustainable alternative livelihood strategies.	220 000	Number of sustainable alternative livelihood strategies.	No sustainable alternative livelihood strategies.	At least 10 sustainable alternative livelihood strategies developed for the 5 CPA intervention sites (50% of beneficiaries to be women).	National finance/insurance expert		5000				**5000**
Develop business plans for alternative livelihood options.						National livelihoods expert (business plans)		10000	5000			**15000**
Facilitate the integration of small-scale farmers into domestic, regional and global markets for high-value agricultural (HVA) products.						National livelihoods expert (market access)		20000	10000			**30000**
Train local communities in CPAs where ecotourism is appropriate.						Group training and capacity building for alternative livelihoods (e.g. ecotourism, NTFPs)	40000	30000	30000	30000	20000	**150000**
Establish sustainable alternative livelihoods.						National livelihoods expert (business establishment)		10000	5000	5000		**20000**
Identify target communities and areas for monitoring outside the CPA intervention sites.	2.4 Socio-economic and ecosystem monitoring of AF project impacts downstream of CPA intervention sites	162 000	Number of monitoring reports and research protocols.	No formal monitoring reports or research protocols.	At least 5 monitoring reports and research protocols (at least 1 each per CPA intervention site).	National adaptation expert (communities)		2000				**2000**
Develop socio-economic and ecological monitoring protocols.						National adaptation expert (monitoring)		8000				**8000**
Train local communities to undertake the baseline surveys and data collection.						Group training (baseline surveys)		30000	15000			**45000**
Conduct baseline surveys.						National adaptation expert (implementation)		10000				**10000**
Develop and implement a tool to measure the downstream impact of the project.						National adaptation expert (data collection)		4000	4000	4000	4000	**16000**
Undertake an economic analysis of the direct and indirect socio-economic, ecological and hydrological benefits in target community areas.						National socio-economic/ecological/hydrological expert		8000	8000			**16000**
Develop and implement long-term socio-economic and ecosystem research protocols for multi-use forests and conservation agriculture practices in CPA intervention sites and downstream community sites.						International adaptation researcher (long-term research)		20000	5000	5000	5000	**35000**
Compile a report of the initial results.						International adaptation researcher (report)			30000			**30000**
	TOTAL Component 2	**3423000**					201337	1631706	951730	504227	134000	**3423000**
COMPONENT 3. Institutional capacity, awareness raising and upscaling of ecoagriculture interventions												
OUTCOME 3. Restoration and conservation agriculture interventions to build climate resilience of local communities mainstreamed into Cambodia's adaptation framework and related sector policies												
Raise public awareness of the impacts of climate change and the benefits of adaptive agricultural techniques.	3.1 Awareness increased at a local level of the importance of ecoagriculture for protecting and enhancing	271 000	Number of 'events' to raise awareness (including documentary films, campaigns, workshops, initiatives, network portals). Number of community members/farmers aware of	No previous 'events' to raise awareness, and no existing use of the ecoagriculture approach in Cambodia.	At least 28 'events' to raise awareness. At least 40% of community members/farmers at intervention sites adopting ecoagriculture practices.	National campaign expert (public awareness)	4000	2000	2000			**8000**
Produce a documentary film to promote the						International short-film producer		10000	6000			**16000**

ecoagriculture approach.	commercial and subsistence activities.		conservation agriculture interventions.									
Design and implement an awareness raising campaign.						National campaign expert (local communities)	5000	5000	2000	2000	2000	**16000**
Establish demonstration gardens, farmer field days and workshops as teaching tools.						Group training (demonstration gardens)		20000	20000	10000	10000	**60000**
Target local communities situated in CPAs away from intervention sites for an additional awareness raising campaign.						Group training (local communities)		20000	20000	10000	10000	**60000**
Undertake education initiatives at schools and universities.						National education expert		10000				**10000**
'Train the trainers'.						Group training ('train the trainers')		30000	20000	10000	10000	**70000**
Develop a web-based data network portal to supply information about the ecoagriculture interventions to local government agencies.						National web-based data expert	5000	2000	2000	2000	2000	**13000**
Use a social networking site to promote: i) information generated in the project; and ii) the documentary film.						National social networking expert	2000	1500	1500	1500	1500	**8000**
Promote the species used in the AF project REDD as well as REDD+.			Number of REDD(+) feasibility studies and Project Idea Notes which integrate/promote ecoagriculture activities or species from multi-use forests developed.	No existing REDD(+) projects in Cambodia that integrate/promote ecoagriculture activities or species from multi-use forests.	At least 1 REDD+ feasibility study and Project Idea Note that integrates/promotes ecoagriculture activities or species from multi-use forests.	National REDD+ expert	5000	3000	2000			**10000**
Undertake capacity-building needs assessments.	3.2 Ecoagriculture activities promoted through institutional capacity building and proposed revisions to policies, strategies and legislation.	70 000	Number of proposed revision of policies, strategies and legislation.	No proposed revisions to integrate climate change and ecoagriculture into agricultural, forestry and development policies, strategies and plans e.g. Strategic Agriculture Development Plan.	At least 3 revisions to key policies, strategies and legislation documents proposed.	National adaptation expert (capacity building)	10000					**10000**
Conduct PRAs of local communities at all CPAs in Cambodia.						National adaptation expert (PRAs)		20000				**20000**
Propose revisions to relevant national policies, strategies and legislation to incorporate the ecoagriculture approach and promote restoration as an adaptation measure.						National policy expert (revisions)		15000	5000			**20000**
Encourage co-ordination and collaboration with other restoration projects at national and provincial levels.						National adaptation expert (PM coordination)	2000	2000	2000	2000	2000	**10000**
Conduct multi-stakeholder consultations on land tenure to generate a report with recommendations on how to encourage local communities to invest in the ecoagriculture approach.						National policy/Protected Area expert (land tenure)	10000					**10000**

	Undertake a gap analysis of national development plans and policy.	3.3 National ecoagriculture upscaling strategy developed and institutionalised for CPAs in Cambodia.	46 000	Number of upscaling strategies developed.	No such strategy exists.	1 national ecoagriculture upscaling strategy developed.	National policy expert		8000				**8000**
	Identify existing entry points for proposed revisions which incorporate ecoagriculture approaches at a national scale.						National policy expert		4000				**4000**
	Establish an inter-ministerial and multi-partner task group to facilitate the development of the upscaling strategy.						Task force		4000				**4000**
	Engage with the private sector about the commercial viability of AF project interventions.						National adaptation expert (private sector)		4000	4000			**8000**
	Investigate other sources of funding for the upscaling of AF project interventions.						National adaptation expert (funding)			4000			**4000**
	Identify successful ecoagriculture adaptation interventions from Components 1 and 2, and ensure that these are incorporated into the proposed national strategy revisions.						National adaptation expert (upscaling)				4000		**4000**
	Prepare a summary report and policy briefs promoting the AF project and ecoagriculture approaches.						National policy expert (report)				4000	10000	**14000**
		TOTAL Component 3	**387 000**					**43000**	**160500**	**90500**	**45500**	**47500**	**387000**
	SUB TOTAL PROJECT OPERATIONS		**4170000**					**439337**	**1837206**	**1082230**	**589727**	**221500**	**4170000**
4. Project/Programme Execution cost													
	Project Coordinator						Project coordinator	16000	16000	16000	16 000	16 000	**80 000**
	Financial and Administrative Management						National financial manager	12000	12000	12000	12000	12000	**60000**
	Technical and Logistical Support						Administrative support	9000	9000	9000	9000	9000	**45000**
	Steering, supervision and reporting costs						Travel	16100	14850	13400	13400	13400	**71150**
Monitoring and Evaluation							Baseline	40 000					**40000**
							Evaluations			30000		30000	**60000**
							Audit	4000	4000	4000	4000	4000	**20000**
							inception and steering meetings	4000	4000	4000	4000	4000	**20000**
TOTAL Project execution (300,000)								**101100**	**59850**	**88400**	**58400**	**88400**	**396150**
5. Total Project/Programme Cost								540437	1897056	1170630	648127	309900	**4566150**
6. Project Cycle Management Fee charged by the Implementing Entity (if applicable)													**388123**
Amount of Financing Requested													**4954273**

PART IV: ENDORSEMENT BY GOVERNMENT AND CERTIFICATION BY THE IMPLEMENTING ENTITY

A. RECORD OF ENDORSEMENT ON BEHALF OF THE GOVERNMENT[223]

Dr Tin Ponlok Deputy Director General Ministry of Environment	Date: 17 April 2012

The Letter of Endorsement is attached as Annex XV.

B. IMPLEMENTING ENTITY CERTIFICATION

I certify that this proposal has been prepared in accordance with guidelines provided by the Adaptation Fund Board, and prevailing National Development and Adaptation Plans (2006) and subject to the approval by the Adaptation Fund Board, understands that the Implementing Entity will be fully (legally and financially) responsible for the implementation of this project/programme.

for:

Ibrahim Thiaw, Director, Division of Environmental Policy Implementation , UNEP.
Implementing Entity Coordinator

Date: 16. 04. 2012	Tel. and email:ibrahim.thiaw@unep.org; +254 20 7624782, ibrahim.thiaw@unep.org

Project Contact Person: Ermira Fida, UNEP-GEF Adaptation Portfolio Manager

Tel. And Email: + 254 20 7623113; ermira.fida@unep.org

[221] Each Party shall designate and communicate to the Secretariat the authority that will endorse on behalf of the national government the projects and programmes proposed by the implementing entities.

ANNEXES

Annex I: Background information on Protected Areas in Adaptation Fund project targets areas.

Annex II: Community Protected Area Survey (17-28 September 2011).

Annex III: Second CPA Community Survey (23 March – 03 April 2012).

Annex IV: Indicative costs of reforestation/forest restoration

Annex V: Tree species list.

Annex VI: The cost, economic benefit and ecological benefits of planting nitrogen fixing trees around rice paddies.

Annex VII: Proposed crop species to promote intensification and diversification of existing homegardens through improved conservation agriculture practices.

Annex VIII: Costing of additional suite of adaptation activities per CPA intervention site to complement conservation agriculture activities (US$).

Annex IX: Mission report and meeting minutes.

Annex X: Checklist of Environmental and Social Safeguards.

Annex XI: Methodology for vulnerability index development.

Annex XII: Suggested Terms of Reference.

Annex XIII: Alignment with AF Objectives.

Annex XIV: Budget.

Annex XV: Letter of Endorsement from Cambodia's DNA.

ANNEX I: BACKGROUND INFORMATION ON PROTECTED AREAS IN ADAPTATION FUND PROJECT TARGETS AREAS.

Two target areas were selected for the Adaptation Fund (AF) project (Figure 97):

- **North-eastern Forests**: Lowland deciduous forests and limited dry evergreen forest generally associated with sandstones and basalts respectively. The area has low population densities and is dominated by natural and modified landscapes used for forestry, the maintenance of biological diversity, and limited agriculture. Ethnic groups living in this area include the Tampoun, Brao, Rhade, Stieng and Khmer.
- **Northern Plains**: Lowland dry evergreen and associated deciduous forests on sandstones. The region has low population densities and natural and modified landscapes used for forestry, the maintenance of biological diversity, and limited agriculture. Ethnic groups living in this area include Khmer, Pear, Kouy and Stieng[224].

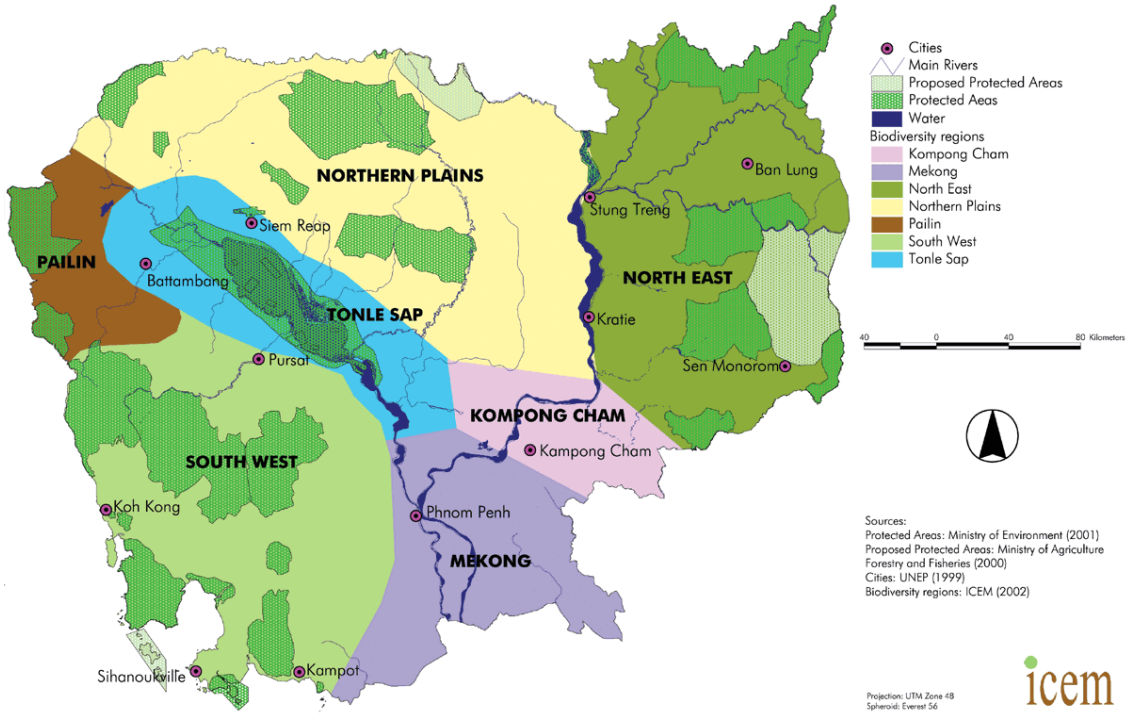


Figure 97: Biodiversity regions of Cambodia[225].

These target areas were selected based on: i) the low adaptive capacity of resident rural communities to the effects of climate change[226]; and ii) the high dependence of these communities on ecosystem-based services[227].

Protected Areas (PAs) within the target areas are:

- **North-eastern Forests target area**: Virachey National Park (NP); Phnom Prech Wildlife Sanctuary (WS); Lomphat WS; and Namlear WS.
- **Northern Plains target area**: Kulen Promtheap WS; Phnom Kulen NP; and Beung Per WS.

[224] ICEM, 2003. *Cambodia National Report on Protected Areas and Development.* Review of Protected Areas and Development in the Lower Mekong River Region, Indooroopilly, Queensland, Australia. 148 pp.
[225] Ibid
[226] Based primarily on: Yusuf, A.A. & Francisco, H. (2009). Climate Change Vulnerability Mapping for Southeast Asia. Economy and Environment Program for Southeast Asia (EEPSEA), Singapore.
[227] MoE. 2002. Cambodia's Initial National Communication under the United Nations Framework Convention on Climate Change.

Community Protected Areas (CPAs) were considered for the placement of intervention sites because of their secure land tenure. As a result Lomphat and Namlear WSs were excluded from the site selection process since they had no CPAs. Figure 10 shows the PAs that were considered for intervention site placement.

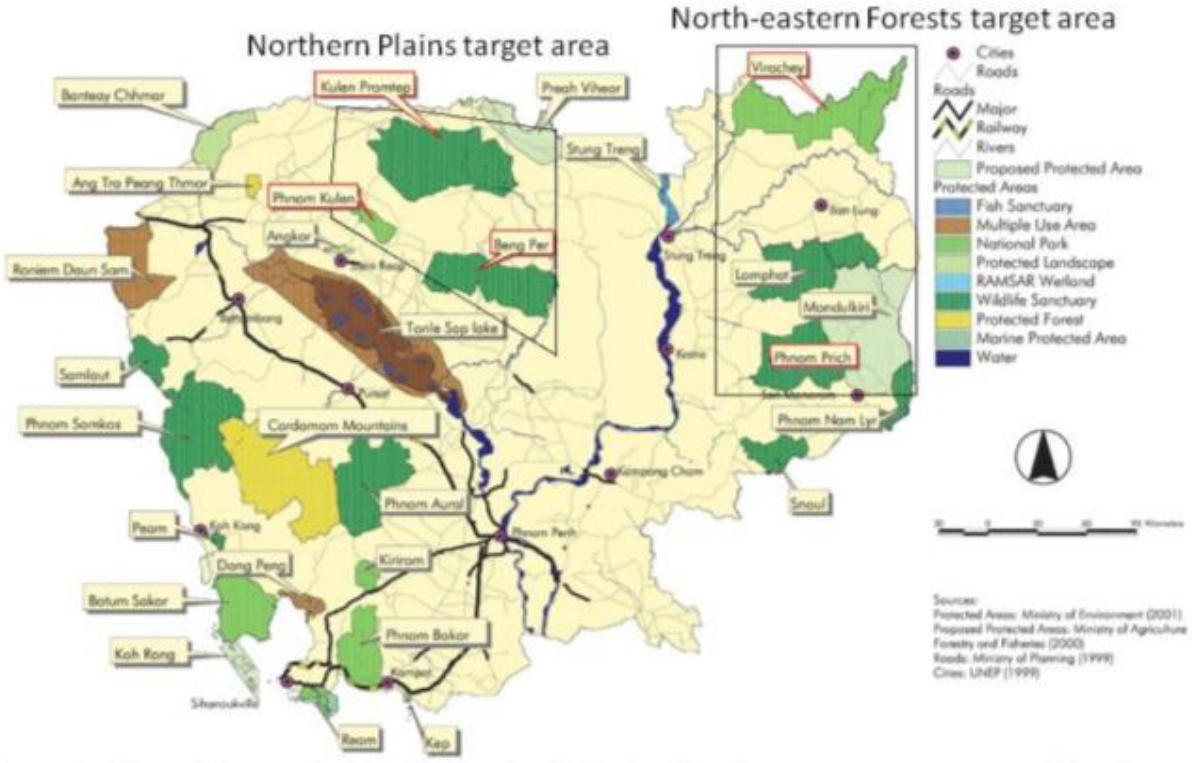


Figure 10: PAs containing CPAs within the AF project target areas[228].

A brief description of the PAs with potential intervention sites is provided below.

Virachey National Park

Virachey National Park in north-eastern Cambodia is one of the top priority areas for conservation in Southeast Asia. The park covers 332,500 ha and is one of only two Cambodian ASEAN Heritage Parks. It was created under the Royal Decree Concerning the Creation and Designation of Protected Areas, issued on the 1st of November 1993, and is under the administration of the Ministry of Environment of Cambodia. The park occurs in the most inaccessible part of Cambodia and comprises of pristine dense semi-evergreen lowlands, montane forests, upland savannah, bamboo thickets and occasional patches of mixed deciduous forest. The elevation ranges from 400 m to 1,500 meters above sea level. There are currently five Community Protected Areas (CPAs) supporting 1,346 families, covering a combined area of 18,395 ha.

Table 11: CPAs in Virachey National Park.

CPA	No. of families	Size (ha)
Yorn Center	9	550
O'toung	390	9,862
O'khampha	190	2,382
O'tabok	87	2,800
G'Urcay	670	2,801

[228] ICEM, 2003. *Cambodia National Report on Protected Areas and Development.* Review of Protected Areas and Development in the Lower Mekong River Region, Indooroopilly, Queensland, Australia. 148 pp.

Phnom Prich Wildlife Sanctuary
Phnom Prich Wildlife Sanctuary is located in eastern Cambodia. PPWS was established in 1993 by Royal Decree. The area has, however, been a protected forest reserve since 1962 when it was set aside as a refuge for endangered Kouprey (*Bos sauveli*). It is roughly 225,000 ha in size and forms one of the largest remaining relatively undisturbed landscapes in mainland Asia. The wildlife sanctuary is under threat of hunting and forest clearance. WWF is currently supporting government conservation efforts in the sanctuary. It is notable for its rich habitat diversity, including the following forest types: hilly evergreen (10% of forest), open dry dipterocarp woodlands (50% of forest) and semi-evergreen (remaining 40%) forests. This wealth of ecosystems is due to the sanctuary's very diverse elevation structure, varying between 80 m to 640 m above sea level. This variation has created a rich, intricate mosaic of forest habitats. There are currently three CPA's supporting 373 families in an area of 7,687 ha.

Table 12: CPAs in Phnom Prich Wildlife Sanctuary.

CPA	No. of families	Size (ha)
Sre Thom Mleung	132	3,000
Ronouk Khgeng	80	1,734
Pouhoung Poutong	161	2,953

Kulen Promtep Wildlife Sanctuary
Kulen Promtep Wildlife Sanctuary is approximately 402,500 ha and is the largest PA in Cambodia. It was established in 1993 to protect Kouprey habitat. It is part of the Northern Plains Dry Forest Priority Corridor with elevations ranging from ~180 m to 550 m above sea level. The wildlife sanctuary is covered by lowland forest and contains the largest swamp in the Cambodia. Threats include deforestation. There is currently one CPA supporting 222 families in an area of 1,763 ha.

Table 13: CPAs in Kulen Promtep Wildlife Sanctuary.

CPA	No. of families	Size (ha)
Thmatbeutheun krosinm	222	1,763

Phnom Kulen National Park
Phnom Kulen National Park is located in the Phnom Kulen mountain massif in Siem Reap Province. It was established in 1993 and covers 37,500 ha. The area originally consisted of primary forest. However, human activities have led to the clearing of the original vegetation and resulted in the replacement of primary forests with secondary scrubland vegetation consisting of shrub morphs and lianas. There are currently five CPA's supporting 980 families in an area of 980 ha.

Table 14: CPAs in Phnom Kulen National Park.

CPA	No. of families	Size (ha)
Preyphnom Kduoch	63	78
Preyphnom Manos	99	230
Preyphnom	158	270
Preyphnom Popel	59	96
Chop Tasok	48	306

Beng Per Wildlife Sanctuary
Beng Per Wildlife Sanctuary is located in Kampong Thom, Siem Reap and Preah Vihear provinces. Established in 1993 and covering an area of 242,500 ha, the wildlife sanctuary forms the southern end of the Northern Plains Dry Forest Priority Corridor. The natural vegetation consists of forests and shrublands. The sanctuary is threatened by deforestation. There are currently 19 CPA's supporting 8,143 families in a combined area of 44,701 ha.

Table 15: CPAs in Beng Per Wildlife Sanctuary.

CPA	No. of families	Size (ha)
Chiork Beungprey	158	1,500
Beung Totil	308	2,587
Prey Thom	692	2,440
Anlong Krang	325	401
Chumareach	314	1,800
Chroppou Rongreung	230	1,988
Chhomprey	197	1,981
Phnom Preah lean	76	1,869
O'Pangna	476	5,487
O'Chhengchhen	206	2,295
Beung Tonle Mreachh	158	1,722
Korki prohornk	132	1,524
Skor Mreach	642	3,449
Chom Thlork	948	4,684
Tropeungprey Thom	534	2,334
Chhom Pen	128	1,891
Damnakchankhan	253	2,117
Damnak Knachtrach	554	1,832
Phnom Balang	1,812	2,800

ANNEX II: COMMUNITY PROTECTED AREA SURVEY (17-28 SEPTEMBER 2011).

A brief description of the First CPA Community Survey is provided below, followed by:

- the survey questionnaire;
- responses from the five CPA intervention sites eventually selected (it was decided not to include the responses of all 33 CPA communities); and
- the vulnerability matrix developed based on the results.

Context:
Meetings were held during the UNEP International Consultants' June 2011 mission with committee members of the following three Community Protected Areas (CPAs):

- Thmatbeutheun Krosinm in Kulen Promptheap Wildlife Sanctuary (WS);
- Preyphnom in Phnom Kulen National Park (NP); and
- Chiork Beungprey in Beung Per WS.

Committee members were asked questions about observed changes in climate and forest degradation in and outside of CPAs. The concepts of homegardens and adaptation restoration were discussed. Based on the feedback and discussions held, it was evident that wider consultation of CPA communities using a consistent and structured questionnaire was required in order to finalise the proposed interventions and intervention sites for the Adaptation Fund (AF) project.

Two clusters of Protected Areas (PAs) were decided on as the target area of the project based on the low adaptive capacity of communities and high vulnerability to the effects of climate change[229]. These clusters are:

- North-eastern cluster:
  - Virachey NP;
  - Phnom Prech WS;
  - Lomphat WS; and
  - Namlear WS.
- Northern plains cluster:
  - Kulen Promtheap WS;
  - Phnom Kulen NP; and
  - Beung Per WS.

As secure land tenure is a requirement for Adaptation Fund (AF) projects, only CPAs were considered for project interventions[230]. Lomphat and Namlear WS do not have any established CPAs meaning they will not form part of the project at the time of proposing this AF project. The remaining five PAs contain 33 CPAs (see Annex A for full details):

- 5 CPAs in Virachey NP;
- 3 CPAs in Phnom Prech WS;
- 1 CPA in Kulen Promtheap WS;
- 5 CPAs in Phnom Kulen NP; and
- 19 CPAs in Beung Per WS.

The above CPAs were visited from 17-28 September 2011 and the consultations held with the CPA committees. Based on the feedback and discussions, at least three of the most appropriate CPAs will be selected as intervention sites for the AF project.

Criteria used for site selection:
Approved and pending AF Full Proposals and Project Concepts were reviewed in order to gain an understanding of the requirements for AF projects to be approved. Guided by this review, the purpose of the survey is to gather information from the consulted CPA committees on the:

- relevance of the project hazard (erratic rainfall) to the particular CPA;
- willingness of the committee (speaking on behalf of the community) to support the concrete project adaptation interventions;

[229] Based primarily on: Yusuf, A.A. & Francisco, H. (2009). Climate Change Vulnerability Mapping for Southeast Asia. Economy and Environment Program for Southeast Asia (EEPSEA), Singapore.
[230] Areas zoned as 'Community Zones' also provide a secure land tenure, however there are no such zoned areas at present.

- cost effectiveness of a range of adaptation interventions to manage the hazard;
- cost of climate change impacts on the communities; and
- level of degradation within the CPA.

While at least three sites will be selected from the CPAs consulted (based on the review of approved AF project), visiting all 33 CPAs in the target area has numerous advantages. The consultations have:

- formed a very solid platform of stakeholder engagement which will be very useful for meeting the AF Board requirements;
- increased the knowledge base for the project, particularly with regards to alternative interventions, costs of interventions and species to use in the project;
- built awareness of the adaptation restoration concept in the communities;
- provided information for upscaling the project when funds become available through other avenues; and
- built a useful knowledge base for the Ministry of Environment (MoE), particularly the Department of Research and Community Protected Area Development (DRCPAD).

Method:
A questionnaire was devised (Annex B) which was used to gather the required information. The same questions were asked to all CPA committees in order to compare responses. These responses will be used to rank the CPAs in terms of suitability for project interventions. The information will also be used to further refine interventions and provide detail for the AF Full Proposal. The questionnaire will be translated in Khmer and the answers translated into English.

Timing:
Five teams consisting of two DRCPAD staff members each conducted the consultations from 17-28 September 2011. As the consultations took place in the wet season, the roads were in a poor condition, which slowed the progress of the consultations. The roads in the Virachey NP and Phnom Prech WS were in a particularly poor state. Motorcycle were required in order to access the CPAs in these PAs. The consultations took three weeks to complete. The answers to the question were translated and sent back to the UNEP over the course of the consultations.

Budget:
Funding was required for the following (US$):

Car rental (including petrol)	3,000
Motorcycle rental (US$30 x 2 x 4 x 8 (one day per CPA))	1,920
Food (US$30 x 8 x 21 days)	5,880
Accommodation (US$15 x 4 (2 per room) x 21)	1,260
Miscellaneous (e.g. gift for CPA Committee, photocopying)	940
TOTAL	**13,000**

Attachments:

Annex A: Details of all CPAs in the target area.
Annex B: CPA questionnaire.

Annex A: Details of CPAs consulted

PA	CPA	No. of families	Size (ha)	Supporters	Remarks
Phnom Prech WS	Sre Thom Mleung	132	3000	WWF	Continued Support
	Ronouk Khgeng	80	1734	WWF	Continued Support
	Pouhoung Poutong	161	2953	WWF	Continued Support
Lomphat WS				Birdlife	Assessment process
Virachey NP	Yorn Center	9	550	BPAMP	No supporter
	O'toung	390	9862	BPAMP	No supporter
	O'khampha	190	2382	BPAMP	No supporter
	O'tabok	87	2800	BPAMP	No supporter
	GUrcay	670	2801	BPAMP	No supporter
Kulen Promtheap WS	Thmatbeutheun krosinm	222	1763	WCS	Continued Support
Phnom Kulen NP	Preyphnom Kduoch	63	78	FAO	No supporter
	Preyphnom Manos	99	230	FAO	No supporter
	Preyphnom	158	270	FAO	No supporter
	Preyphnom Popel	59	96	FAO	No supporter
	Chop Tasok	48	306	FAO	No supporter
Beung Per WS	Chiork Beungprey	158	1500	CFRP	No supporter
	Beung Totil	308	2587	Mlupbaitong	No supporter
	Prey Thom	692	2440	FAO	No supporter
	Anlong Krang	325	401	MoE	No supporter

	Chumareach	314	1800	MoE	No supporter
	Chroppou Rongreung	230	1988	ADRA	No supporter
	Chhomprey	197	1981	ADRA	No supporter
	Phnom Preah lean	76	1869	ADRA	No supporter
	O'Pangna	476	5487	MoE	No supporter
	O'Chhengchhen	206	2295	MoE	No supporter
	Beung Tonle Mreachh	158	1722	MoE	No supporter
	Korki prohornk	132	1524	MoE	No supporter
	Skor Mreach	642	3449	MoE	No supporter
	Chom Thlork	948	4684	MoE	No supporter
	Tropeungprey Thom	534	2334	MoE	No supporter
	Chhom Pen	128	1891	World Vision	No supporter
	Damnakchankhan	253	2117	World Vision	No supporter
	Damnak Knachtrach	554	1832	MoE	No supporter
	Phnom Balang	1812	2800	MoE	No supporter
Namlear WS					No CPA

Annex B: CPA Questionnaire

PA name	
CPA name	
Date	
Time started	
Time finished	
MoE representatives	
CPA attendees	Please fill in the Attendance List (attached)

Assessment of climate hazard (erratic rainfall)
Drought

1. Has there been an increase in drought episodes over the lifetime of the committee members?
2. Has there been an increase in drought episodes over the last 5 years?
3. What time of year have these episodes been in?
4. What impact has this had on the community?
5. What impact has this had on agricultural production?
6. What impact has this had on the forest in the CPA?
7. What dollar value has this impact had?
8. What has the community done as a result of these challenges?

Storms and heavy rainfall

9. How would the community define a storm and heavy rain period?
10. Has there been an increased in the number of storms and heavy rainfall periods over the lifetime of the committee members?
11. Has there been an increased in the number of storms and heavy rainfall periods over the last 5 years?
12. What time of year have these episodes been in?
13. What impact has this had on the community?
14. What impact has this had on agricultural production?
15. What impact has this had on the forest in the CPA?
16. What dollar value has this impact had?
17. What has the community done as a result of these challenges?

Assessment of the CPA

18. What is the CPA used for?
19. Can the committee put a dollar value to this use?
20. Are there areas that are degraded in the CPA?
21. What percentage of the CPA is degraded?
22. What are the sizes of these degraded areas in ha?
23. What is the cause of this degradation?
24. If the community had funding, what changes would they make in the CPA to protect against the impacts of droughts / storms and high rainfall described earlier?
25. How long would these changes take to make, and what resources would be required (building material, nursery/trees etc.)? What would these changes cost?
26. If the community had funding, what changes would they make outside of the CPA, around where they live, to protect against the impacts of droughts / storms and high rainfall?
27. How long would these changes take to make, and what resources would be required (building material, nursery/trees etc.)? What would these changes cost?

Assessment of the project concept

28. Does the community grow homegardens i.e. areas of mixed fruit trees, medicinal plants, vegetables, timber trees etc?
29. Where do they grow these homegardens?

(*Explain basic project concept*): If approved, the project will provide funding to plant degraded areas of forest with fruit, fibre and resin trees, medicinal plants, other NTFP trees, vegetables and timber for firewood and general. The degraded areas of varying sizes will become productive homegardens densely planted with a range useful tree and plant species. These areas will provide a consistent supply of NTFPs and wood throughout the year, even in times of drought. In times of heavy rainfall, the forest floor and soil will be protected from erosion. Another way of describing this is called 'enrichment forestry'. The project will be implemented as a trial in most likely two CPAs in the north-eastern and northern PAs in Cambodia. If the trial proves to be successful, the concept may be expanded to other areas.

30. Would the CPA committee and community support the idea of planting homegardens, and would they take care of them and ensure they are properly managed and not cut down?
31. Where would the community like homegardens to be planted?
32. What size would the community prefer?
33. What would be the dollar value of such a size of densely packed trees providing NTFPs and timber? How much would it be worth to the community?
34. What species would they like planted in such a homegarden? Please fill in the list provided. Please provide as much detail and as many species as possible.
35. Would the community like homegardens planted in the CPA?
36. How would the homegardens be managed in the CPA?
37. Who would the benefits (NTFP, wood) go to?
38. Would the management of the homegarden be included in the CPA management plan?
39. Does the community view the planting of homegardens as described above as a useful way of coping with the challenges of droughts/storms and heavy rainfall, given the value of the homegardens producing NTFPs and wood throughout the year, and the impact of droughts/storms on agricultural production discussed earlier?
40. What other actions could you suggest to protect specifically the forest against the challenges posed by an increase in droughts/storms?
41. What other actions could you suggest to protect the community in general against the challenges posed by an increase in droughts/storms?

Akun jann.

CPA meeting attendance list

CPA Name:
Date:

Name	CPA/Community position	Age	Gender (M/F)

Species list for planting into CPA

Species	Use (Fruit, fibre, resin, other NTFP, timber, fire wood)	Local or exotic?	Approximate height (m)	Time from planting until useful (i.e. bearing fruit) in months or years

RESPONSES TO THE SURVEY (ONLY THOSE OF THE FIVE CPA INTERVENTION SITES SHOWN, ATTENDANCE AND TREE LISTS NOT SHOWN):

Boeung Per WS

PA name	Boeung Per WS, Chiork Beungprey
Date , time	20 September 2011, 13h30 – 16h00
MoE representatives	Ros Chor, Van Savuth

Assessment of climate hazard (erratic rainfall)

Drought

1. YES
2. YES
3. 2009
4. Health problem; andsShortage of water and impact to rice fields.
5. Damage to rice crop, corn, bean and seasame.
6. No impact on forest.
7. Don't know.
8. Do nothing.

Storms and heavy rainfall

9. When there is strong winds and heavy rain.
10. YES for storm but no for flood.
11. YES it is increasingly.
12. September 2009 during Ketsana regional storm.
13. No
14. No
15. Overturned 4.5ha of CPA forests; and falling of 1600 resin trees.
16. 160 000 US dollars.
17. Maintain the existing CPA forests; and replant more trees.

Assessment of the CPA

18. For community usage and protect biodiversity; protect forest and resource for next generation; and restore ecological.
19. Collect NTFP such as mushroom, resin, rattan etc.
20. YES, there has been degraded forest in the CPA land.
21. 15%
22. 350 ha
23. Natural degraded area such as lakes; and land clearance for farming.
24. Maintain the existing CPA forests; and replant more trees.
25. 500 Riel x 2000 x 350= 350 000 000 Riel which is equal to 87 500 US dollars.
26. Plant homegarden; and build dams and dikes.
27. It will cost hundred of thousand US dollar for building irrigation system.

Assessment of the project concept

28. YES such as cashew nut, mango, jackfruit, papaya, orange, pineapple etc,.
29. Homegardens are planted around houses and in farm lands.

(*Explain basic project concept*)

30. YES, very much appreciate and support because homegarden provide many benefits to the community.
31. Homegarden should plant at degraded areas.
32. Approximately 350 ha.
33. Don't know.
34. (Please see in that attached species list).
35. Very much appreciate and support.
36. Assigned community members to patrol/protect and maintain.
37. For CPA income & expense; for support orphanage children; and for support to commune development.
38. Homegarden should not included in the CPA management plan.
39. YES, it can stop land encroachment; YES, it can attract more regular rainfall

40. Protect forest fire; raise awareness on forest benefits; and enforce/increase more patrolling activities.
41. Should follow management plan; withdraw resources technically; raise awareness about forest benefit; and participate in tree planting activities.

PA name	Boeung Per WS, Chom Thlork
Time finished	17 September 2011, 13h00 – 16h30
MoE representatives	Ros Chor, Van Savuth

Assessment of climate hazard (erratic rainfall)

Drought

1. YES
2. YES
3. The strongest events took place in 2009 and 2010.
4. Impact to rice fields; drying up water sources; shortage of water; and damage rice fields.
5. The falling of crop yield.
6. No impact on forest.
7. 20 000 Riel x 10 x 135 (families) = 27 000 000 which is equal to 6 750 US dollars.
8. Change rice specie to IR-16 (adapt to drought specie); and practice dry season farming.

Storms and heavy rainfall

9. When there is strong winds and heavy rain.
10. There have been an increased in the intensity of rain and storm.
11. YES
12. September 2009 during Ketsana regional storm.
13. Damage roads; flooded rice fields; and flooded villages.
14. Falling of crop yield; death of animal; and triggered various illness.
15. Overturned CPA forests.
16. 7000 UD dollars
17. Help protect and restore forests; and replant more trees.

Assessment of the CPA

18. Protect forest and resource for next generation; right of usage for CPA community; and protect storm and floods.
19. Collect NTFP such as mushroom, resin, rattan etc.
20. YES, there has been degraded forest in the CPA land.
21. 30%
22. 1000 ha
23. Land clearance for farming; too windy wind; and Illegal logging.
24. Replant forests in the degraded forest areas.
25. Raise awareness to CPA villagers about the benefit of preserving forests; and dig irrigation system.
26. Not sure; dig irrigation system; and build dams.
27. Approximately 20 000 US dollars.

Assessment of the project concept

28. YES such as cashew nut, mango, jackfruit, papaya etc,.
29. Homegardens are planted around houses, along fences and some degraded forest areas.

(*Explain basic project concept*)

30. YES, very much appreciate and support because homegarden provide many benefit to the community.
31. Homegarden should plant at degraded areas.
32. Approximately 1000 ha.
33. it will cost about one million dollar.
34. (Please see in that attached species list).
35. Very much appreciate and support.
36. Assigned community members to patrol/protect and maintain.
37. For community use as a whole; for patrolling groups; and for support poor people.
38. YES homegarden should included in the CPA management plan.
39. YES

40. Prohibit forest clearance for farm land; and patrol/protect forest from being logged.
41. Protect forests; and participate in all CPA activities.

PA name, CPA	Boeung Per WS, Skor Mreach (Skor Kroch)
Date, time	16 September 2011, 14h00 – 17h00
MoE representatives	Sun Kulvira, Ouk Vichearak

Assessment of climate hazard (erratic rainfall)

Drought

1. YES, especially in 1983, 1995 and 2005.
2. YES in 2005.
3. 2005 during the early time of dry season.
4. The falling of standard of living; shortage of food (people found wild potatoes for food substitution); find substitute resources from NTFP; and migration.
5. Rice (decreased crop yield); and reduced livestock farming production (Buffaloes, cows chicken, pigs etc).
6. No impact on forest.
7. Thousands of US dollar lost from drought.
8. We do nothing because we have no mean of intervention. There is no water source nearby and we do not have water pumping machine. The best choice is to enter forest to search for wild potatoes and other NTFPs.

Storms and heavy rainfall

9. When there is winds overturn houses and trees, and large amount of water flooded village.
10. Frequently happened.
11. YES.
12. September 2009 during Ketsana regional storm.
13. Falling of houses, make holes in roofs; and killed people/animals.
14. Destroyed rice fields and home gardens such as bananas, mangoes etc.
15. Overturned CPA forests, broken of many tree branches and trunks.
16. 7000 UD dollars.
17. Do nothing!

Assessment of the CPA

18. Possession of forest land for the community ownership and usage; right of usages; and protect outside intruders.
19. Collect NTFP and sale for little amount of money.
20. YES, because the forests have been logged and cleared cut. There is a few available wood tree that can be used for construction material.
21. 90% because these forests have been cut since the Pol Pot time, and the still standing big trees are left since 1979.
22. 2000 ha out of 3449 ha.
23. Land clearance for farming, rice fields and cassava plantations.
24. Build dams, install water pumping machines; and replant forests in the degraded forest areas.
25. 12000 US dollars.
26. Forests plantation and home garden plantation.
27. 5000 US dollars.

Assessment of the project concept

28. YES such as cashew nut, cassava, mango, bitter gourd, cucumber, pumpkin papaya etc.
29. At farm lands and at homegarden around houses.

(*Explain basic project concept*)

30. YES, very much appreciate and support because there is difficulties in finding wood tree for usages.
31. Homegarden should plant nearby residential areas and in community forest land.
32. Approximately 100 ha.
33. 75000 US dollars for cashew nut plantation.
34. (Please see in that attached species list).
35. Very much appreciate and support.
36. Assigned community members to protect and maintain.

37. For community use as a whole, group patrolling, support the poorest and window people.
38. YES homegarden should included in the CPA management plan in order to collect benefit/yields.
39. Not sure or no understanding.
40. Prohibit forest clearance for farm land (for villagers); and patrol/protect forest from being cut/logged (illegal loggers).
41. Protect forests; and participate in all CPA activities in order to help protect the forests.

Phnom Preach Wildlife Sanctuary

PA name, CPA	Phnom Preach WS Ronouk Khgeng
Date, time	23 September 2011, 08h00-11h30
MoE representatives	Kim Sarin, Pouk Buntheth

Assessment of climate hazard (erratic rainfall)
Drought

1. YES drought happen every year.
2. YES
3. From May to August.
4. Death of animal.
5. Dramatically reduced yield of rice crop.
6. Sparked/Broken out of worms damage/eating tree leaves.
7. Damaged rice crop approximately 20 000US dollar; and died 12 cows-buffalos approximately 4 000 US dollar.
8. Rent pumping machine (2%); and contacted veterinary to cure animal.

Storms and heavy rainfall

9. When there are strong rain flooded most of safety hill-ground.
10. There is no storm but has heavy rain and floods.
11. There is no storm but has heavy rain and floods.
12. Flooded in 2010 in September.
13. Land erosion; and death of livestock.
14. Damage rice crop mostly for farmers who has rice fields close to river (about 25%).
15. No.
16. Approximately 17 000 US dollar due to crop lost.
17. Move livestock to safety hill-ground.

Assessment of the CPA

18. To protect forest for CPA usage; and to sustainably withdraw resources from the CPA.
19. Collect NTFP with income in average 2 000 000 Riel + 50 000 Riel = 2 050 000R= 512.5 US dollar per family per year.
20. YES
21. There are 5% of degraded forest within CPA of 1 734 ha.
22. Approximately 86 ha.
23. Slash and burn areas.
24. Replant trees; and create tree nursing grounds.
25. Approximately 5 000 US dollars.
26. To build one dam (Length 900m x height 2m X Size 3m); to dig two ponds (L100m x W80m x H4m)' and to plant homegarden.
27. Dam cost 20 000 US; ponds cost 20 000 US; and Homegarden ??

Assessment of the project concept

28. YES
29. At some degraded areas and nearby houses.

(*Explain basic project concept*).

30. YES, very much appreciate and support because it is mentioned in the CPA management plan.
31. Homegarden should plant in degarded CPA land; and homegarden should plant around houses.
32. 86 ha in degarded CPA land; and 20 ha nearby houses.
33. 69 000 US dollars per year.
34. (Please see in that attached species list).
35. YES, very much appreciate and support because it is mentioned in the CPA management plan.

36. We will manage and maintain homegarden following the CPA principle and CPA management plan.
37. For forest and NTFP should be use as a common property for the CPA; and for fruit trees should be privately manage by family.
38. Already existed in the CPA management plan.
39. Can slow/reduce erosion; protect drought; and increase CPA villagers income.
40. To stop all illegal logging activities; replant trees at degraded land; dig ponds to store water; and build dam to store water.
41. Same answer to question 40.

Phnom Kulen National Park

PA name	Phnom Kulen National Park, Chop Tasok
Time finished	20 September 2011, 09h00 – 11h45
MoE representatives	Meas Sothun Vatanak, Srey Marona

Assessment of climate hazard (erratic rainfall)
Drought

1. No
2. No
3. No
4. No
5. No
6. No
7. No
8. Do nothing.

Storms and heavy rainfall

9. When there were strong wind and heavy rains.
10. There have been an increased in heavy rain event.
11. YES
12. Heavy rain start from June to September every year.
13. Damaged roads; increased food price.
14. The falling of rice pollination process thus reduce crop yield.
15. Overturned trees in the CPA and farm land.
16. 250 US dollar x 53 families= 13 250 US dollar.
17. Repair roads.

Assessment of the CPA

18. For sustainably withdraw resources from the CPA and reserve for next generation.
19. Collect NTFP for sale.
20. YES
21. There is 30% of degraded forest in the CPA.
22. Approximately 330 ha in the CPA.
23. Land encroachment from migrated people; and population increase.
24. To repair road; to replant trees; and to build irrigation system.
25. 50 000 000 Riel = 12 500US dollars.
26. To plant more trees.
27. 20 000 000 Riel = 5 000US dollars.

Assessment of the project concept

28. YES such as orange, mango, jack fruit, banana, cashew nut, cabbage, bean cucumber, taro, sesame, pumpkin, cassava etc.
29. At farm land and nearby homes.

(*Explain basic project concept*):

30. YES, very much appreciate and support.
31. Homegarden should plant in farm land, nearby homes.
32. One family one ha.
33. 530 000 Riel = 132.5US dollar.
34. (Please see in that attached species list)
35. YES, very much appreciate and support.

36. Take turn to protect following the patrolling pattern.
37. For CPA income/expense.
38. YES homegarden should be included in the CPA management plan.
39. It is a good way to adapt to these challenge.
40. To protect forest through more patrolling activities; to plant more tress; to stop land encroachment; and to plant home garden.
41. To plant more tress; to cooperate with Rangers; and to divert water flow to protect erosions and floods.

Table 16: Vulnerability matrix ranking sites according to the results of the First CPA Community Survey. The sites in red text were selected for the Second CPA Community Survey.

PA	CPA	Vulnerability to Climate Hazard	CPA Forest Degraded Area	CPA Management Committee	CPA Management Plan and Demarcation	CPA Ease of Access	TOTAL	RANK
		Score*	Score*	Score*	Score*	Score*		
Beung Per WS	Chiork Beungprey	1.5	2	2	2	2	9.5	1
Beung Per WS	Skor Mreach	1.5	2	2	1	1.5	8	2
Beung Per WS	Chom Thlork	1.5	2	2	1	1.5	8	2
Beung Per WS	Tropeungprey Thom	1.5	2	2	1	1.5	8	2
Beung Per WS	O'Pangna	1.5	2	2	1	1	7.5	5
Beung Per WS	Chumareach	1	2	2	1	1.5	7.5	5
Beung Per WS	Damnak Knachtrach	1	2	2	1	1.5	7.5	5
Beung Per WS	Phnom Balang	1	2	2	1	1.5	7.5	5
Phnom Prech WS	Ronouk Khgeng	1.5	1	2	2	1	7.5	5
Phnom Kulen NP	Chop Tasok	1	2	2	1	1	7	10
Beung Per WS	O'Chhengchhen	1	2	2	1	1	7	10
Beung Per WS	Korki prohornk	1	2	2	1	0.5	6.5	12
Phnom Prech WS	Sre Thom Mleung	1.5	1	2	1	1	6.5	12
Phnom Prech WS	Pouhoung Poutong	1.5	1	2	1	1	6.5	12
Virachey NP	O'toung	2	1	1.5	1	1	6.5	12
Virachey NP	GUrcay	2	1	1.5	1	1	6.5	12
Kulen Promtheap WS	Thmatbeutheun krosinm	2	0	2	1	1.5	6.5	12
Beung Per WS	Beung Tonle Mreachh	1.5	0	2	1	2	6.5	12
Virachey NP	O'khampha	2	1	1.5	1	0.5	6	19
Virachey NP	O'tabok	2	1	1.5	1	0.5	6	19
Phnom Kulen NP	Preyphnom	2	0	2	1	1	6	19
Beung Per WS	Beung Totil	1	1	2	1	1	6	19
Beung Per WS	Phnom Preah lean	1	0	2	1	2	6	19
Phnom Kulen NP	Preyphnom Kduoch	1.5	0	2	1	1	5.5	24
Beung Per WS	Prey Thom	1	0	2	1	1.5	5.5	24
Beung Per WS	Chroppou Rongreung	1	0	2	1	1.5	5.5	24
Beung Per WS	Chhomprey	0.5	0	2	1	2	5.5	24
Virachey NP	Yorn Center	2	0	1.5	1	0.5	5	28

Phnom Kulen NP	Preyphnom Manos	1	0	2	1	1	5	28
Beung Per WS	Chhom Pen	1	0	2	1	1	5	28
Beung Per WS	Damnakchankhan	1	0	2	1	1	5	28
Beung Per WS	Anlong Krang	0.5	0	2	1	1.5	5	28
Phnom Kulen NP	Preyphnom Popel	0	0	2	1	1	4	33
Score*	0 = not appropriate; 1 = appropriate; 2 = highly appropriate			Red text	Proposed sites for Second CPA Community Survey			

ANNEX III: SECOND CPA COMMUNITY SURVEY (23 MARCH – 03 APRIL).

The following information was collected in the Second CPA Community Surveys, and is shown below for the Skor Mreach CPA intervention site:

- Responses to the CPA questionnaire;
- A letter of support for the AF project from the CPA Management Committee (English translation provided); and
- Photographs and GPS co-ordinates of exiting homegardens, rice fields, orchards and degraded forest areas.

Similar information is available for all six CPA sites included in the Second CPA Community Survey, but is not included here in the interests of brevity. The vulnerability matrix used to rank the sites based on the results of the Second CPA Community Survey is shown at the end of the Annex.

CPA Second CPA Community Survey Questionnaire

PA name	Beung Per WS
CPA name	Skor Mreach
Date	30 March 2012
MoE representatives	Sun Kolvira Ouk Vichearak
CPA attendees	Please fill in the Attendance List (attached)

Description of project and why it is necessary (from MoE to explain to those in attendance)

- Climate change is predicted to cause the following effects over the next 20-50 years:
  - increase in the amount of rainfall in the rainy season;
  - storms with lots of rain and high winds happening more often, leading to flooding and erosion of areas not covered and trees and bushes; and
  - increase in the average temperature throughout the year.
- Because of the above predictions, we need to plan and prepare for changes in rainfall. An important part of this is looking after the forests and rivers and using improved farming techniques.
- This is called “climate change adaptation” which means adapting the way we do things to make sure we can cope with the changes caused by climate change.
- The Ministry of Environment, in partnership with the United Nations Environmental Programme, or UNEP as it is known, is applying for money from the Adaptation Fund, which is a global group giving money for climate change adaptation.
- This money will be used to help vulnerable communities living close to Community Protected Areas in Protected Areas in Cambodia to cope with the effects of the predicted climate change.
- Skor Mreach CPA was selected for further investigation based on the results of the MoE surveys from last September.
- However, the final CPAs where the MoE/UNEP project will be implemented have not been decided yet. Skor Mreach CPA may not be selected as only a limited number of CPAs can be included.
- Even if Skor Mreach CPA is not selected, there will be an opportunity to learn about what is happening elsewhere through the project, which may eventually be implanted in all CPAs in Cambodia.

Please assist us with answering the questions below, and showing us the degraded forest in the CPA and the agricultural areas used by the community. There are no right or wrong answers, so please provide as much information as you can.

Vulnerability to climate hazards

In the September survey it was stated that droughts, storms and floods were having an impact on the community and becoming more frequent.

1. Do the community feel threatened by droughts, storms and floods, and are they worried that if they become more frequent they will not be able to cope with the impacts they cause? Or is the

community not worried by this. Yes, we feel threatened and the community may not be able to adapt to this increasing intensity of the impacts.

2. Have droughts, storms and floods had a major impact on the community? Yes
3. If so, what has this impact been and how serious is it? Damaged rice crop, killed animal, threatened food security, people got strength diseases, poverty, people migrated to city and other nearby countries offering labour services.

Availability of policies and legislation

4. Does the CPA have a management plan? No
5. If yes, who wrote it? No
6. If no, are there any other documents detailing how the CPA should be managed? CPA regulation.
7. If no, who decides how the CPA is managed and according to what rules? PA Law and the declaration by the Ministry of Environment acknowledging that CPA land and forest under the management of Skor Mreach CPA.

Readiness from the sites to participate in implementation process

8. In September 2011 you said you were supportive of the idea of the project, which is:
   Firstly, to provide money to plant degraded areas of forest with fruit, fibre and resin trees, medicinal plants, other NTFP trees, vegetables and timber for firewood to turn the degraded areas in productive, diverse forests. Secondly, to use improved farming techniques to make farming areas more productive with a wider range of vegetables and crops grown, using practices such as rainwater harvesting, drip irrigation, green manuring and reduced tillage.
9. Is this still true that you are supportive of the project and will protect the forests that are planted with useful trees, and continue to use the improved farming practices? Yes, we are still supporting the project ideas.
10. If yes, are you will to write a short letter saying that this? Yes
11. If yes, please write this short letter, with a date and your signature, and give it to me. Thank you. (Please see attached Supporting Letter)

Availability of on-going support

12. Is anyone, from the Government, an NGO or any other group providing any support to the community? Yes
13. If so, who and what are they doing? Ministry of Rural Development construct and repair roads, WS NGO provides latrines and wells to the community.
14. Has there been any support from anyone in the past? Yes
15. If so, when and what kind of support was provided? UNICEF built school and dig wells in 2010.

Availability of data in the sites

16. Has anyone come to the community and CPA to study the forest? No
17. If so, who and when? No
18. Has anyone come to the community to study the farming practices? No
19. If so, who and when? No
20. Are you aware of any records/data on the number of trees in the forest and what type they are, how much they are worth of how much of the forest is degraded? We just know some valuable tree species and traditionally understand about its benefits. Unfortunately, most of those tree species are now depleted (90%).

Poverty rate/level

21. What is the average income per community member per month? Around 6$ per month per member.
22. Is the income secure i.e. are there some months when no income is earned? Not secure. During rainy season, it is difficult to get income.
23. What activities generate the income:

Income source	$/person/month	Type of vegetable/crop etc and $/type/person/month
Sales of vegetables		• Pumpkin 25$ per year

grown in homegardens		• Cabbage 10$ per year • Cucumber 20$ per year
Sale of crops		• Cashew nut 100$ per year
Sale of rice	Only for household consumption	
Sale of livestock	Cows and Buffalos use only for providing labour service at the rice fields	
Sale of NTFPs		• Raisin 70$ per year
Sale of timber		• Fence pole 100$ per year
Other (please explain) Labour service		• Provide labour for the community 30$ per month

Gender

24. Is there a difference between income earned by men and women? Yes
25. If so, what is the difference? Men can work harder and migrate farther so that men would earn more than women.
26. How many families/households are there in the community? 642 families
27. How many men/women? Men have 1632 persons and women have 1679 persons
28. How many families/household are headed by women? 52 families
29. Would women and men be given equal opportunities in the project? Yes, it can be
30. Benefits shared? Men and women will be shared benefits equally.
31. What is the role of women in the agricultural practices at the moment? Women have the same role as men at the rice fields

Suitability of project interventions

Extensive interventions

The project will plant degraded areas with trees so that the areas produce more food, principally fruit, than the original forests, and bind soils to prevent them from being washed away when during heavy rain storms. The forests will also provide 'ecological services' like regular water flow, provide timber, enhance biodiversity, carbon sequestration, pollination from bees and other pollinators, pest control and provision of medicine, fibre, resin and other NTFPs.

32. In the September survey it was stated that there was 2000 ha of degraded forest in the CPA (60% of CPA), and that the causes of degradation was land clearance for farming rice fields and cassava plantations. Can you please confirm this? People turn to cut forest for farming because rice fields are flooded. The other reason that causes degradation is side affect from ELC somewhere near the community.
33. Are there other causes of degradation? Yes, weather and erosion can also cause degradation.
34. Was the land cleared for farming illegally? Yes, it is illegal.
35. Is there currently farming in the CPA? Yes
36. If so, who is farming, and is it legal? Some from the inner of CPA and some from outsider of CPA. The outsiders' land (from clearing forest in the CPA) can be confiscated by law and return to the CPA to manage, especially to replant.
37. Would you like the areas that were cleared for farming replanted with useful tree species? Yes, we want the area be replanted with useful tree species because we did not get enough yield from rice crop.
38. How would you protect this area and prevent it from being cleared again? CPA members to cooperate with Rangers from MoE to protect the replanted trees, Constance patrolling, to build patrol office and take turn to patrol.

39. Do you think the forest will grow back without assistance? Without intervention, forest would unlikely to grown again, especially when the poverty rate is high.
40. Is erosion a problem in the degraded areas? Is soil washed away when it rains? Yes, water will bring sand to fill rice fields
41. How would the products (fruits, resin, fibre, medicinal plants, timber etc) from the forest be shared amongst the community? Would all community members benefit? All community members will be shared benefits equally and the income will manage by the CPA committee.
42. Would the products from the restored forest be sold? CPA committee will decide whether the products to be sold or to be supplied for the community.
43. If so, who would the money go to? CPA committee will play role in managing the benefits and the money from selling the products will go to CPA financer and financing the CPA.

Please take us to the degraded CPA forest sites.
MoE: Please take a GPS co-ordinate in the centre of the degraded area/s, as well as on as many of the boundaries with intact forest as possible. At each GPS point, please take photographs in a North, South, East and West direction. Please label the photographs "GPS point – direction (N, S, E or W)". Please take many additional photographs show that the forest is degraded.

44. Using the 'map' provided or the blank image showing the outline of the CPA, please indicate where the degraded areas are.
45. In September it was stated that the following trees in the list below should be planted. Please fill in the columns to help us plan how the forests should be restored:
    - Distance to next tree – can the trees be planted close together (1m apart) or do they need a large distance to grow their canopy (5m apart). Depend on type of tree species
    - Preferred soil/slope – do the trees grow better in, for example, sandy soils, or damp/rich soils? Do they grow better in flat areas or on slopes? Trees can grow well in this location.
    - How grown – can the trees be grown from seed, or from cuttings grown in a nursery? Can the seeds be collected in the wild? Trees can be growing from baby trees either by cutting grown or by seedling. Seeds can be collected from the wild.
    - What would be the value of the tree be in a year, in terms of what it produces? How long does it take to produce goods of value. Provide fuel wood and NTFPs such as raisin and vegetable etc.

    Please add extra trees that you would like planted.

Tree	Distance to next tree	Preferred soil/slope	How grown	Value per tree per year, how long to produce
Cashew nut tree	8m		Fast	3y
Acasia	3m		Fast	6y
Hopea ferrea Laness	10m		Slow	60y
Dipterocarpus retusus Blume	10m		Slow	60y
tmisoptera costata Korth	10m		Slow	60y
Rattan	5m		Fast	3y
Som	5m		Fast	3y
Teak wood	10m		Slow	30y
Additional trees				
Rubber tree	4m		Fast	5y
Rosewook	4m		Slow	40y

46. Please indicate on the map where areas of different soil types are, as well as any ridges and valleys (slopes).

Intensive interventions

Farm lands and homegardens around where the communities live will also be improved. This will be through three different methods: i)

- intensifying and diversifying the existing homegardens around community houses;
- planting the borders of existing rice paddies and other farming areas with trees to improve soils; and
- testing new varieties of rice in a few test areas.

47. Please explain the problems the community has with growing crops and vegetables in homegardens. What is preventing more crops from growing and better yields from homegardens? Lack of skill and technique, lack of seedling, shortage of water, not enough composting.
48. Are any of these problems related to weather – drought, floods, wind or rain? Yes, especially drought
49. Does each family/household in the community have a homegarden, or are there communal homegardens? Family has home garden but communal does not have homegarden
50. What is the typical size of the homegardens? 10mX20m=200m2

Please show us typical examples of homegardens.
MoE: Please take GPS co-ordinates at least 5 homegardens at various locations in the village. At each GPS point, please take photographs in a North, South, East and West direction. Please label the photographs "GPS point – direction (N, S, E or W)". Please take many additional photographs showing what is growing in the homegardens.

51. The project will provide communities with crops, fruits and vegetables to plant in existing homegardens to intensify and diversify current production. Please complete the table below, indicating which crops, fruits and vegetables you would like grown in homegardens, as well as the value of each in a year.

Crop / fruit / vegetable	Wanted in homegarden Yes/No?	Distance to next plant	Use (eating/sold)	Value in a year in $
Coconut palm	Yes	5m	eating/sold	100$
Cashew	Yes	8m	eating/sold	100$/ha/year
Oranges	Yes	4m	eating/sold	100$
Lime	Yes	4m	eating/sold	100$
Mandarin	Yes	5m	eating/sold	
Durian	Yes	3m	eating/sold	
Cassava	Yes		eating/sold	25$
Soya bean	Yes		eating/sold	
Sweet potato	Yes		eating/sold	
Eggplant	Yes		eating/sold	25$
Mungbean	Yes		eating/sold	
Maize	Yes		eating/sold	
Peanut, ground nut	Yes		eating/sold	25$
Kangkong	Yes		eating/sold	50$
Sesame	Yes		eating/sold	30$
Lettuce	Yes		eating/sold	25$
Cabbage	Yes		eating/sold	20$
Tomato	Yes		eating/sold	
Cauliflower	Yes		eating/sold	
Taro	Yes		eating/sold	
Ginger	Yes		eating/sold	
Rambutan	Yes	4m	eating/sold	
Bitter Gourd	Yes		eating/sold	25$

Trees will be planted around rice paddies and other farm lands (larger scale than homegardens). These trees will i) improve the fertility, moisture-holding capacity and structure of agricultural soils; ii) protect crops from climate-related hazards such as drought, floods and wind; and iii) provide communities with additional benefits such as food, medicine, firewood and fodder.

52. Please explain the problems the community has with growing rice and other crops in larger scale farmlands. What is preventing more crops from growing and better rice yields? Droughts, floods, damaged by insects.
53. Are any of these problems related to weather – drought, floods, wind or rain? Droughts and floods
54. Does each family/household in the community have a rice paddy, or are there communal paddies? Family have but communal does not have. If there is any intervention, we will confiscate illegal land own by outsiders in the CPA land so that we will use the confiscated land as a communal rice filed or homegarden.
55. What is the typical size of the rice paddies and farm lands (not homegardens, but larger scale farmlands)? 0.7 ha-1ha
56. Are you aware of the benefits of planting trees around rice paddies and farmlands to fix atmospheric nitrogen and improve the soils? Do not know
57. Is this a common practice in the community? We would like this practice.

Please show us typical examples of rice paddies and other farmlands.
MoE: Please take GPS co-ordinates at least 5 areas of rice paddies of other farmlands. At each GPS point, please take photographs in a North, South, East and West direction. Please label the photographs "GPS point – direction (N, S, E or W)". Please take many additional photographs showing what is growing in the homegardens.

58. Please complete the table below to indicate which trees you would like planted around rice paddies and farmlands to improve production. The trees below are suggested they increase soil fertility and provide NTFPs.

Trees	**Reason for selection**
chres (*Albizia lebbek*),	
snaov (*Gliricidia sepium*), and	
kra ngoung (*Dalbergia cochinchinensis*),	
thnong (*Pterocarpus indicus*),	
drumstick tree (*Moringa oleifera*)	
Leucaena leucocephala,	
Acacia mangium.	

59. Are there any farmers in the community who would be willing to testing improved varieties of rice (potentially drought-tolerant and other varieties more productive varieties), rather than traditional varieties currently being grown? Yes there will be volunteers
60. The goal is to plant ~100 ha of improved rice varieties. Do you think this will be possible? Yes, it is possible
61. Please complete the table below to indicate additional activities the project could implement to complement the restoration of degraded forests and improvements in farming practices described above.

Other intervention	**Reason it will benefit community**	**$ benefit per year**
Constructing ponds/dams and canals for irrigation	Provide water for consumption and irrigation	(what is the value of failed crops per year because of no water to irrigate)
Establishing woodlots to provide timber for fuelwood (for fires and/or charcoal)	Sustainable forest management	How much is spent on fuelwood)
Improve post-harvest storage	Sale at high price, better income	(what is the value of crops

techniques		lost in storage per year)
Improve crop pest and disease management	Increase yields	(what is the cost of crop pests and diseases per year)
Improved patrolling of CPA	Crack down illegal activities	(what is the value of forest products illegally taken per year)
Additional interventions		
Marketing crop products	Maintaining pricing	Reduce lost

62. Please describe activities you think will be important to make sure that the forests, homegardens, rice paddies and farmlands remain productive after the project is completed?
    - Better control of financing
    - Continue protection and maintaining
    - Solidarity in the community
    - Constant meeting (monthly, semester and yearly) and sharing view on forest management

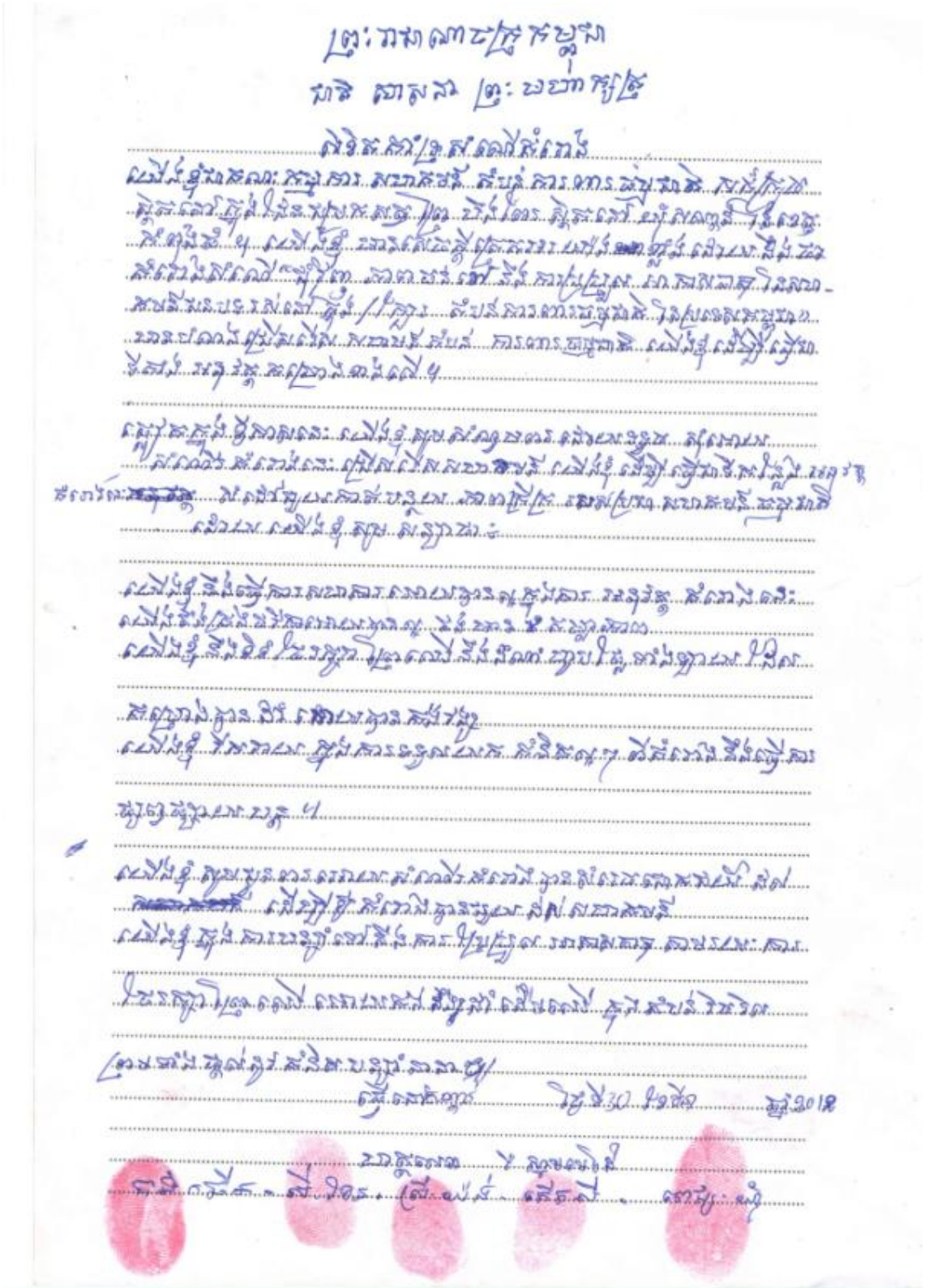
Akun jann.

CPA meeting attendance list

CPA Name: Skor Mreach
Date: 30 March 2012

Name	CPA/Community position	Age	Gender (M/F)
Um Vanny	Vice chief of CPA	47	m
Pich Yam	Patrol group	50	m
Srey Lavy	Patrol group	40	m
Noun Se	Finacer	25	m
Keut Ly	Patrol group	50	m
Srey Chem	Patrol group	55	m
Kung Chheut	Chief of CPA	56	m
Mueong Krin	Member	30	m
Meas Horm	Member	25	m
Srey Yorng	Member	40	f
Sey Khen	Member	36	f
Srey Khorn	Member	38	f
Chuch Krouch	Member	25	m
Kum Thy	Member	25	m
Kung Sun	Member	47	m
Chea Kim Tong	Member	25	m

Letter of Support from CPA management Committee:



English translation of letter of support:

Kingdom of Cambodia
Nation Religion King
Skor Mreach: CPA Support Letter for Project Proposal

We are the representatives of the committee member of Skor Mreach Community Protected Area locates in Beung per Wildlife Sanctuary of Kampong Thom Province. We are so happy that the proposed project proposal "Enhancing Climate Resilience of Rural Community Living Within/Near Protected Area of Cambodia" intends to choose our Skor Mreach CPA as an implementation site for the project.

Taking this opportunity, we would like to request this proposed project proposal to select our community as an implementation site so that the project would have reduce poverty of our community, and to help our community to adapt to the impact from the increasing sever climate disasters. If our CPA was chosen, we would like to promise as following:

- We are going to provide good collaboration in the project implementation and to manage the income properly.
- We are going to maintain the forest and other fruit trees that would have been planted in the project activities.
- We are pleased to accept any constructive ideas provided by the project.
- We will mainstream the project concept to other communities.

We wish the above mentioned project proposal for a success in order to help our community to adapt to the impacts of climate change by replanting useful forests and provide other necessary adaptation activities.

Kampong Thom Province: Date 30 March 2012
Finger prints

Kung Chheut Sey Khen Srey Yorng Keut Ly Pich Yam

Skor Mreach/Chrouch Community Protected Area

I. Home garden

1. UTM = 519794 - 1444929

N

S

W

E

2. UTM = 525732 - 1450908

N

S

W E

3. UTM = 525478 - 1451085

N S

W E

4. UTM = 525668 - 1449550

N

S

W

E

5. UTM = 526032 - 1449184

N

S

W E

II. Rice field

1. UTM = 525809 - 1450764

N S

W E

2. UTM = 525058 - 1451281

N

S

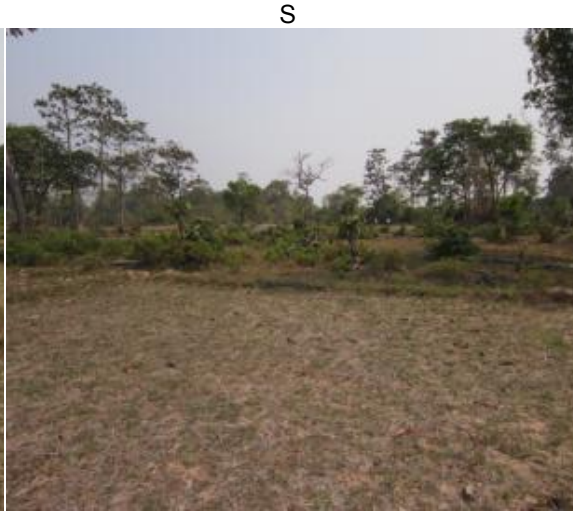
W

E

3. UTM = 524396 - 1452071

N

S



W E

4. UTM = 525788 - 1450385

N S

W E

III. Chamkar/Orchard

1. UTM = 524239 - 1452201

N

S

W

E

2. UTM = 524160 - 1453108

N

S

W E

3. UTM = 524796 - 1451468

N S

W E

4. UTM = 525038 - 1451419

N

S

W

E

5. UTM = 525314 - 1450961

N

S

W

E

IV. Deforestation

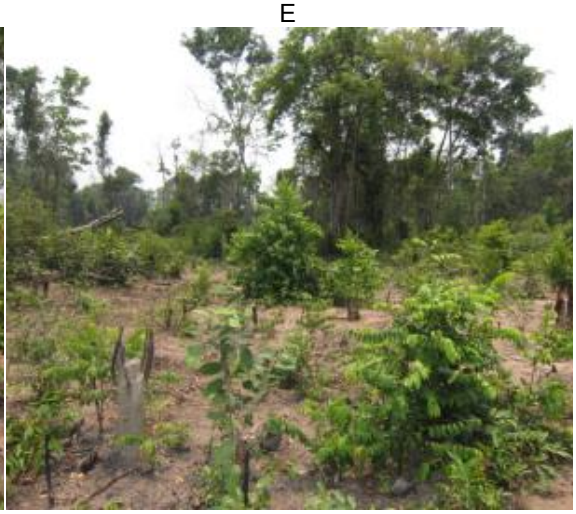
1. UTM = 523965 - 1453628

N

S

W

E



2. UTM = 523620 - 1454674

N

S

W

E

3. UTM = 523634 - 1454532

N

S

W E

4. UTM = 53328 - 1454686

N S

W E

5. UTM = 522396 - 1456040

N

S

W

E

Table 17: Vulnerability matrix ranking sites according to the results of the Second CPA Community Survey. The sites in red text were selected as the five CPA intervention sites.

Rank	PA	CPA	ha	families	Vulnerability to Climate Hazard	Availability of Policies and Legislation	Participation in Implementation	Availability of Ongoing Support	Availability of data	Poverty rate/level	Gender (families headed by women)	Suitability of Extensive interventions	Suitability of Intensive interventions	TOTAL	RANK
1	Beung Per WS	Chiork Beungprey	350	166	2	2	2	2	1	2	2	1	1.5	15.5	1
2	Phnom Prech WS	Ronouk Khgeng	51	89	2	2	2	2	1	1.5	1.5	1	2	15	2
3	Beung Per WS	Chom Thlork	1000	935	2	1	2	2	0	1.5	1	2	2	13.5	3
4	Beung Per WS	Skor Mreach	2000	642	2	1	2	1	0	2	1.5	2	2	13.5	3
5	Beung Per WS	Tropeungprey Thom	1000	521	2	1	2	0	0	0.5	1	2	2	10.5	5
6	Phnom Kulen NP	Chop Tasok	330	75	1.5	0.5	2	2	0	0.5	0.5	1.5	1	9.5	6
	Score*	0 = not appropriate; 1 = appropriate; 2 = highly appropriate													

ANNEX IV: INDICATIVE COSTS OF REFORESTATION/FOREST RESTORATION.

		Year 1	Year 2	Year 3
Cost per hectare (US$)	839 [231,232,233,234,235]	427	267	146
Number of hectares	1875	1875	1875	1875
Total budgeted cost (US$)	1,573,125	800,000	500,000	273,125
Management activities	Proposed allocation of costs per hectare [236,237,238]	Cost per hectare (US$)		
Site preparation, establishment, replacement planting	0.55	234.9	146.9	80.3
Agrochemicals (fertiliser, pesticide)	0.12	51.2	32.0	17.5
Pruning, thinning, weeding	0.065	27.8	17.4	9.5
Seasonal labour	0.065	27.8	17.4	9.5
Forest protection	0.2	85.4	53.4	29.2

[231] Agroforestry costs **~US$ 960** per ha in Bangladesh. Rahman, S. A., Paras, F. D., Khan, S. R., Imtiaj, A., Farhana, K. M., Toy, M. M., Akhand, M. B., Sunderland, T. 2011. Initiatives of tropical agroforestry to sustainable agriculture: A case study of Capasia Village, Northern Bangladesh. Journal of Horticulture and Forestry 3(4): 115-121.
[232] Agroforestry in Cambodia costs **~US$ 300** - **US$ 500** per ha in a 2011 project. Information obtained from the Wildlife Alliance in Cambodia.
[233] Woodland restoration costs **~US$ 1,750** per ha in Australia. Source: http://fotpin.hussat.com.au/docs/woodland-restoration-implementation-plan%20.pdf. [Accessed 4 September 2011].
[234] Bottomland Forest restoration costs **~US$ 178** - **US$ 267** per ha in a USA based project. National Research Council. 1991. Restoration of Aquatic Ecosystems: Science, Technology, and Public Policy. National Academy Press, Washington. DC.
[235] Spekboom Thicket restoration costs **~US$860** per ha in South Africa.
[236] S.A. Rahman et al., "Initiatives of Tropical Agroforestry to Sustainable Agriculture: A Case Study of Capasia Village, Northern Bangladesh," Journal of Horticulture and Forestry 3, no. 4 (2011): 115 – 121..
[237] S Zhou et al., "The Costs and Benefits of Reforestation in Liping County, Guizhou Province, China," Journal of Environmental Management 85, no. 3 (2007): 722–735..
[238] E.S. Gardiner and J.M. Oliver, "Restoration of Bottomland Hardwood Forests in the Lower Mississippi Alluvial Valley, U.S.A." (CRC Press LLC, 2005), http://www.unep-wcmc.org/medialibrary/2011/05/24/07113dac/US%20Mississippi%20highres.pdf..

ANNEX V: TREE SPECIES LIST.

The table below presents a list of tree species that are likely to be appropriate for the homegarden interventions planned for the AF project. The most appropriate species will be selected at the beginning of project implementation based on expert advice. Trees have been prioritised based on their climate change adaptation value and properties such as food production, soil stabilisation, drought tolerance and other NTFPs. Indigenous trees are listed first followed by exotic trees with properties which would be beneficial to the community and the degraded ecosystems in which they will be planted.

Scientific or available name	Indigenous	Exotic	Food	Soil Stabilisation	Drought tolerant	Fodder	Apiculture (Honey)	Soil Fertility[239]	Medicines	Resin	Fibre	Mulch/leaf litter	Timber	Fuelwood	Charcoal	Crop cover/Shade	Description of bio-phyiscal parameters
Senna siamea	x		x	x		x		x	x			x	x	x	x	x	A medium-sized, evergreen tree (up to 18 m). Altitude 0-1000 m; mean annual temperature between 20-31 ºC; mean annual rainfall: 400-2800 mm. Performs best on deep well-drained fertile soils with pH 5.5-7.5, but will grow on degraded lateritic soils provided drainage is not impeded. The species is intolerant of saline soils.
Morus alba	x		x	x		x		x			x	x	x	x		x	A medium-large tree (up to 35 m). Altitude 0-3300 m; mean annual temperature 0-43 ºC; mean annual rainfall: 1500-2500 mm. The plant grows on a variety of soils ranging from sandy loam to clayey loam, but prefers deep, alluvial, loamy soil with sufficient moisture and pH 6.0-7.5.
Bambusa spp.	x		x	x		x						x					An evergreen multi-stem grass (bamboo) up to 25-35 m tall and culm diameters of 8-10 cm. Altitude 0-2000m; mean annual temperature 8 - 36 ºC; mean annual rainfall:1200-2500 mm. Good species for restoration of forest areas and stabilizing eroding areas. This species is one of the best bamboos for windy sites due to the strength of the culms.
Morinda citrifolia	x		x						x				x	x		x	An evergreen shrub (3-10 m). Altitude 0-1500 m; mean annual temperature unknown; mean annual rainfall: 1500-3000 mm. In areas where the plant is cultivated, the soil is usually well structured and of volcanic origin (Java), but it may be poor and ferralitic (Cambodia). The plant also occurs on infertile, degenerated soils, sometimes badly drained or with a very low water-retention capacity and a deep water table.

[239] Soil fertility – refers to species that increase the nutrient content of the soil (e.g. nitrogen fixing species).

*Afzelia xylocarpa**	x		x					x	x				x				A large deciduous tree (15-30m). Altitude: 500- 900 m; mean annual temperature: 15-35 ºC; mean annual rainfall: 1000-2500 mm. Occurring on well-drained flatlands or transitional zones between evergreen and dry open dipterocarp forest.
*Dasymaschalon lamentaceum**	x		x										x				A shrub, (1-4m). Altitude: unknown; mean annual temperature: unknown; mean annual rainfall: unknown. This species is normally found in secondary forests and at the edges of dense forests.
*Cinnamomum cambodianum**	x		x						x				x	x			A large tree from (15-25 m). Altitude: below 1500 m; mean annual temperature: unknown; mean annual rainfall: unknown. This species is distributed in wet, dense, piedmont forests.
*Sterculia lychnophora**	x		x										x	x			A large tree from (18-25 m). Altitude: above 1700 m; mean annual temperature: unknown; mean annual rainfall: unknown. This species is distributed in wet, dense, piedmont forests.
Calamus spp.	x								x		x		x				Perennial clustering, moderate-sized, high-climbing, evergreen rattans with canes reaching a length of 100 m. Altitude 0-800 m; Grows for 6 years before the first harvest and needs 15 years before full production.
Albizia saman		x	x			x		x		x		x	x	x	x	x	A large semi-deciduous tree from (up to 60 m). Altitude: below 0 -1300 m; mean annual temperature: 20-35 ºC; mean annual rainfall: 600-3000 mm. Found on neutral to moderately acid soils and can grow on soil with pH as low as 4.6. It grows on light or heavy soils and tolerates infertile or waterlogged conditions.
Borassus flabellifer		x	x		x						x	x	x	x		x	A large solitary, pleonanthic, dioecious palm (25-40 m). Altitude: below 0 -800 m; mean annual temperature: 30-45 ºC; mean annual rainfall: 500-5000 mm. It can be found on any kind of soil, preferring soils rich in organic material
Cajanus cajun		x	x	x		x	x	x			x	x		x		x	Short-lived perennial (1-5 years) shrub, (0.5-4 m). Altitude: unknown; mean annual temperature: 18-38 ºC; mean annual rainfall: 400-2500 mm. The major soils are alluvials, Vertisols and Alfisols, which range in pH from 5 to 7 or more. It is sensitive to salinity and has not been produced on saline soils. It is also susceptible to water logging.
Feronia limonia		x	x			x			x	x			x	x			A deciduous, slow-growing tree (unknown size). Altitude: below 0-450 m; mean annual temperature: unknown; mean annual rainfall: unknown mm. Throughout its range there is a diversity of soil types, but it is best adapted to light soils.
Gliricidia sepium		x	x	x		x	x	x			x	x	x	x	x	x	A small to medium sized tree (2-15 m). Altitude 0-1600 m; mean annual temperature 15-30 ºC; mean annual rainfall: 600-3500 mm. Grows on a range of soil types from pure sand to deep alluvial lake-bed deposits. In much of its natural range the soils are acidic (pH 4.5-6.2); however, where parent material is limestone, the soils are slightly alkaline. It performs well on marginally saline vertisols but will not tolerate very acidic soils.

Jatropha curcas		x	x	x		x		x	x	x				x			A small tree (up to 6 m). Altitude 0-500 m; mean annual temperature 20-28 ºC; mean annual rainfall: 300-1000 mm. Grows on well-drained soils with good aeration and is well adapted to marginal soils with low nutrient content. On heavy soils, root formation is reduced. Also used as a bio-diesel
Leucaena leucocephala		x	x	x	x	x	x	x		x	x		x	x		x	A small tree (up to 5 m). Altitude 0-2100 m; mean annual temperature 25-30 ºC; mean annual rainfall: 650-3000 mm. Performs optimally on calcareous soils but can be found on saline soils and on alkaline soils up to pH 8; it is not tolerant of acid soils or waterlogged conditions. L. leucocephala is known to be intolerant of soils with low pH, low phosphorus, low calcium, high salinity, high aluminium saturation and water logging and has often failed under such conditions.
Pithecellobium dulce		x	x			x	x	x		x			x	x		x	A medium tree (10-15 m). Altitude 900-1800 m; mean annual temperature 0-48 ºC; mean annual rainfall: 250-1650 mm. Found on most soil types including clay, limestone, and wet sand with a brackish water table. The tree is rated highly tolerant to soil salinity and impoverished soils. It grows best on well-drained, deep, fertile loamy agricultural soils.
Sandaricum koetjape		x	x	x									x				A medium-large tree (up to 50 m). Altitude up to 1000 m, prefers podzolic soils in both humid and seasonal climates, prefers high rainfall but can tolerate dry seasons.
Sesbania grandiflora		x	x			x		x		x	x	x	x			x	A small tree (8-15 m). Altitude 0-1000 m; mean annual temperature 22-30 ºC; mean annual rainfall: 800-4000 mm. It can be grown on a wide range of soils including those that are poor and waterlogged. It tolerates saline and alkaline soils and has some tolerance to acidic soils down to pH 4.5.
Sesbania rostrata		x	x	x		x		x						x			A short-lived perennial (1-3 m). Altitude 0-1600 m; mean annual temperature unknown; mean annual rainfall: unknown. Occurs naturally in marshes, floodplains, on muddy river banks and the edges of pools, but has also been recorded in open savanna. It tolerates waterlogged soils and flooding to over 1 m deep. In cultivation, S. rostrata is almost always associated with wet rice.
Tamarindus indica		x	x			x	x					x	x	x		x	A large evergreen tree (up to 30 m). Altitude 0-1500 m; mean annual temperature up to 47 ºC; mean annual rainfall: 350-1500 mm. Soil type: It grows in most soils but prefers well-drained deep alluvial soil.
*Dialium cochinchinense**	x		x										x			x	A medium sized tree (up to 30 m). Altitude 0-300 m; mean annual temperature unknown; mean annual rainfall: unknown. Occurs in evergreen and deciduous (dipterocarp) forest with a canopy varying from dense to open.
Manilkara zapota		x	x			x			x				x				A large, evergreen forest tree (more than 30 m). Altitude 0-2000 m; mean annual temperature below 42 ºC; mean annual rainfall: 1250-2500 mm. Soils can be well-drained, slightly alkaline, medium-textured loams; however, M. zapota will tolerate a wide range of soil types from drier sands through to heavy clays with marginal drainage.

Dimocarpus longan		x	x									x	x	x		x	A small-medium sized tree (9-12 m). Altitude 150-450 m; mean annual temperature 15 ºC; mean annual rainfall: unknown. Thrives best on a rich sandy loam and nearly as well on moderately acid, somewhat organic, sand. It also grows to a large size and bears heavily in oolitic limestone. In organic muck soils, blooming and fruiting are deficient.
Carissa congesta		x	x			x			x				x	x			A straggly, woody, climbing shrub (3-5 m). Altitude 0-1800 m; mean annual temperature unknown; mean annual rainfall: unknown. The plant grows on sand or limestone. In India, it grows wild on the poorest and rockiest soils and is grown as a hedge plant in dry, sandy or rocky soils. It is most fruitful on deep, fertile, well-drained soil but if the soil is too wet, there will be excessive vegetative growth and lower fruit production.
Acacia mangium		x	x	x		x		x			x		x	x	x	x	A large evergreen tree (25-35 m). Altitude 0-800 m; mean annual temperature 18-28 ºC; mean annual rainfall: 1500-3000 mm. Prefers deeply weathered or alluvial soils.
Azadirachta indica	x		x	x		x		x	x	x			x	x	x	x	A medium tree (15-30 m).Altitude 0-1500 m; mean annual temperature up to 40 ºC; mean annual rainfall: 400-1200 mm. It grows on a wide variety of neutral to alkaline soils but performs better than most species on shallow, stony, sandy soils, or in places where there is a hard calcareous or clay pan not far below the surface. It grows best on soils with a pH of 6.2-7.
Moringa oleifera		x	x	x	x	x	x		x	x	x	x		x		x	A small to medium tree (up to 10 m). Altitude 0-1000 m; mean annual temperature 12.6-40 ºC; tolerates rainfall as low as 500 mm per year. Adapted to a wide-range of soil types but does well in well drained clay or clay loam without prolonged water logging. Prefers a neutral to slightly acidic soil reaction, but it has recently been introduced with success in Pacific atolls where the pH is as high as 8.5.
*Albizia lebbeck**	x			x	x	x		x	x					x			A medium tree (15-30 m). Altitude: below 1800 m; mean annual temperature: 20-35 ºC; mean annual rainfall: 600-2500 mm (can survive with as little as 300 mm of annual rainfall). This species grows well on fertile, well-drained, loamy soil.
Pinus merkusii	x			x				x	x	x			x	x		x	A large tree (50-70 m). Altitude: 0-2000 m; mean annual temperature: 21-28 ºC; mean annual rainfall: 1000-3500. Growing well on many different types of soil, such as sandy and red soils, and in varying climates
Acacia auriculiformis		x		x				x					x	x	x		A medium evergreen tree (15-30 m). Altitude: below 0 -1000 m; mean annual temperature:24-38 ºC; mean annual rainfall: 650-6000 mm. Found most commonly on clay soils, it exhibits the ability to grow in a variety of soils including calcareous sands and black cracking clays, seasonally waterlogged soils, sandy loams and coral rag. It can also tolerate highly alkaline and saline soils, pH ranging between 4.3 and 9.

Crotalaria juncea		x		x	x			x			x					An herbaceous, laxly branched annual, (1-3.5 m). Altitude: below 0-900 m; mean annual temperature: 9-30 ºC; mean annual rainfall: 170-200 mm. Found on light, loamy well-drained soils are preferred; on low-lying or clay soils it achieves vigorous growth. A pH of 5-8.4 is a suitable range.
*Dipterocarpus alatus**	x			x				x			x		x				A medium-large tree (up to 40 m). Altitude: below 0-500 m; mean annual temperature: unknown; mean annual rainfall: unknown mm. The tree prefers alluvial soils.
Flemingia macrophylla	x			x	x	x		x				x	x	x		x	A woody, deep-rooting, tussock-forming shrub (1-4 m). Altitude 0-2 000 m; mean annual temperature: unknown; mean annual rainfall: 1100-2850 mm. Found naturally on both on clay and lateritic soils. The species has an outstanding adaptation to acid (pH 4.6) and infertile soils with high soluble aluminium (80% saturation). It can tolerate fairly long dry spells and is capable of surviving on poorly drained soils with water logging.
Peltophorum pterocarpum		x		x		x	x	x				x	x	x		x	A medium-large deciduous tree (15-24 m). Altitude 0-1600 m; mean annual temperature 22-32 ºC; mean annual rainfall: 1500-4500 mm. The tree prefers light to medium free draining alkaline soils although it also tolerates clay soils.
Ceiba pentandra		x				x	x				x	x	x				A large deciduous tree (60-70 m). Altitude: below 0-900 m; mean annual temperature: 18-38 ºC; mean annual rainfall: 750-3000 mm. Found on deep permeable, volcanic loam, free from water logging.
Erythrina variegata	x					x			x		x		x				A deciduous tree, 3-27 m. Altitude 0-1200 m; mean annual temperature 20-32 ºC; mean annual rainfall: 1250 mm. Occurs in evergreen and deciduous (dipterocarp) forest with a canopy varying from dense to open.
Khaya senegalensis		x				x			x	x	x		x	x			A medium deciduous evergreen tree (15-30 m).Altitude 0-1800 m; mean annual temperature 24-31 ºC; mean annual rainfall: 400-1750 mm. Tolerant to a wide range of soil conditions, from neutral to very strongly acidic and from very well-drained, coarse sandy loam to somewhat poorly drained clay. Prefers neutral, deep, sandy loam soil that is well drained. Such fertile conditions are often found in alluvial soils.
*Aquilaria crassna**	x								x	x			x				A medium-large tree (15-40m). Altitude: 300-900 m; mean annual temperature: unknown; mean annual rainfall: unknown mm. Generally in moist areas, along streams and rivers, and on hill sides. Species occurs sparsely in primary and secondary forest, and usually on ferralitic soils with shallow to moderately deep layers.
*Gardenia ankorensis**	x				x				x				x				A short tree (up to 10 m). Altitude: unknown; mean annual temperature: unknown; mean annual rainfall: unknown. Able to grow on most soils.
*Pterocarpus macrocarpus**	x				x				x				x				A medium-large tree (10-30 m). Altitude: up to 700 m; mean annual temperature: unknown; mean annual rainfall: unknown. Prefers well drained, light textured soils with shallow depths and little humus.

*Dysoxylum loureiri**	x								x				x				A large tree (20-35m). Altitude: unknown; mean annual temperature: unknown; mean annual rainfall: unknown. It usually on basalt, sandstone, and sandy clay soils. Especially abundant along the southwest coast and adjacent highlands of Cambodia.
*Fagraea fragrans**	x								x				x			x	An evergreen, medium-large tree (up to 20 m). Altitude: below 800 m; mean annual temperature: unknown; mean annual rainfall: unknown. Usually found in semi deciduous forests and rarely in dense or open forests. The tree prefers sandy soils that are periodically inundated along streams or rivers
*Shorea cochinchinensis**	x								x	x			x				A deciduous, medium-large tree (10-30m). Altitude: 50-1000m; mean annual temperature: unknown; mean annual rainfall: unknown.
*Hopea helferi**	x									x			x	x			A medium to large tree (8-25 m). Altitude: below 700 m; mean annual temperature: unknown; mean annual rainfall: unknown. The species requires wet and deep soils, often grows along streams.
*Garcinia hanburyi**	x								x				x				A medium sized tree (10-20 m). Altitude: up to 800 m; mean annual temperature: unknown; mean annual rainfall: up to 2500mm. Found in the dense and secondary forests of Cambodia.
*Cananga latifolia**	x								x				x				A small tree (8-25 m). Altitude: unknown; mean annual temperature: unknown; mean annual rainfall: unknown. This species is distributed in wet, dense, piedmont forests.
Hopea odorata	x								x	x			x				A large, evergreen tree (up 45 m). Altitude: 0-300 m; mean annual temperature: 25-27 ºC; mean annual rainfall: more than 1200 mm. In most of its natural distribution area it is found in lowland tropical forests on deep, rich soils, often along streams and rivers.
*Dipterocarpus alatus**	x							x		x			x				A medium-large tree (40+ m). Altitude: 0-500 m; mean annual temperature unknown; mean annual rainfall: unknown. The tree prefers alluvial soils.
Eucalyptus camaldulensis		x					x		x		x		x	x	x	x	A large tree (20-50 m). Altitude: 0-1500 m; mean annual temperature 3-40 ºC; mean annual rainfall 250-2500 mm. Grows best on deep, silty or loamy soils with a clay base and accessible water table. Tolerates water logging and periodic flooding. It is one of the species found to be most tolerant to acid soils.
Eucalyptus tereticornis		x					x				x		x	x	x	x	A large tree (45+ m). Altitude 0-1000 m; mean annual temperature 2-32 ºC; mean annual rainfall: 500-3500 mm. Will grow on a variety of soils, with a preference for deep, well-drained soils of fairly light texture, including alluvial soils, silts and clays. A neutral or slightly acidic pH is suitable, but not a strongly acidic one.

Eucalyptus urophylla		x									x		x	x	x		A large tree (up to 45 m). Altitude 350-3000 m; mean annual temperature 8-29 ºC; mean annual rainfall: 1000-1500 mm. Develops best on deep, moist, well-drained, acidic or neutral soils derived from volcanic or metamorphic rock. Also commonly found on basalt, schist and slates, but rarely on limestone.
*Dalbergia cochinchinensis**	x				x								x				A large tree (25-30m). Altitude: 400-500 m; mean annual temperature: unknown; mean annual rainfall: 1200-1650 mm. Able to grow on most soils, preferring deep sandy clay soil and calcareous soil.
*Dalbergia oliveri**	x												x				A medium to large tree (10-35m). Altitude: 0-900 m; mean annual temperature: unknown; mean annual rainfall: unknown mm. Generally in moist areas, along streams and rivers, and on hill sides. Trees prefer loam soil but can tolerate well-drained, heavy, acidic clay soils.
*Diospyros cruenata**	x												x	x			A medium to large tree (8-35m). Altitude: unknown; mean annual temperature: unknown; mean annual rainfall: unknown.
*Diospyros bejaudii**	x												x				A medium evergreen tree (10-20m). Altitude: unknown; mean annual temperature: unknown; mean annual rainfall: unknown. Found in dense and semi-dense forests of Cambodia, where it is endemic.
Tectona grandis		x						x	x				x	x	x		A large deciduous tree (30+ m). Altitude 0-1200 m; mean annual temperature 14-36 ºC; mean annual rainfall: 1200-2500 mm. Their most suitable soil is deep, well-drained, fertile alluvial-colluvial soil with a pH of 6.5-8 and a relatively high calcium and phosphorous content. The quality of growth, however, depends on the depth, drainage, moisture status and the fertility of the soil. Does not tolerate water logging or infertile lateritic soils.

*Indicates rare species, listed by Cambodia Tree Seed Project or IUCN threatened species list.

Core references

Cambodia Tree species Project.2004. Available online at http://www.treeseedfa.org/cambodia_monograph.htm. [Accessed 8 September 2011].
AgroForestry Tree Database. Available online at http://www.worldagroforestry.org. [Accessed 8 September 2011].
FAO - Food and Agriculture Organization of the UN Ecocrop Database http://ecocrop.fao.org/ecocrop/srv/en/cropFindForm [Accessed 6 November 2011].

ANNEX VI THE COST, ECONOMIC BENEFIT AND ECOLOGICAL BENEFITS OF PLANTING NITROGEN FIXING TREES AROUND RICE PADDIES.

Suggested leguminous tree and shrub species to plant	Cost of planting[240]	Cost of fertiliser without nitrogen fixing trees for a high yield rice crop	Financial benefit of reduced fertilizer use due to planting of leguminous trees[241]	Ecological benefits of nitrogen fixing trees
Leucaena leucocephala, *Albizia lebbek* (chres), *Gliricidia SEPIUM* (SNAOV), *DALBERGIA COCHINCHINENSIS* (KRA NGOUNG), *PTEROCARPUS INDICUS* (THNONG), *MORINGA OLEIFERA* and *Acacia mangium*	Approximately 0.12 ha of trees will be planted for every ha of rice paddy. The cost of establishing trees[242] has been estimated at ~ US$ 839 ha^{-1} so the cost of establishing a border of nitrogen fixing trees around rice paddies would be ~US$107 per ha of rice paddy. The intervention aims to target 2,286ha of agricultural land, which would cost ~US$ 244,602. A suggested average agricultural land use of 1-1.5 ha of rice paddy per family[243] means that this intervention would benefit 1,783 families	In 2004 N fertiliser costs were approximately US$ 0.40/kg[244]. Rice farmers on high yielding farms require 100-300kg N per ha per crop cycle, which equates to ~US$ 40 - 120 per ha per crop cycle.	Legumes contribute 50 -120 kg N/ha per crop cycle (up to 500 kg N / ha in the case of *Leucaena leucocephala),* so assuming N costs US$ 0.4ha^{-1} then nitrogen fixers could save the farmer US$ 20-48 ha^{-1} per crop cycle(and up to US$ 200 ha^{-1} in the case of *Leucaena leucocephala*).	The availability of soil nitrogen and other nutrients is essential to increase crop yields[245]. Leguminous nitrogen fixing plants have been found to increase soil pH, organic matter, and nutrients (N, P, K, Ca, and Mg), which is beneficial to grain yields and biomass, provided the trees do not shade the rice plants[246,247]. By introducing nitrogen fixing trees the efficiency of nutrient inputs is improved, so a higher yield is possible with less fertilizer input. Less fertilizer input means reduced emissions from fertilizer production, and has the added benefit that farmers have to spend less money on improving soil quality. In addition to the nutritional benefits, this conservation agriculture approach ensures protection of soils due to the presence of leaf litter, which reduces the effects of both drought and flood. Trees help with food supply, and increase the adaptability of agricultural systems to climate change by diversifying production as well as diminishing effects of extreme weather events such as heavy rains and droughts, as well as preventing soil erosion, stabilizing soils, and increasing infiltration rates.

[240] FAO http://www.fao.org/docrep/u2246e/u2246e06.htm.
[241] Lowendor HS. 1982. Biological nitrogen fixation in flooded rice fields. Cornell international agricultural mimeograph. 1982
[242] See Table 1 for a breakdown of the cost of tree establishment.
[243] Meyer A, Glaser, S, Hager V. Assessment of neglected and underutilised species (NUS) in Cambodia http://www.agrofolio.eu/agrofolio/uploads/files/final/Agrofolio_assessment_Cambodia.pdf suggest that each family has 0.5-1ha of agricultural lands.
[244] March Irrigation Scheme, Kampong Cham Province, Cambodia (October 2004).
[245] FAO 2010 "Climate-Smart" Agriculture: Policies, Practices and Financing for Food Security, Adaptation and Mitigation.
[246] Sae-Lee S, Vityakon P, Prachaiyo B. 1992. Effects of trees on paddy bund on soil fertility and rice growth in Northeast Thailand. Agroforestry Systems 18 (3) 213-223
[247] FAO http://www.fao.org/DOCREP/006/Y4751E/y4751e0k.htm.

ANNEX VII: PROPOSED CROP SPECIES TO PROMOTE INTENSIFICATION AND DIVERSIFICATION OF EXISTING HOMEGARDENS THROUGH IMPROVED CONSERVATION AGRICULTURE PRACTICES.

Estimates of production costs and gross return values of each crop obtained from Agrifood Consulting International (2005) Final Report for the Cambodian Agrarian Structure Study. Prepared for the Ministry of Agriculture, Forestry and Fisheries, Royal Government of Cambodia, the World Bank, the Canadian International Development Agency (CIDA) and the Government of Germany / Gesellschaft für Technische Zusammenarbeit (GTZ) by Agrifood Consulting International. Bethesda, Maryland.
http://agrifoodconsulting.com/ACI/uploaded_files/project_report/project_35_1220605826.pdf

Key: Growth forms/ life forms: 1. Grass/ Leafy Veg, 2. Shrub, 3. Tree, 4. Climber, 5. Root/tuber, 6. Annual, 7. Perennial

Social or environmental uses: 1. Cereal, 2. Legume, 3. Vegetable, 4. Fruit, 5. Medicinal or cultural value, 6. Industrial/construction, 7. Roots/tubers, 8. Fodder, 9. Climate adaptation benefits (e.g. soil fertility, drought or waterlogging tolerance), 10. Highly nutritious, 11. Seed.

Scientific name	Common name	Growth form/ life form	Material costs ($/ha)[248]	Labor ($/ha) [249]	Total production costs ($/ha)[250]	Gross returns ($/ha)[251]	Social or environmental uses	Reasons for inclusion
Cocos nucifera	Coconut palm	3, 7	21	55	76	204	4, 5, 6	This crop can be grown in combination with other crops to diversify production and increase food supply. Production costs are low and it was identified as a neglected and underutilised species[252] in Cambodia. Criteria used to identify these priority species included prevalence of local and national use (i.e. cultural acceptance), traditional knowledge of cultivation, potential for export, scientific knowledge and nutritional value.
Anacardium occidentale	Cashew	3, 7	18	85	104	646	4, 9	Can be grown in combination with other crops for diversity and is adapted to tolerance of erratic rainfall. Identified as a neglected and underutilised species in Cambodia[253].

[248] Agrifood Consulting International. 2005. Final Report for the Cambodian Agrarian Structure Study. Prepared for the Ministry of Agriculture, Forestry and Fisheries, Royal Government of Cambodia, the World Bank, the Canadian International Development Agency (CIDA) and the Government of Germany / Gesellschaft für Technische Zusammenarbeit (GTZ) by Agrifood Consulting International. Bethesda, Maryland. http://agrifoodconsulting.com/ACI/uploaded_files/project_report/project_35_1220605826.pdf.
[249] Ibid.
[250] Ibid.
[251] Ibid.
[252] Meyer A, Glaser, S, Hager V. Assessment of neglected and underutilised species (NUS) in Cambodia http://www.agrofolio.eu/agrofolio/uploads/files/final/Agrofolio_assessment_Cambodia.pdf.
[253] Ibid.

Citrus spp.	Oranges, lime, mandarin	3, 7	121	124	245	4969.98	4, 5, 9	This crop is water stress resistant and has been identified as an underutilised species in Cambodia[254].
Durio zibethinus	Durian	3, 7	77	198	274	1167	4, 7	Can be grown with other crops for diversification and intensification of agriculture. Has been identified as an underutilised species in Cambodia[255]
Manihot esculanta	Cassava	2, 7	73	105	177	375	6, 7, 9	Highly nutritious, low maintenance, highly productive, used extensively already.
Glycine max	Soya bean	2, 6	93	61	153	422	2, 6, 8, 9, 10	Highly nutritious, has a wide range of uses, and stabilises and improves soil fertility.
Ipomoea batatas	Sweet potato	2, 6	57	59	116	332	7, 8, 10	Can be grown in combination with other crops for diversification of agriculture. Identified as a neglected species in Cambodia[256].
Solanum melongena	Eggplant	1, 6	87	31	118	1375	3, 5, 10	This will increase food supply as it is nutritious and easy to grow on small scale. Growing it in combination with other crops will diversify farming practices.
Vigna radiata	Mungbean	1, 6	75	47	122	352	2, 9	This species has positive benefits for soils, as it is nitrogen fixing. Identified as a neglected species in Cambodia[257].
Zea mays	Maize	1, 6	87	47	134	708	1, 6, 8	Highly productive, high energy content, capable of high yield in small areas to intensify agriculture.
Arachis hypogaea	Peanut, ground nut	1, 1	85	54	139	327	2, 6, 9, 10	This species is nitrogen fixing (see Annex V for the importance of nitrogen fixers in agricultural systems) and can be grown in combination with other crops to diversify agriculture. Identified as underutilised species in Cambodia[258].
Ipomoea aquatica	Kangkong	1, 6	103	46	149	433	3, 9, 10	This crop grows easily and is highly nutritious, highly productive, and already used extensively in Cambodia. Can be grown in combination with other crops for diversification.
Sesamum indicum	Sesame	1, 6	138	41	180	681	5, 6, 9, 11	High profit returns, can tolerate broad climatic parameters.
	Vegetables (lettuce, cabbage,	1, 6	90	69	159	1035	3, 10	Growing a combination of vegetables at different times of year will diversify output and make communities more resilient to failed crops. Nutritious

[254] Ibid.
[255] Meyer A, Glaser, S, Hager V. Assessment of neglected and underutilised species (NUS) in Cambodia http://www.agrofolio.eu/agrofolio/uploads/files/final/Agrofolio_assessment_Cambodia.pdf.
[256] Ibid.
[257] Ibid.
[258] Ibid.

	tomato, cabbage, cauliflower)							and easy to grow on small scale.
Colocasia esculenta	Taro	1, 6	n/a	n/a	n/a	n/a	5, 7, 8, 9, 10	Widely utilised already, and tolerant of erratic climate. Has various uses and has been identified as a neglected and underutilised species in Cambodia[259]
Zingiber officinarum	Ginger	2, 6	n/a	n/a	n/a	n/a	5, 7, 10	This species has a high yield per area (1.5-7.5 t/ha for dried ginger and up to 38 t/ha for green ginger)[260] and has a high market value. Identified as a neglected species in Cambodia[261]
Nephelium lappaceum	Rambutan	3, 7	n/a	n/a	n/a	n/a	4	Useful food plant. Identified as a neglected and underutilised species in Cambodia[262]
Momordica charantia	Bitter Gourd	1, 6	n/a	n/a	n/a	n/a	3, 5, 9	Widely utilised in Cambodia and can be grown in combination with other crops. Medicinally useful and can tolerate erratic climate[263].
Min value			**18**	**31**	**76**	**204**		
Max value			**138**	**198**	**274**	**4969**		
Average			**80**	**73**	**153**	**930**		

[259] Meyer A, Glaser, S, Hager V. Assessment of neglected and underutilised species (NUS) in Cambodia http://www.agrofolio.eu/agrofolio/uploads/files/final/Agrofolio_assessment_Cambodia.pdf.
[260] http://ecocrop.fao.org/ecocrop/srv.
[261] Meyer A, Glaser, S, Hager V. Assessment of neglected and underutilised species (NUS) in Cambodia http://www.agrofolio.eu/agrofolio/uploads/files/final/Agrofolio_assessment_Cambodia.pdf.
[262] Ibid.
[263] http://ecocrop.fao.org/ecocrop/srv.

ANNEX VIII: COSTING OF ADDITIONAL SUITE OF ADAPTATION ACTIVITIES PER CPA INTERVENTION SITE TO COMPLEMENT CONSERVATION AGRICULTURE ACTIVITIES (US$).

CPA site	Terracing	Dams/ponds and canals	Fire breaks	Improved seeds to local businesses	Woodlots	Improved post-harvest storage	Pest/disease management	Additional interventions	Total per CPA
Chiork Beung-prey	11 383	8 977	1 133		4 352		6 483		**32 328**
Ronouk Khgeng	10 131	4 813			2 334	2 492		21 746	**36 918**
Chom Thlork	2 277	50 562	3 147	10 000	24 515	26 180	36 515	33 000	**187 494**
Skor Mreach	1 480	34 717	6 293		16 833		25 073	11 000	**101 545**
Chop Tasok	13 090	4 056		10 000	1 966		2 929	20 000	**49 190**
Total (USD)	**38 359**	**103 125**	**10 573**	**20 000**	**50 000**	**28 672**	**71 000**	**85 746**	
Notes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	

Notes:

1. Terracing costs calculated based on area of intensified/diversified homegardens (see Table 2 in Part II.A) and a cost of **US$ 569 ha^{-1}**.
   Source: Bizoza AR and de Graaff. 2012. Financial cost-benefit analysis of bench terraces in Rwanda. Land Degrad. Develop. **23**: 103–115.
2. Cost of dams/ponds and canals are calculated on basis of one 800 m^3 pond (**US$ 275**) per five families for irrigation purposes (see Table 2 in Part II.A for number of families per CPA).
   Source: Nissen-Petersen E. 2006. Water from Small Dams: A handbook for technicians, farmers and others on site investigations, designs, cost estimates, construction and maintenance of small earth dams. Danish International Development Assistance (Danida).
3. Cost of establishing fire breaks in the restored forests (see Table 2 in Part II.A) has been based on area of firebreaks constituting 10% of forest area, and a cost of **US$ 29 ha^{-1}** for prevention and pre-suppression.
   Source: Sameer Karki. 2002. Community Involvement in and Management of Forest Fires in South East Asia. Prepared for: WWF, IUCN and FireFight South East Asia.
   FAO. Firebreaks. Available from: http://www.fao.org/ag/againfo/programmes/en/lead/toolbox/Tech/4Firebrk.htm#cost [Accessed 18 April 2012].
   Forestry Research Institute of Ghana. 2003. Forest Fire Management in Ghana: Final Technical report.
4. **US$ 10,000** has been allocated to Chom Thlork and Chop Tasok CPAs to engage with local seed distributors and provide local businesses with improved seeds to sell to surrounding communities.
5. Cost of establishing woodlots is calculated on basis of 1 ha (**US$ 86 ha^{-1}** to establish) per three families for fuelwood provision (see Table 2 in Part II.A for number of families per CPA).
   Source: Guo E. 2007. Potential of woodlot establishment in meeting the practical and strategic gender needs of women in the upper west region of Ghana. Studies in gender and development in Africa. **1**: September 2007.
6. The cost of improved post harvest storage is calculated on the basis of one 500 kg metal silo (**US$ 28** per silo) per family in Ronouk Khgeng and Chom Thlork (see Table 2 in Part II.A for number of families per CPA).
7. Pest/disease management is calculated on the basis of the number of families farming per CPA.
8. Additional interventions: **US$ 21,746** for ecotourism project in Ronouk Khgeng in addition to the funding in Output 2.3; **US$ 11,000** for financial credit schemes in Chom Thlork and Skor Mreach to further the activities in Output 2.3; and **US$ 20,000** for marketing crop products in Chom Thlork and Chop Tasok to further the activities in Output 2.3.

ANNEX IX: MISSION REPORT AND MEETING MINUTES.

UNEP Adaptation Fund project: Cambodia Mission Report
International consultant: Mike Jennings, C4 EcoSolutions
Dates of mission: 20 June – 3 July 2011

Project title: Enhancing climate change resilience of local communities living in forests and watersheds in protected areas of Cambodia.

A mission was undertaken by the international consultant to Cambodia to gather information to develop a Cambodia Project Concept for submission to the Adaptation Fund (AF) Board. Meetings were held in Phnom Penh with a range of Government departments and NGOs operating in and around Protected Areas. A field visit was undertaken to the Northern Plains region, where meetings were held with Management Committees of three Community Protected Areas (CPAs). Details of the key stakeholders who were consulted and actions taken during the mission are presented below (See Table 1 for a full meeting schedule):

- Meetings were held with the following departments in the Ministry of Environment: General Department of Administration for Nature Conservation and Protection;
  - Department of Research and Community Protected Area Development;
  - Climate Change Department;
  - Wildlife Sanctuary Department; and
  - Department of National Parks.
- Meetings were held with the following Government departments:
  - Ministry of Agriculture Forestry and Fisheries;
  - Ministry of Planning;
  - Ministry of Rural Development;
  - Ministry of Water Resources and Meteorology;
  - National Committee for Disaster Management;
  - National Mekong Committee; and
  - Cambodia Development Resource Institute.
- Meetings were held with the following NGOs:
  - World Wildlife Fund;
  - Clinton Foundation;
  - Wildlife Conservation Society;
  - International Union for Conservation of Nature;
  - Fauna and Flora International;
  - Wildlife Alliance;
  - Cambodia Non-Timber Forest Working Group;
  - Cambodia Rural Development Team; and
  - Centre for People and Forests.
- Meetings were held with Ms. Ermira Fida (UNEP, Chief of GEF Adaptation Unit, Climate Change Adaptation Department) during which the requirements of the AF Board were discussed. It was during these meetings that it was decided not to submit a Project Concept, but rather a Full Project Proposal.
- A field trip was undertaken during which meetings were held with committees of the following CPAs:
  - Thmatbeutheun Krosinm in Kulen Promptheap Wildlife Sanctuary (WS);
  - Preyphnom in Phnom Kulen National Park (NP); and
  - Chiork Beungprey in Beung Per WS.

  Committee members were asked questions regarding changes in climate, forest degradation in and outside of CPAs, and homegardens.

Based on the feedback from the field trip and discussions held, it was evident that wider consultation of CPA communities using a consistent, structured questionnaire was required in order to finalise the proposed interventions and intervention sites. A survey plan is being prepared. The information gathered will be included in the Full Project Proposal.

Table 1: Cambodia Adaptation Fund UNEP mission meetings:

No.	Date	Time	Name	Organization	Position	Contact	Card
1	21/06/11	15h00-16h00	Ros Chor	MoE, GDANCP, DRCPAD	Deputy of Department	Ros.chor@yahoo.com; 012986098	No
			Heng Heng	MoE, GDANCP, DRCPAD	Chief of Office	Honghong73@yahoo.com; 012705060	No
			Poux Bunthet	MoE, GDANCP, DRCPAD	Staff	kethbunthet@yahoo.com; 012973887	No
			Kim Sarin	MoE, GDANCP, DRCPAD	Deputy of Department	kimsarin@gmail.com;012864045	Yes
			Srey Morona	MoE, GDANCP, DRCPAD	Director	sreymorona@yahoo.com; 097821854	Yes
			Ouk Navann	MoE, GDANCP, DRCPAD	Deputy Director General	navannouk@yahoo.com; 011845845	Yes
2	22/06/11	09h00-10h00	Phan Kamnap	MAFF, FA, Community Forest Office	Chief	phankamnap@yahoo.com; 012846994	Yes
3	22/06/11	10h00-11h00	Ou Ratank	WWF	Rattan Project Manager	Ratank.ou@wwf.panda.org; 012886086	Yes
4	22/06/11	11h00-12h00	Dr Tin Ponlok	MoE, GDANCP, CCD (CCCA)	Deputy Director General	etap@online.com.kh; 012915351	Yes
			Thy Sum	MoE, GDANCP, CCD	Director	cceap@online.com.kh; 023218370	Yes
5	22/06/11	15h30-16h30	Sony Oum	FFI	Project Coordinator	sony.oum@gmail.com; 012308988	Yes
6	22/06/11	16h30-17h00	Linda Rosengren	FFI, REDD	Regional Programme Manager	Linda.rosengren@fauna-flora.org	No
7	23/06/11	10h00-10h30	Nuth Chansokha	Ministry of Planning	Under Secretary of State	nchansokha@yahoo.com; 012373838	Yes
8	23/06/11	11h00-11h30	Hour Limchhun	Clinton Foundation	National Coordinator	hlimchhun@clintonfoundation.org; 011728738	Yes
9	23/06/11	11h30-13h00	Lic Vuthy	Forest and Environment Specialist	Consultant	licvuthy@yahoo.com; 012967865	Yes
10	23/06/11	14h30-15h00	Sy Ramony	MoE, GDANCP, Wildlife Sanctuary Department	Director	Ramony@online.com.kh	Yes
11	23/06/11	15h00-16h00	Mark Gately	WCS	Country Programme Director	mgately@wcs.org; 012807455	Yes
			Ashish Joshia Ingthy John	WCS	Community Conservation Management Advisor	ajohn@wcs.org; 012738526	Yes
12	23/06/11	16h00-17h00	Sokkheng Novin	MoE, GDANCP, Dept National Parks	Director	gdancp@yahoo.com	Yes
13	23/06/11	17h00-17h30	Khem Rogden	MoE, GDANCP, DRCPAD	Staff	011267966	No
14	24/06/11	09h00-10h30	Edwin Payuan	RECOFTC	Country Program Coordinator	edwin@recoftc.org; 077901995	Yes
			Hou Kalyan	REFOFTC	Training Coordinator	kalyan@recoftc.org; 012839955	Yes
15	24/06/11	10h30-11h30	Kimsreng Kong	IUCN	Senior Program Officer	kimsreng.kong@iucn.org; 012888847	Yes
			Sun Kong	IUCN	Field Coordinator	kong.sun@iucn.org; 012755501	Yes
16	24/06/11	14h30-15h00	Kol Vathana	Cambodia National Mekong Committee	Deputy Secretary General	kol_vth@cnmc.gov.kh; 012388502	Yes
17	24/06/11	16h30-17h00	Koy Ra	Cambodia Development Resource Institute, National Resource and Environment Program	Program Coordinator	ra@cdri.forum.org.kh; 012873432	Yes
			Kim Sour	CDRI, NRE Program	Research Associate	sour@cdri.forum.org.kh; 012867278	Yes
18	24/06/11	17h30-18h00	Samnang Sar	Mekong Carbon	President	sarsamnang@yahoo.com; 012481169	Yes

19	27/06/11	09h00-10h00	Sun Mao	Cambodian Rural Development Team	Executive Director	sun_mao@crdt.org.kh; 012635865	Yes
			Hean Pheap	Cambodian Rural Development Team	Operations Manager	hean_pheap@crdt.org.kh; 012674160	Yes
20	27/06/11	10h30-12h00	Khou Eang Hourt	Cambodian NTFP WG	National Network Facilitator	khou_eanghourt@yahoo.com; 012954627	Yes
21	27/06/11	14h00-16h00	Edwin Payuan	RECOFTC	Country Program Coordinator	edwin@recoftc.org; 077901995	2nd
			Hou Kalyan	REFOFTC	Training Coordinator	kalyan@recoftc.org; 012839955	2nd
22	27/06/11	16h00-17h30	Ouk Navann & team	MoE, GDANCP, DRCPAD	Deputy Director General	navannouk@yahoo.com; 011845845	2nd
23	28/06/11	08h30-09h30	Ev Sambath	Ministry of Rural Development, Dept of Rural Health Care	Deputy Director	sambath_ev@yahoo.com; 012668968	Yes
24	28/06/11	10h30-11h30	Ken Serey Rotha	MoE, GDANCP	Deputy Director General	ken.rotha@gmail.com; 077989112	Yes
25	28/06/11	11h30-12h30	Dr Tin Ponlok	MoE, GDANCP, CCD (CCCA)	Deputy Director General	etap@online,com.kh; 012915351	2nd
			Thy Sum	MoE, GDANCP, CCD	Director	cceap@online.com.kh; 023218370	2nd
26	28/06/11	13h00-14h30	Lic Vuthy	Forest and Environment Specialist	Consultant	licvuthy@yahoo.com; 012967865	2nd
27	28/06/11	15h00-15h30	Crawford Prentice	Nature Management Services	Consultant	crawford.prentice@gmail.com; +60(12)2095794	Yes
28	28/06/11	15h30-16h30	Berry Mulligan	FFI	Operations Manager	berry.mulligan@fauna-flora.org; 012533105	Yes
			Matt Maltby	FFI	Project Officer	matt.maltby.ffi@gmail.com; 023220534	Yes
29	28/06/11	16h30-17h30	Sau Sereymony	Ministry of Water Resources and Meteorology	Secretary of State	sausereymony@gmail.com; 012815711	Yes
30	28/06/11	17h30-18h00	Ma Norith	National Committee for Disaster Management, Information and International Relations	Director, Advisor to NCDM	ma.north@ncdm.gov.kh; 077897070	Yes
31	01/07/11	14h00-15h00	Lesley Perlman	Wildlife Alliance	Program Manager	lperlman@online.com.kh; 012900473	No
32	01/07/11	15h30-16h30	Berry Mulligan	FFI	Operations Manager	berry.mulligan@fauna-flora.org; 012533105	2nd
			Matt Maltby	FFI	Project Officer	matt.maltby.ffi@gmail.com; 023220534	2nd

Meeting between the Ministry of Environment, Cambodia and UNEP representative:

Location: Ministry of Environment offices, Phnom Penh, Cambodia
Date: 14 March 2012
Time: 10h00-12h00

In attendance:

Name	Position	Organization	Contact/Email
Ms. Ermira Fida	Head of GEF Climate Change Adaptation Unit	United Nations Environment Programme (UNEP)	ermira.fida@unep.org
Dr. Tin Ponlok	Deputy Director General; and Designated Authority for Adaptation Fund	General Department of Administration for Nature Conservation and Protection, MoE	etap@online.com.kh
Mr. Ouk Navann	Deputy Director General	General Department of Administration for Nature Conservation and Protection, MoE	navannouk@yahoo.com
Mr. Sum Thy	Director	Climate Change Department, MoE	cceap@online.com.kh
Mr. Srey Marona	Director	Research and Community Protected Area Development Department, MoE	marona9@gmail.com
Mr. Kim Sarin	Deputy Director	Research and Community Protected Area Development Department, MoE	kimsarin@gmail.com
Mr. Ros Chor	Deputy Director	Research and Community Protected Area Development Department, MoE	ros.chor@yahoo.com
Mr. Uy Kamal	Chief of Office	GHG Inventory and Mitigation Office, Climate Change Department, MoE	kamaluy@hotmail.com
Mr. Hak Mao	Chief of Office	Adaptation Office, Climate Change Department, MoE	cheamao2003@yahoo.com
Mr. Sun Kolvira	Chief of Office	Administration Office, Research and Community Protected Area Development Department, MoE	sunkolvira@gmail.com
Mr. Khem Rongden	Vice Chief of Office	Research and Cooperation Office, Research and Community Protected Area Development Department, MoE	khemrongden007@yahoo.com

Meeting minutes (taken by Ms Ermira Fida):

- The MoE participants continue to be excited about the AF project; they reiterated the importance of this project and find it as a very well formulated one, believing that if it will be approved it will help them to address the vulnerability to climate hazards and make the case for future adaptations in the country.
- Following the First CPA Community Survey and the comments / recommendations made by the AF review team a Second CPA Community Survey is needed to narrow down the site selection.

Participants agree with the proposal: selecting 5-6 sites using the matrix and further narrow down the list through conducting another round of survey

- Following the briefing on the status of the current resources of the AF made by Ermira Fida, UNEP representative at the meeting, the participants understand the need for a submission at this upcoming round (April 2012) and expressed their willingness to do their best to supporting the second round of the survey and the finalization of the proposal .
- The participants feel that the funds available (the balance of 2.5kUSD worth from the total budget provided by UNEP) are not sufficient to undertake this round of review. However they feel committed to finalize the proposal and will seek all means of in-kind support by the Ministry to make this happen within the limited time and resources. Ermira committed herself to make sure the balance is transferred urgently to the project account. She will follow up from Cambodia to making sure the funds are made available so the survey will start immediately.
- Participants agreed that a set of additional criteria for the second round of selection must be agreed. They propose for the sites to represent different geographic locations/ landscape. They propped the following to be considered;
  - **Vulnerability to climate hazard.**
  - **Availability of policies and legislation** to regulate the protection of ecosystems
  - **Readiness from the sites to participate in the implementation process**. (Letters of intent/ interest from the selected communes are encouraged).
  - **Availability of the ongoing support** as means of creating synergy with other projects / programs in order to maximize the impact.
  - **Availability of data in the sites** which will help us to come up with an acceptable baseline for targets and indicators at the submission round.
  - **Poverty rate/ level.**
  - **Gender** (number of families headed by women).
  - **Suitability of interventions.** Participants confirm that we need to make sure that the forests areas we are making interventions to are very degraded. Dr Ponlok suggested the use at the extent possible of literature review (GTZ, UNDP etc); GIS and the data from the survey itself.
- Participants do not believe that the second round of survey will increase any expectations from interviewed / involved communities. Dr Ponlok had a great suggestion which we can build on. Dr Ponlok suggested to keep them engaged as observers in the project including by inviting them to the workshops, training etc. This could be part of the strategy for upscaling. Replicating this project into other sites through other sources of funding including LDCF must be considered as a solution for those sites and part of the strategy.
- Navann Ouk and the team are committed to undertake the survey starting from tomorrow should the questionnaires be ready so the ball is now in your court. They need 2 weeks to complete the Second CPA Community Survey.
- The expected the deadline for the Full Project Proposal is 18 April 2012.

ANNEX X: CHECKLIST OF ENVIRONMENTAL AND SOCIAL SAFEGUARDS.

To address Environmental and Social Safeguards UNEP has developed this checklist with the following guidance:

1. **Executing Agency** is responsible for completing the checklist with support from **UNEP Task Manager**.
2. Checklist shall initially be filled in during concept development to help guide in the identification of possible risks and activities that will need to be assessed and included in the project design.
3. The checklist shall accompany the Project Concept with the relevant column completed.
4. Final checklist shall be submitted with Full project Proposal clearly showing what activities have been assessed and how negative impact will be avoided or mitigated, incl. responsibility for mitigation measures.
5. Checklist and planned mitigation measures shall be reviewed annually at PIR stage, to ensure that planned mitigation measures are taking place and that any previously unanticipated issues are identified and addressed.
6. Checklists and implementation will be reviewed by UNEP annually during PIR review, at Mid-term and at Terminal Evaluation stage.

Project Title:	***Enhancing climate change resilience of rural Communities living in Protected Areas of Cambodia***		
AF project ID and UNEP ID/IMIS Number		***Version of checklist***	
Project status (preparation, implementation, PIRFYXX)	*Under preparation*	***Date of this version:***	*July 2011*
Checklist prepared by (Name, Title, and Institution)	Mr Ouk Navann, Deputy Director General, General Department of Administration for Nature Conservation and Protection, Ministry of Environment.		

Section A: Project location:

	Yes/No/N.A [264]	*Description of the issue: Distance, direction, connection to project area and size of applicable category and other relevant criteria.*	*At Project Concept stage: Outline of studies/assessments to be conducted prior to Full Project Proposal development to determine scope of impact, including responsibility and budget implications for mitigation.*	*At Full Project Proposal stage: Planned mitigation measures, incl. timing, budget and responsibility.*
- Is the project area in or close to -				
- densely populated area	No	The AF project will be implemented in Protected Areas (PAs), in both Community Protected Areas (CPAs; in which people are not permitted to live)		

[264] The N.A. category should be reserved for projects, which do not have a specific location identified, e.g. global or regional projects with a predominantly normative scope.

		and in surrounding villages (which are not densely populated).		
- cultural heritage site	No			
- protected area	Yes	The AF project will be implemented in PAs with the endorsement of the MoE (Executing Agency of the AF project, and responsible for administration of PAs in Cambodia).		No mitigation measures required. The AF project will improve the ecological functioning of – and ecosystem service delivered by – CPA intervention sites in PAs.
- wetland	Yes	There are numerous wetlands in the CPAs. The exact location in relation to the extensive restoration sites will be determined during the baseline surveys as part of Component 1 of the AF project.		No mitigation measures required. The extensive restoration will be implemented in degraded forest sites, and will include measures to control erosion while multi-use trees are growing. Once established, the forests will bind soils and prevent erosion, thereby enhancing the ecological functioning of wetlands.
- mangrove	No			
- estuarine	No			
- buffer zone of protected area	No	The AF project will be implemented in PAs as opposed to buffer zones outside of PAs.		
- special area for protection of biodiversity	Yes	Protection of biodiversity is one of the functions of PAs.		No mitigation measures required. Biodiversity will be enhanced through the AF project.

Section B: Environmental impacts, i.e.

	Yes/No/N.A.[265]	*Description of the issue:*	*At Project Concept stage: Outline of studies/assessments to be conducted prior to Full Project Proposal development to determine scope of impact, including responsibility and budget implications for mitigation.*	*At Full Project Proposal stage: Planned mitigation measures, incl. timing, budget and responsibility.*
- Will project require temporary or permanent support facilities?	No			
- Will project cause any loss of precious ecology, ecological, and economic functions due to construction of infrastructure?	No			
- Are ecosystems related to project fragile or degraded?	Yes	The AF project will restored degraded forest areas in CPAs at an extensive scale. This will result in positive changes to ecosystems functioning and climate change resilience of the degraded areas.	Second CPA Community Survey to gather information at the six CPA sites ranked as most vulnerable based on the results of the First CPA Community Survey. MoE members were shown degraded forest areas at each CPA intervention site.	No mitigation measures required.
- Will project cause impairment of ecological opportunities?	No	The AF project will result in improved ecological opportunities and ecosystem functioning.		No mitigation measures required.
- Will project cause increase in peak and flood flows? (including from temporary or permanent waste waters)	No	The AF project will restore the watershed services of degraded forests, which will improve water infiltration into soils and reduce peak and flood flows.		No mitigation measures required.
- Will project cause air, soil or water pollution?	No	The AF project will reduce erosion and excessive siltation of downstream waterways, thereby improving soil and water quality.		No mitigation measures required.
- Will project cause soil erosion and siltation?	No	The AF project will reduce erosion and excessive siltation of downstream		No mitigation measures required.

[265] The N.A. category should be reserved for projects, which do not have a specific location identified, e.g. global or regional projects with a predominantly normative scope. Careful consideration of the specific issue should be exercised to determine potential impact, both short- and long-term.

		waterways, thereby improving soil and water quality.		
- Will project cause increased waste production?	No			
- Will project cause hazardous waste production?	No			
- Will project cause threat to local ecosystems due to invasive species?	No	The AF project will favour indigenous multi-use trees for use in forest restoration and conservation agriculture activities. Non-indigenous species will be planted at the request of the communities at the CPA intervention sites, however, no invasive species will be planted.	Second CPA Community Survey to gather information at the six CPA sites ranked as most vulnerable based on the results of the First CPA Community Survey. Community members advised which species they would like planted. These will be included in the protocols to capture indigenous knowledge and ensure community buy-in.	No mitigation measures required. The forest restoration and conservation agriculture protocols will be guided by forestry, botany and agricultural experts who will ensure invasive species are not part of the AF project interventions.
- Will project cause Greenhouse Gas Emissions?	No	The AF project will reduce GHG emissions through the restoration of 1,875 ha of degraded forest.		
- Does the project encourage the use of environmentally friendly technologies?	Yes	The AF project will use an ecoagriculture approach. This approach makes use of environmentally friendly agriculture practices and will result in the restoration of degraded areas.	Second CPA Community Survey to gather information at the six CPA sites ranked as most vulnerable based on the results of the First CPA Community Survey. Further details of the ecoagriculture approach (which is already part of community agriculture to some degree) were explained to communities to build on the engagement of the First CPA Community Survey.	No mitigation measures required. Forest restoration and conservation agriculture protocols, as well as community training, will guide the implementation of AF project activities.
- Other environmental issues, e.g. noise and traffic	No			

Section C: Social impacts

	Yes/No/N.A.[266]	*Description of the issue:*	*At Project Concept stage: Outline of studies/assessments to be conducted prior to Full Project Proposal development to determine scope of impact, including responsibility and budget implications for mitigation.*	*At Full Project Proposal stage: Planned mitigation measures, incl. timing, budget and responsibility.*
- Does the project respect internationally proclaimed human rights including dignity, cultural property and uniqueness and rights of indigenous people?	Yes	One of the original criteria for selecting PAs was the vulnerability of indigenous, ethnic minority groups in Cambodia. The climate change resilience of these groups will be enhanced by the AF project.	Second CPA Community Survey to gather information at the six CPA sites ranked as most vulnerable based on the results of the First CPA Community Survey.	No mitigation measures required.
- Are property rights on resources such as land tenure recognized by the existing laws in affected countries?	Yes	The reason for selecting PAs and CPAs at intervention sites for the AF project was because of the secure land tenure provided by the MoE in the form of official agreements with the CPA communities (as per the PA Law).	Second CPA Community Survey to gather information at the six CPA sites ranked as most vulnerable based on the results of the First CPA Community Survey. Property rights were discussed with the communities.	No mitigation measures required.
- Will the project cause social problems and conflicts related to land tenure and access to resources?	No	CPA forest resources are shared amongst the community, as overseen by the CPA Management Committee. The conservation agriculture interventions will benefit all individual families in the five CPA intervention sites.	Second CPA Community Survey to gather information at the six CPA sites ranked as most vulnerable based on the results of the First CPA Community Survey. Details on sharing of resources and family homegardens/rice paddies were gathered in both the First and Second CPA Community Surveys.	No mitigation measures required. The CPA Management Committee will oversee the sharing of resources from the restored forests.
- Does the project incorporate measures to allow affected stakeholders' information and consultation?	Yes	The AF project has followed a participatory approach from the outset, which has included two extensive community surveys of the project target areas. Outputs/activities from all three components allow for information	Second CPA Community Survey to gather information at the six CPA sites ranked as most vulnerable based on the results of the First CPA Community Survey. This followed the First CPA Community Survey, when	No mitigation measures required. Outputs/activities from all three components allow for information transfer and community consultation.

[266] The N.A. category should be reserved for projects, which do not have a specific location identified, e.g. global or regional projects with a predominantly normative scope. Careful consideration of the specific issue should be exercised to determine potential impact, both short- and long-term.

		transfer and community consultation.	community consultation was initiated for the AF project.	
- Will the project affect the state of the targeted country's (-ies') institutional context?	Yes	Outputs in Component 3 will promote ecoagriculture activities through institutional capacity building and proposed revisions to policies, strategies and legislation.		No mitigation measures required.
- Will the project cause change to beneficial uses of land or resources? (incl. loss of downstream beneficial uses (water supply or fisheries))?	Yes	The AF project will result in a positive impact of the use of land and resources. This will be principally through the restoration of degraded forests (for sustainable NTFP harvesting and ecosystem service enhancements), and intensification of agricultural production from existing agricultural areas.	Second CPA Community Survey to gather information at the six CPA sites ranked as most vulnerable based on the results of the First CPA Community Survey. Communities advised which ecoagriculture interventions were appropriate for their CPA and agricultural lands.	No mitigation measures required. The AF project will result in positive impacts.
- Will the project cause technology or land use modification that may change present social and economic activities?	Yes	The AF project will result in positive changes to present social and economic activities. This will be through intensification of agricultural production, setting up of sustainable, alternative livelihoods, and the safety net afforded by productive, restored forest areas.	Second CPA Community Survey to gather information at the six CPA sites ranked as most vulnerable based on the results of the First CPA Community Survey.	No mitigation measures required. The AF project will result in positive impacts.
- Will the project cause dislocation or involuntary resettlement of people?	No			
- Will the project cause uncontrolled in-migration (short- and long-term) with opening of roads to areas and/or possible overloading of social infrastructure?	No	CPAs are strictly for the use of CPA community members only. This is stipulated in the PA Law and in the official agreements between the MoE and the CPA communities. Harvesting by outsiders (non-community members) is illegal, but does occur and was reported as a problem by all five CPA communities where the AF project will be implemented. Activities in Component 2 have been dedicated to strengthening the patrolling of restored sites. The AF project will not result in the	Second CPA Community Survey to gather information at the six CPA sites ranked as most vulnerable based on the results of the First CPA Community Survey.	Patrolling of restored areas will be strengthened. Patrolling responsibilities are shared between MoE Park Rangers and the community. Co-ordination will be strengthened, signs erected indicating the boundary of the CPA and that harvesting by outsiders is illegal, patrol towers will be built and equipment required for effective communication of patrolling teams (i.e. radios) will be purchased. An indicator to measure

		opening of roads or improved access to areas.		the success of the patrolling efforts has been included in the project results framework.
- Will the project cause increased local or regional unemployment?	No			
- Does the project include measures to avoid forced labour and/or child labour?	Yes	MoE through local extension officers will ensure that communities participate at their own free will. As a result of the community benefits of the AF project, community members have indicated their willingness to participate. This was established in the First and Second CPA Community Surveys. The CPA Management Committees will oversee the community participation at each intervention site.	Second CPA Community Survey to gather information at the six CPA sites ranked as most vulnerable based on the results of the First CPA Community Survey. Community participation was discussed, and CPA management Committees advised that communities are eager to participate in the implementation of the AF project.	No mitigation measures required. Interventions that include local community participation will be conducted in adherence with Cambodia's labour codes and gender equality targets.
- Does the project include measures to ensure a safe and healthy working environment for workers employed as part of the project?	Yes	Workers will not be employed as part of the project. Rather, community members will implement plant the trees and crops themselves, under the guidance of the CPA Management Committees, local agricultural extensions officers, MoE and UNEP. All activities will be conducted in adherence with Cambodia's labour codes and gender equality targets.		No mitigation measures required. Interventions that include local community participation will be conducted in adherence with Cambodia's labour codes and gender equality targets.
- Will the project cause impairment of recreational opportunities?	No			
- Will the project cause impairment of indigenous people's livelihoods or belief systems?	No	The AF project has followed a participatory approach from the outset. Activities are demand-driven based on the engagement with the communities through the First and Second CPA Community Surveys. Belief systems will not be impaired and livelihoods will be enhanced by improved security and diversification and securing of income	Second CPA Community Survey to gather information at the six CPA sites ranked as most vulnerable based on the results of the First CPA Community Survey.	No mitigation measures required.

		streams.		
- Will the project cause disproportionate impact to women or other disadvantaged or vulnerable groups?	No	The AF project will follow a gender sensitive approach which will afford equal opportunities and benefits to men and women.	Second CPA Community Survey to gather information at the six CPA sites ranked as most vulnerable based on the results of the First CPA Community Survey. Information was collected regarding numbers of female-headed households, and this information was used in the ranking of the vulnerability of potential CPA intervention sites.	No mitigation measures required. Gender disaggregated indicators have been included in the project results framework.
- Will the project involve and or be complicit in the alteration, damage or removal of any critical cultural heritage?	No	The AF project has followed a participatory approach from the outset. The community has been actively involved in the development of activities through information gathered in the First and Second CPA Community Surveys. This has ensured that cultural heritage will not be negatively impacted.	Second CPA Community Survey to gather information at the six CPA sites ranked as most vulnerable based on the results of the First CPA Community Survey.	No mitigation measures required.
- Does the project include measures to avoid corruption?	Yes	UNEP, as the MIE, will assume ultimate responsibility for the accountability for outputs and deliverables as part of the AF project development. This will ensure that there is no corruption at any stage of the AF Project.		No mitigation measures required.

Section D: Other considerations

	Yes/No/N.A.[267]	*Description of the issue:*	*At Project Concept stage: Outline of studies/assessments to be conducted prior to Full Project Proposal development to determine scope of impact, including responsibility and budget implications for mitigation.*	*At Full Project Proposal stage: Planned mitigation measures, incl. timing, budget and responsibility.*
- Does national regulation in affected country (-ies) require	No	MoE is the entity responsible for reviewing all EIAs, and having assessed		No mitigation measures required.

[267] The N.A. category should be reserved for projects, which do not have a specific location identified, e.g. global or regional projects with a predominantly normative scope. Careful consideration of the specific issue should be exercised to determine potential impact, both short- and long-term.

Environmental Impact Assessment and/or Social Impact Assessment for this type of activity?		the AF project, has concluded that an EIA is not required.		
- Is there national capacity to ensure a sound implementation of EIA and/or SIA requirements present in affected country (-ies)?	Yes	MoE is the entity responsible for reviewing all EIAs.		No mitigation measures required.
- Is the project addressing issues, which are already addressed by other alternative approaches and projects?	Yes	Degraded areas are being reforested in other areas in Cambodia, but not in PAs. Furthermore, these projects (see Part II.F of the Full Project Proposal) are not using the ecoagriculture approach. There is therefore no duplication of activities.		No mitigation measures required.
- Will the project components generate or contribute to cumulative or long-term environmental or social impacts?	Yes	The AF project will result in increased ecosystem services from restored forests, and improved social well-being by enhancing food security and diversifying and securing community income streams.	Second CPA Community Survey to gather information at the six CPA sites ranked as most vulnerable based on the results of the First CPA Community Survey. Aspects of long-term environmental and social benefits were discussed with communities.	No mitigation measures required.
- Is it possible to isolate the impact from this project to monitor E&S impact?	Yes	Output 2.4 is dedicated to “socio-economic and ecosystem monitoring of AF project impacts downstream of CPA intervention sites”. The M&E activities will relate benefits to specific AF project interventions.		No mitigation measures required.

ANNEX XI: METHODOLOGY FOR VULNERABILITY INDEX DEVELOPMENT.

Conceptual framework for the vulnerability index construction

The conceptual framework for the vulnerability analysis is based on the Intergovernmental Panel on Climate Change's definition of vulnerability: "*the degree, to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity; and its adaptive capacity*"[268]. Understanding vulnerability at a community level requires an integrative approach that looks at both the physical (external hazard/risk) and social dimensions (internal susceptibility/coping of different groups) of vulnerability. Consequently, vulnerability is best understood as an aggregation of three components, exposure; sensitivity; and adaptive capacity:

- *Exposure* - nature and degree to which a system is exposed to significant climatic variations.
- *Sensitivity* - responsiveness of a system to climatic influences (shaped by both socio-economic and environmental conditions).
- *Adaptive capacity* - ability of communities to cope, re-organise and minimise loss from climate change impacts at different levels. The key determinant of adaptive capacity is access to resources/capital (natural, financial, social, human and physical).

Selection of indicators

A household vulnerability index indicates the extent to which households at the project pilot sites are susceptible to sustaining damage from climate change. The selected indicators represent both the biophysical conditions of the farming regions and the socio-economic conditions of the farmers. Examples of indicators generally selected in the climate change vulnerability assessments literature[269], to reflect the three vulnerability components: exposure, sensitivity, and adaptive capacity (see Figure 11) are:

- Exposure: e.g. i) changes in temperature; ii) changes in rainfall patterns; iii) drought episodes; and iv) flooding events.
- Sensitivity: e.g. i) soil degradation level; ii) irrigation rate; iii) livelihood sources; iv) household size; and v) dependency ration.
- Adaptive capacity: e.g. i) climate change awareness[270]; ii) surplus production; iii) access to early warning systems (information); iv) access to credit (greater financial flexibility); and v) Response: change in agricultural practices.

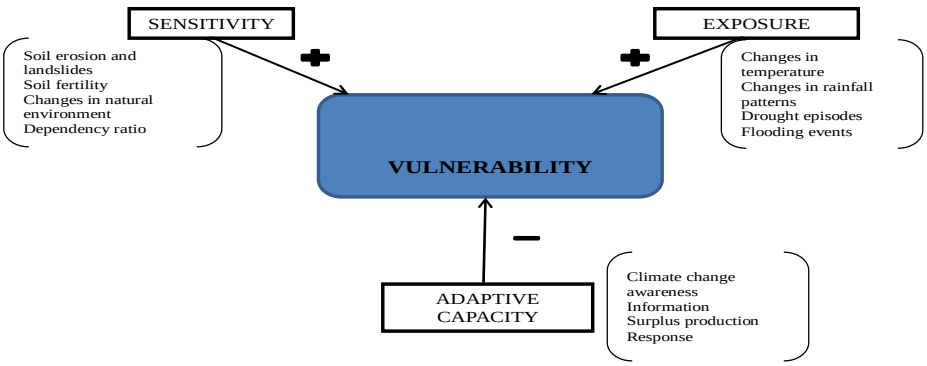


Figure 11: Vulnerability framework - components and indicators.

[268] IPCC, 2007. *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, Parry, M.L., Canziani, O.F., Palutikof, J.P., van der Linden, P.J., Hanson, C.E. (Eds.), Cambridge University Press: Cambridge, UK, 976 pp.

[269] For a detailed review on climate vulnerability assessment see: Gbetibouo, GA 2011, *Vulnerability and adaptation of farming to climate change in South Africa*, PhD thesis, University of Pretoria, Pretoria, viewed *at* http://upetd.up.ac.za/thesis/available/etd-10182011-151131/.

[270] See the following section for details on the calculation of the awareness index.

Calculation of the vulnerability index

The vulnerability index was calculated through the following equations:

- The vulnerability index was expressed as the product of sensitivity and exposure minus adaptive capacity.

  Vulnerability = (Exposure x Sensitivity) – Adaptive capacity

- The exposure index was expressed as the sum of the scores for indicators i – iv.

$$Exposure = \left(\sum_{i}^{iv} score\_indicator \right)$$

- The sensitivity index was expressed as the sum of six indicator scores (v – x).

$$Sensitivity = \left(\sum_{v}^{x} score\_indicator \right)$$

- The adaptive capacity index was expressed as the sum of four indicator scores (xi – xiv).

$$Adaptive\ capacity = \left(\sum_{xi}^{xiv} score\_indicator \right)$$

Calculation of the climate change awareness index

Climate change awareness is expressed as a composite index of three indicators: i) conceptual awareness; ii) experiential awareness; and iii) engagement.

Climate change awareness = *conceptual awareness (what is climate change)* + *experiential awareness (*have you personally felt the impacts of climate change?) + *engagement* (do you talk about climate change often?).

TERMS OF REFERENCE FOR CONSULTANTTO UNDERTAKE BASELINE VULNERABILITY STUDY

1. Scope of the consultancy

The main objective of the consultancy is to establish: i) an updated logical framework; and ii) baseline information for the project indicators, against which the project performance and impact will be measured. The consultant is expected to carry out baseline surveys in each of the pilot sites of the project.

The specific tasks of the consultant are:

- Assess and briefly describe the status of each of the indicators, and where appropriate, validate or further develop the indicators and targets for each outcome and output included in the project document according to the adaptation results the projects are aiming to generate. Indicators and targets should be SMART (Specific, Measurable, Achievable, Results-based, and Time-bound) and gender-senstive, and means of verification should be as easy as possible:
  - Familiarise with the project documents, including the project log-frame, budget, and detailed work plans.
  - Carry out a desktop review of national/sectoral strategies, plans and policy documents related to planning, poverty reduction, climate change, agriculture, land and water relevant to the determination of project indicators baseline (e.g. NBSAPs, national communications, NAPAs, NAPs, NIPs, TNAs, PRSPS, etc.).
  - Consider whether the current outcome/output targets are achievable and relevant, and if necessary, propose how they could be revised.
- Collect baseline data for the project indicators established. Baseline values should be established for the relevant project indicators on the basis of the data collected.
- Identify data gaps and agree in consultation with the project management team and LMS on a methodology to fill in the data gaps. The consultant should prepare complete baseline information.
- Undertake a climate-risks-via-perception based survey in the three project sites to assess the vulnerability of local communities:
  - Develop a sampling design and a data collection and management protocol.
  - Faciliate recruitment and training of field staff (interviewers) and pre-testing data collection tools in collaboration with the project team.
  - Co-ordinate collection of data and data entry into a suitable platform for cleaning and analysis.
  - Analyse and interpret the findings.

2. Duration of the contract

The contract is 30 days over the period.

3. Conduct of the work

The consultant is expected to spend:

- 3 days for preparing the field mission, and elaborating data gathering tools (e.g. surveys). It is recommended that part of this preparation time is spent in-country.
- 15 days work in Cambodia to carrying out the project tasks.
- 12 days for drafting and review process.

4. Expected deliverables

The following deliverables are expected:

- ***Inception report*** detailing the evaluation design, methodology, tools, and workplan schedule to carry out the assignment.
- ***First draft report*** which should contain at least the following information on:
  - Description of the baseline survey methodology and vulnerability assessment for local communities at the project sites.
  - Evaluation methodology and recommended indicators, targets and their baselines.

- Recommended methods that will be used to measure and track indicators during project implementation.
- Updated version of the logical framework with validated and proposed indicators, baselines, targets, sources of verification and risks assessments.
- Recommended strategies for monitoring project indicators during the project implementation.
- Annexes: mission report, documentation of interviews, surveys made, list of people involved / consulted, references etc.
- Data collection tools and data set (original and cleaned with codebook).

- ***Final report*** incorporating all the comments from the stakeholders.

5. **Terms of payment**

Payment will be trenched according to the following schedule and upon receipt of deliverables to a satisfactory standard:

- Payment 1: 20% upon submission of the inception report.
- Payment 2: 50% upon submission of the first draft report.
- Payment 3: 30% upon submission of the final report.

No additional costs will be claimed.

6. Competencies requirements

The selection of candidates will be based on the following criteria:

- Masters degree in environmental sciences or related area.
- A minimum of 5 years relevant work experience.
- Demonstrated knowledge of climate change adaptation and development with a focus on land management.
- Experience in working on climate change data and information systems/ climate early warning system.
- Demonstrated experience in project development, implementation and management.
- Demonstrated experience in: i) the development of project log-frames and SMART-based indicators; ii) the appraisal of projects on the basis of log-frame indicators and participatory rural appraisal methods; and iii) the development and implementation of surveys.
- Experience in vulnerability assessment particularly related to climate change.
- Demonstrated understanding of donor-funded national climate change programmes and projects.
- Strong interpersonal and communication skills (particularly with regards to good team leadership).
- Fluency in English with excellent writing skills is a requirement. In addition fluency in Sesotho and working experience in Lesotho is an advantage.
- Availability to conduct this assignment as soon as possible.

7. Proposal submission specifications:

Those interested in the consultancy must include in their application the following components:

- Understanding and interpretation of the ToR.
- Methodology to be used in undertaking the assignment.
- Time and activity schedule.
- Organisational and personal capacity statement.
- Relevant experience related to the assignment.
- Appropriate references.
- Curriculum vitae.

ANNEX XII: SUGGESTED TERMS OF REFERENCE.

Terms of Reference for Project Manager (PM)

Scope of Work

The PM will lead the project team and provide overall operational management for the successful execution and implementation of the project. The PM has the daily responsibility for management, coordination, and supervision of the implementation of the project and delivery of the results in accordance with the project document and agreed work plans. The PM will be responsible for financial management and disbursements, with accountability to the government, and UNEP. The PM will report to the Project Board (PM).

The responsibilities of the PM will include:

- Oversee and manage project implementation, monitor work progress, and ensure timely delivery of outputs.
- Report to the NCCC and PB regarding project progress.
- Develop and facilitate implementation of a comprehensive monitoring and reporting system.
- Ensure timely preparation of detailed annual work plans and budgets for approval by PB.
- Assist in the identification, selection and recruitment of staff, consultants and other experts as required.
- Supervise, coordinate and facilitate the work of the administrative/technical team (consisting of the assistant coordinator, finance/administration staff and national and international consultants).
- Control expenditures and assure adequate management of resources.
- Establish linkages and networks with on-going activities by other government and non-government agencies.
- Provide input to management and technical reports and other documents as described in the M&E plan for the overall project. Reports should contain assessments of progress in implementing activities, including reasons for delays, if any, and recommendations on necessary improvements.
- Inform the NCCC, without delay, of any issue or risk which might jeopardise the success of the project.
- Liaise and coordinate with UNEP on a regular basis.

Qualifications

- Master's degree in environment, natural resources management, agriculture or a closely related field.
- A minimum of 10 years relevant work experience.
- Demonstrated solid knowledge of environment and ecological restoration.
- Experience in the public participation development process associated with environment and sustainable development an asset.
- Experience in working and collaborating within governments an asset.
- Excellent knowledge of English including writing and communication skills.

Reporting

The PM will be a staff member of MoE and will report to the PB. The PM will work closely with the PB, CTA and UNEP to ensure the availability of information on progress and performance in the implementation of the project.

Terms of Reference for the Chief Technical Advisor (CTA)

Scope of Work

The CTA will develop the restoration and conservation agriculture protocols, as well as provide the PM with technical guidance on the implementation of the AF project. The position of CTA is likely to be filled by an international consultant, because the technical expertise required is currently unavailable within Cambodia.

Responsibilities

- Develop the technical restoration and conservation agriculture protocols.
- Provide quality assurance and technical review of project outputs.
- Undertake technical review of project outputs (e.g. studies and assessments).
- Assist in the drafting of TORs for technical consultancies.
- Supervise the work of consultants.
- Assist in monitoring the technical quality of project M&E systems (including AWPs, indicators and targets).
- Conduct the financial administrative reporting and the PIR.
- Provide advice on best suitable approaches and methodologies for achieving project targets and objectives.
- Provide a technical supervisory function to the work carried out by national technical advisors, and consultants hired by the project.
- Assist in knowledge management, communications and awareness-raising.
- Facilitate the development of strategic regional and international partnerships for the exchange of skills and information related to climate change adaptation.

Qualifications

- At least an advanced post-graduate at or above M.Sc. level in a relevant discipline, including climate change adaptation, botany/forestry/soil science, environmental management, natural resources management, agriculture, water resources or related discipline.
- A minimum of 5 years' experience in a senior technical lead position with planning and management of environmental and/or natural resources management programmes in developing countries.
- A minimum of 5 years in a senior technical position involved in institutional strengthening and capacity building.
- Previous similar experiences in provision of technical support to complex projects.
- Experience from Cambodia or South-east Asia region would be an advantage.
- Good communication and computer skills.
- Fluent in spoken and written English.

Reporting

The CTA will report to the chair of the PB. The CTA will cooperate with the chair of the NCCC and the PM to ensure the availability of information on progress and performance in the implementation of the project. In the implementation of his/her duties, the CTA will work in close collaboration with UNEP in consultation with which will take decisions for implementation and decision making of the project.

ANNEX XIII: ALIGNMENT OF PROJECT OBJECTIVES/OUTCOMES WITH ADAPTATION FUND RESULTS FRAMEWORK

Any project or programme funded through the AF must align with the Fund's results framework and directly contribute to the Fund's overall objective and outcomes that are outlined. Not every project/programme outcome will align directly with the Fund's framework but at least one outcome and output indicator from the Adaptation Fund's Strategic Results Framework must be included at the project design stage.

Project Objective(s)[271]	**Project Objective Indicator(s)**	**Fund Outcome**	**Fund Outcome Indicator**
Enhance the climate change resilience of communities living around at least three CPA intervention sites, as well as downstream communities, to the climate change-induced hazard of erratic rainfall.	Area of degraded forest (ha) restored through extensive interventions. Area of agricultural fields (ha) intensified through conservation agriculture interventions.	Outcome 5: Increased ecosystem resilience in response to climate change and variability-induced stress.	Indicator 5: Ecosystem services and natural assets maintained or improved under climate change and variability-induced stress.
Project Outcome(s)	**Project Outcome Indicator(s)**	**Fund Output**	**Fund Output Indicator**
Outcome 1: Technical expertise and a local enabling framework for forest restoration and conservation agriculture interventions that build climate resilience developed at CPA intervention sites through a consultative and participatory process.	Number of baseline vulnerability assessments conducted. Number of PhD and MSc projects resulting for the AF project.	Output 1.1: Risk and vulnerability assessments conducted and updated at national level	Indicator 1.1.1.1: No. of projects that conduct and update risk and vulnerability assessments (by project types)
Outcome 2 Multi-use forests established and maintained and agricultural practices diversified/intensified to supply a diverse range of food and stabilize topsoil, despite an increase in climate change-induced droughts and floods.	Number of people trained (gender disaggregated). Area of degraded forest restored (ha). Area of rice paddies (ha) bordered with multi-use trees. Area of intensified/ diversified homegardens (ha). Area of drought-tolerant rice varieties planted (ha). Number of additional	Output 5: Vulnerable physical, natural and social assets strengthened in response to climate change impacts, including variability.	Indicator 5.1: No. and type of natural resource assets created, maintained or improved to withstand conditions resulting from climate variability and change (by type of assets).

[271] The AF utilizes OECD/DAC terminology for its results framework. Project proponents may use different terminology but the overall principle should still apply.

	activities to complement intensive conservation agriculture interventions.		
Outcome 3: Restoration and conservation agriculture interventions to build climate resilience of local communities mainstreamed into Cambodia's adaptation framework and related sector policies.	Number of 'events' to raise awareness at a national level (including documentary films, campaigns, workshops, initiatives, network portals). Number of proposed revision of policies, strategies and legislation. Number of upscaling strategies developed.	Output 7: Improved integration of climate-resilience strategies into country development plans.	Indicator 7.1: No., type, and sector of policies introduced or adjusted to address climate change risks.

ANNEX XIV: BUDGET

Project title: Enhancing climate change resilience of rural communities living in protected areas of Cambodia.															
Project number:															
Project executing partner: MoE															
Project implementation period			Expenditure by project component/activity (provide description)						Expenditure by calendar year						
From:	2012														
To:	2017														
UNEP Budget Line			1	2	3	PM	M&E	Total	Year 1*	Year 2*	Year 3*	Year 4	Year 5	Total	Notes
10	**PERSONNEL COMPONENT**														
	1100	Project personnel													
	1101	Project coordinator				80000		80000	16000	16000	16000	16000	16000	80000	1
	1102	National financial manager				60000		60000	12000	12000	12000	12000	12000	60000	2
	1199	**Sub-total**	**-**	**-**	**-**	**140000**	**-**	**140000**	**28000**	**28000**	**28000**	**28000**	**28000**	**140000**	
	1200	Consultants													
	1201	National institutional expert	10000					10000	10000	-	-	-	-	10000	3
	1202	National research group	10000					10000	5000	5000	-	-	-	10000	4
	1203	International botanist (adaptation expert)	10000					10000	10000	-	-	-	-	10000	5
	1204	International bio-physical, ecological and socio-economic expert	40000					40000	40000	-	-	-	-	40000	6
	1205	National agricultural expert (climate forecasts)	10000					10000	10000	-	-	-	-	10000	7
	1206	National agricultural expert (adaptation)	10000					10000	10000	-	-	-	-	10000	8
	1207	National rice expert	10000					10000	10000	-	-	-	-	10000	9
	1208	National hydrological/engineering expert	10000					10000	10000	-	-	-	-	10000	10
	1209	National academics	40000					40000	-	10000	10000	10000	10000	40000	11
	1210	National finance/insurance expert	10000					10000	10000	-	-	-	-	10000	12
	1211	National finance/insurance expert (product development)	10000					10000	10000	-	-	-	-	10000	13
	1212	National business consultant	10000					10000	10000	-	-	-	-	10000	14
	1213	Naitional agricultural expert (market assessment)	10000					10000	10000	-	-	-	-	10000	15
	1214	National agricultural expert	10000					10000	10000	-	-	-	-	10000	16
	1215	National socio-economic expert	10000					10000	10000	-	-	-	-	10000	17
	1216	International adaptation expert (CTA)	150000					150000	30000	30000	30000	30000	30000	150000	18
	1217	National adaptation expert (training course)		40000				40000	40000	-	-	-	-	40000	19
	1218	International law enforcement expert		45000				45000	5000	25000	5000	5000	5000	45000	20
	1219	National forestry/agricultural expert (community liaison planting officers)		122500				122500	-	40000	30000	30000	22500	122500	21
	1220	National finance/insurance expert		5000				5000	-	5000	-	-	-	5000	22
	1221	National livelihoods expert (business plans)		15000				15000	-	10000	5000	-	-	15000	23
	1222	National livelihoods expert (market access)		30000				30000	-	20000	10000	-	-	30000	24
	1223	National livelihoods expert (business establishment)		20000				20000	-	10000	5000	5000	-	20000	25
	1224	National adaptation expert (communities)		2000				2000	-	2000	-	-	-	2000	26
	1225	National adaptation expert (monitoring)		8000				8000	-	8000	-	-	-	8000	27
	1226	National adaptation expert (implementation)		10000				10000	-	10000	-	-	-	10000	28
	1227	National adaptation expert (data collection)		16000				16000	-	4000	4000	4000	4000	16000	29
	1228	National socio-economic/ecological/hydrological expert		16000				16000	-	8000	8000	-	-	16000	30
	1229	International adaptation researcher (long-term research)		35000				35000	-	20000	5000	5000	5000	35000	31
	1230	International adaptation researcher (report)		30000				30000	-	-	30000	-	-	30000	32

	1231	National campaign expert (public awareness)			8000			8000	4000	2000	2000	-	-	8000	33
	1232	International short-film producer			16000			16000	-	10000	6000	-	-	16000	34
	1233	National campaign expert (local communities)			16000			16000	5000	5000	2000	2000	2000	16000	35
	1234	National education expert			10000			10000	-	10000	-	-	-	10000	36
	1235	National web-based data expert			13000			13000	5000	2000	2000	2000	2000	13000	37
	1236	National social networking expert			8000			8000	2000	1500	1500	1500	1500	8000	38
	1237	National REDD+ expert			10000			10000	5000	3000	2000	-	-	10000	39
	1238	National adaptation expert (capacity building)			10000			10000	10000	-	-	-	-	10000	40
	1239	National adaptation expert (PRAs)			20000			20000	-	20000	-	-	-	20000	41
	1240	National policy expert (revisions)			20000			20000	-	15000	5000	-	-	20000	42
	1241	National adaptation expert (PM coordination)			10000			10000	2000	2000	2000	2000	2000	10000	43
	1242	National policy/Protected Area expert (land tenure)			10000			10000	10000	-	-	-	-	10000	44
	1243	National policy expert			8000			8000	-	8000	-	-	-	8000	45
	1244	National policy expert			4000			4000	-	4000	-	-	-	4000	46
	1245	Task force			4000			4000	-	4000	-	-	-	4000	47
	1246	National adaptation expert (private sector)			8000			8000	-	4000	4000	-	-	8000	48
	1247	National adaptation expert (funding)			4000			4000	-	-	4000	-	-	4000	49
	1248	National adaptation expert (upscaling)			4000			4000	-	-	-	4000	-	4000	50
	1249	National policy expert (report)			14000			14000	-	-	-	4000	10000	14000	51
	1299	**Sub-total**	**360 000**	**394 500**	**197 000**	**-**	**-**	**951500**	**283000**	**297500**	**172500**	**104500**	**94000**	**951500**	
	1300	Administrative Support													
	1301	Administrative support				45000		45000	9000	9000	9000	9000	9000	45000	52
	1399	**Sub-total**	**-**	**-**	**-**	**45000**	**-**	**45000**	**9000**	**9000**	**9000**	**9000**	**9000**	**45000**	
	1600	Travel on official business												-	
	1601	Travel				71150		71150	16100	14850	13400	13400	13400	71150	53
	1699	**Sub-total**	**-**	**-**	**-**	**71150**	**-**	**71150**	**16100**	**14850**	**13400**	**13400**	**13400**	**71150**	
##	**Component total**		**360000**	**394500**	**197000**	**256150**	**-**	**1207650**	**336100**	**349350**	**222900**	**154900**	**144400**	**1207650**	
														-	
30	**TRAINING COMPONENT**													-	
	3200	Group training												-	
	3201	Group training (local authorities, extension officers, CPA Management Committee)		124773				124773	23773	51000	20000	20000	10000	124773	54
	3202	Group training (local communities)		110000				110000	30000	30000	20000	20000	10000	110000	55
	3203	Group training and capacity building for alternative livelihoods (e.g. ecotourism, NTFPs)		150000				150000	40000	30000	30000	30000	20000	150000	56
	3204	Group training (baseline surveys)		45000				45000	-	30000	15000	-	-	45000	57
	3205	Group training (demonstration gardens)			60000			60000	-	20000	20000	10000	10000	60000	58
	3206	Group training (local communities)			60000			60000	-	20000	20000	10000	10000	60000	59
	3207	Group training ('train the trainers')			70000			80000	-	30000	20000	10000	10000	70000	60
	3299	**Sub-total**	**-**	**429773**	**190000**	**-**	**-**	**619773**	**93773**	**211000**	**145000**	**100000**	**70000**	**619773**	
	3300	Meetings/Conferences												-	
	3301	Inception and steering meetings					20000	20000	4000	4000	4000	4000	4000	20000	61
	3399	**Sub-total**	**-**	**-**	**-**	**-**	**20000**	**20000**	**4000**	**4000**	**4000**	**4000**	**4000**	**20000**	
##	**Component total**		**-**	**429773**	**190000**	**-**	**20000**	**639773**	**97773**	**215000**	**149000**	**104000**	**74000**	**639773**	
														-	

40	**EQUIPMENT AND PREMISES COMPONENT**													-	
	4100	Expendable equipment												-	
	4101	Forestry inputs (nursery establishment)		62564				62564	22564	10000	10000	10000	10000	62564	62
	4102	Forestry inputs (forest restoration)		1573125				1573125	-	800000	500000	273125	-	1573125	63
	4103	Agricultural inputs (multi-use trees around rice paddies)		244602				244602	-	120000	70000	54602	-	244602	64
	4104	Agricultural inputs (intensify/diversify homegardens)		201561				201561	-	126561	25000	25000	25000	201561	65
	4105	Agricultural inputs (drought-tolerant rice seed)		29400				29400	-	29400	-	-	-	29400	66
	4106	Agricultural inputs (additional suite of interventions)		407475				407475	-	232745	149730	12500	12500	407475	67
		Purchase project vehicle		30000				30000	30000	-	-	-	-	30000	68
		Maintain project vehicle		50000				50000	10000	10000	10000	10000	10000	50000	69
	4199	**Sub-total**	**-**	**2598727**	**-**	**-**	**-**	**2598727**	**62564**	**1328706**	**764730**	**385227**	**57500**	**2598727**	
##	**Component total**		**-**					**2598727**	**62564**	**1328706**	**764730**	**385227**	**57500**	**2598727**	
														-	
50	**MISCELLANEOUS COMPONENT**													-	
	5500	Evaluation												-	
	5501	Baseline					40000	40000	40000	-	-	-	-	40000	70
	5502	Evaluations					60000	60000	-	-	30000	-	30000	60000	71
	5503	Audit					20000	20000	4000	4000	4000	4000	4000	20000	72
	5599	**Sub-total**	**-**	**-**	**-**	**-**	**120000**	**120000**	**44000**	**4000**	**34000**	**4000**	**34000**	**120000**	
##	**Component total**		**-**	**-**	**-**	**-**	**120000**	**120000**	**44000**	**4000**	**34000**	**4000**	**34000**	**120000**	
99	**TOTAL**		**360000**	**3423000**	**387000**	**256150**	**140000**	**4566150**	**540437**	**1897056**	**1170630**	**648127**	**309900**	**4566150**	
												MIE		**388123**	
												GRANDTOTAL		**4954274**	

Budget notes

Note: '*' denotes a national consultant to be contracted at a daily rate of US$ 90. '+' denotes an international consultant to be contracted at a daily rate of US$ 500.

1		Project coordinator contract.
2		Contract for financial and administrative assistant to the project in charge of procurement and financial accounts.
3	*	Consultancy contract to undertake desktop gap analysis and institutional mapping exercise under Output 1.1 to identify shortfalls in knowledge, planning and implementation of the ecoagriculture approach.
4	*	Consultancy contract for research group to co-ordinate targeted research to fill knowledge gaps under Output 1.1. Meeting space and participant costs to be covered by in-kind contributions from participating organizations.
5	+	Consultancy contract for botanist to select multi-use trees to be used for forest restoration interventions under Output 2.2.
6	+	Consultancy contract for on-the-ground vulnerability and baseline studies under Output 1.1.
7	*	Consultancy contract for agricultural expert to provide planting schedules for crops based on climate forecasts under Output 1.1.
8	*	Consultancy contract for agricultural expert to select crops to be used conservation agriculture interventions in Output 2.2.
9	*	Consultancy contract for rice expert to research rice varieties to be trialled in Output 2.2.
10	*	Consultancy contract for hydrological/engineering expert to inform technical protocols with regard to positive changes to water flow from CPA catchments.
11	*	Funding for 5 Msc and 2 PhD students to contribute to research on ecoagriculture approach.
12	*	Consultancy contract to identify suitability of locally available micro-finance and weather index-based insurance products, further developed under Output 2.3
13	*	Consultancy contract to determine the commercial viability of introducing micro-finance and weather index-based insurance products at the local scale.
14	*	Consultancy contract to write business plans for micro-finance and insurance products under Output 1.2.
15	*	Consultancy contract for agriculture expert to undertake local CPA market assessment of forest/crop products to link with activities under Output 2.3.
16	*	Consultancy contract for agriculture expert to undertake cost-benefit analysis of trees/crops to be planted in Output 2.2.
17	*	Consultancy contract to quantify the socio-economic costs and benefits of each adaptation intervention (per CPA intervention site).
18	+	Consultancy contract for international expert to fulfil role as Chief Technical Advisor of the project, including the development of technical restoration and conservation agriculture protocols based on the results of Outputs 1.1 and 1.2.
19	*	Consultancy contract for adaptation expert to develop training course and adaptation toolkit for local farmers (to be delivered under Output 2.1).
20	+	Consultancy contract for law enforcement expert to develop systems to strengthen patrolling of CPA intervention sites.
21	*	Consultancy contracts for 3 community liaison planting officers (1 in Chop Tasok CPA, 1 in Ronouk Khgeng CPA, and 1 in Chiork Beungprey, Chom Thlork and Skor Mreach CPAs) to oversee on-the-ground activities under Output 2.2.
22	*	Consultancy contract for finance/insurance expert to facilitate local farmers access to micro-finance and weather index-based insurance products identified in Output 1.2.
23	*	Consultancy contract for livelihoods expert to develop business plans for alternative livelihoods identified in Output 1.1.
24	*	Consultancy contract for livelihoods expert to facilitate the integration of small-scale farmers into markets to sell forest/crop products available through Output 2.2.
25	*	Consultancy contract for livelihoods expert to establish sustainable alternative livelihoods based on the plans developed in Output 1.1.
26	*	Consultancy contract to identify communities for the monitoring of downstream impacts.
27	*	Consultancy contract for development of socio-economic and ecological monitoring protocols for implementation in Output 2.4.
28	*	Consultancy contract for adaptation expert to oversee collection of baseline data from target communities identified in Output 2.4 (data collected by communities).

29	*	Consultancy contract to develop and implement a tool to measure downstream impacts of AF project.
30	*	Consultancy contract for an expert to undertake an analysis to quantify the benefits of specific adaptation interventions in target (and downstream) communities.
31	+	Consultancy contract for adaptation researcher to develop and implement long-term socio-economic and ecosystem research protocols (both inside and downstream of CPA intervention sites). These research protocols will extend beyond the lifespan of the AF project, i.e. are different to the monitoring protocols developed in Output 2.4 above.
32	+	Consultancy contract for adaptation researcher to write a report on the initial findings mid-way through the AF project, and motivate for funding to continue the research beyond the life span of the AF project.
33	*	Consultancy contract for campaign expert to design a campaign to raise public awareness of the ecoagriculture approach and the benefits of the interventions under Output 2.2.
34	+	Contract for short-film producer to develop a short film promoting the ecoagriculture approach.
35	*	Consultancy contract for campaign expert to design and implement an awareness raising campaign in rural, isolated communities (i.e. not where AF project interventions are taking place).
36	*	Consultancy contract for education expert to co-ordinate ecoagriculture education initiatives at schools and universities. Material for initiatives to be refined from training course developed in Output 2.1 and 3.1.
37	*	Consultancy contract for expert to develop and maintain a web-based data network portal to supply information about the AF project ecoagriculture interventions to relevant stakeholders.
38	*	Consultancy contract for social media expert to promote the AF project via social networking avenues.
39	*	Consultancy contract for REDD+ expert to develop feasibility assessment (and Project Idea Note if applicable) to promote ecoagriculture activities and species used in the AF project in other REDD+ projects in Cambodia, as well as determine the feasibility of using REDD+ to upscale the AF project interventions. The expert will facilitate communication between the AF PM and national REDD+ PMs.
40	*	Consultancy contract for adaptation expert to undertake capacity building needs assessment to gauge level of understanding of ecoagriculture approach of stakeholders. A training course will be developed based on the results.
41	*	Consultancy contract for adaptation expert to conduct Participatory Rural Appraisals of local communities at all CPAs in Cambodia (at time of submission of this proposal). MoE to provide staff support.
42	*	Consultancy contract for policy expert to propose revisions to relevant policies, strategies and legislation to incorporate and promote the upscaling of the ecoagriculture approach.
43	*	Consultancy contract for adaptation expert to assist the PM of the AF project in collaboration with other related projects, and to develop the upscaling strategy.
44	*	Consultancy contract for expert to compile a report on how to encourage local communities to invest in the ecoagriculture approach, with a specific focus on land tenure. Consultations will be undertaken through the PRAs in Outcome 3.2.
45	*	Consultancy contract for policy expert to undertake gap analysis of national development plans and policies.
46	*	Consultancy contract for policy expert to identify entry points for ecoagriculture approach, based on analysis undertaken above in Output 3.3.
47	*	Consultancy contract for task force to co-ordinate the development of the upscaling strategy. Meeting space and participant costs to be covered by in-kind contributions from participating organizations.
48	*	Consultancy contract for adaptation expert to engage with the private sector to promote the upscaling of ecoagriculture interventions in other CPAs in Cambodia.
49	*	Consultancy contract for adaptation expert to investigate other sources of funding to upscale the ecoagriculture approach to other CPAs in Cambodia.
50	*	Consultancy contract for adaptation expert to review success of individual AF interventions, and ensure that the appropriate interventions are incorporated into the upscaling strategy and suggested policy revisions.
51	*	Consultancy contract for policy expert to prepare a summary report and policy briefs based on the findings of Outcomes 3.2 and 3.3.
52		Salary costs for an administrative, secretarial and clerical functions for the AF project.

53		Travel for project management purposes to five CPA intervention sites, calculated on the basis of 2 annual missions of 3 people (Project Coordinator, CTA, MoE representative). Also included are CTA travel and DSA costs for three mission in Year 1-2 and 2 missions in Year 3-5.
54		Costs of training local authorities, agricultural extension officers and CPA Management Committees to train local communities of ecoagriculture interventions. Includes costs for three workshops (one in each PA).
55		Costs of overseeing the training of local communities on the ecoagriculture approach. Costs include trainer costs (to oversee local authorities, extension officers and CPA Management Committees) and DSA. Material costs, space and MoE staff to come from in-kind contributions of communities and MoE.
56		Costs of training local communities in ecotourism ventures. Costs include trainer and DSA. Material costs, space and MoE staff to come from in-kind contributions of communities and MoE.
57		Costs of training local communities to undertake baseline surveys. Costs include trainer and DSA. Material costs, space and MoE staff to come from in-kind contributions of communities and MoE.
58		Costs of demonstration gardens, farmer field days and workshops at CPA intervention sites. Costs include trainer and DSA. Material costs, space and MoE staff to come from in-kind contributions of community and MoE.
59		Costs of training local communities to undertake baseline surveys. Costs include trainer and DSA. Material costs, space and MoE staff to come from in-kind contributions of communities and MoE.
60		Costs of training professional (teachers/lecturers) to present information about the ecoagriculture approach. Costs include trainer for 1 workshop. Space and MoE staff to come from in-kind contributions from MoE.
61		Travel costs for the organization of the inception meeting and regular meetings of the PB. Meetings are expected to be held in Phnom Penh at MoE offices. Costs include expendables.
62		Costs of establishing and maintaining 5 nurseries (1 in each CPA intervention site). Seed and sapling costs are included in forest restoration/conservation agriculture costs i.e. excluded here.
63		Costs of restoring 1,875 ha of degraded CPA forest at 5 CPA intervention sites, at US$ 839 / ha over a 3-year period. The latter figure is an estimated based on a review of available literature, summarised in Part II.C, Table 5. US$ 800,000 has been allocated for establishment of restored forests in Year 2 at a cost of US$ 427 / ha which includes cost of tree seedlings, land preparation equipment (for clearance of undergrowth, digging holes, pruning etc.), application of agrochemicals where necessary, and an allowance for labour. US$ 500,000 has been allocated for maintenance of reforested areas in Year 3 at a cost of US$ 267 / ha, which includes additional tree seedlings for enrichment planting, equipment and labour for pruning, thinning and control of undergrowth. US$ 273,125 has been allocated for maintenance of reforested areas in Year 4 at a cost of US$ 146 / ha, which includes equipment and labour for pruning, thinning and control of undergrowth as well as harvesting. The estimated costs of forest restoration and maintenance are detailed in Annex IV.
64		Costs of planting the borders of 2,286 ha of existing rice paddies with multi-use trees at 5 CPA interventions sites, at US$ 107 / ha over a 3-year period. The latter figure is an estimated based on a review of available literature, summarised in Part II.C, Table 5. US$ 120,000 has been allocated for establishment of multi-use trees in Year 1 at a cost of US$ 52 / ha which includes cost of tree seedlings, plant and land preparation equipment, labour and application of agrochemicals where necessary. US$ 70,000 has been allocated for maintenance of multi-use trees in Year 2 at a cost of US$ 31 / ha, which includes additional tree seedlings for enrichment planting, equipment and labour for pruning, thinning and control of undergrowth. US$ 54,602 has been allocated for maintenance of reforested areas in Year 3 at a cost of US$ 24 / ha, which includes equipment and labour for pruning, thinning and control of undergrowth as well as harvesting (Annex IV).
65		Costs of intensifying/diversifying 337 ha of existing homegardens at 5 CPA intervention sites, at US$ 153 / ha. Includes costs of improved irrigation systems for 1,907 families at US$ 79 per irrigation system per family. Estimated costs and benefits of homegarden establishment are detailed in Annex VI.
66		Costs of planting 300ha of rice paddies at 5 CPA interventions sites with drought-tolerant rice seed, at US$ 98 / ha.
67		Costs of implementing suite of additional adaptation measures at 5 CPA intervention sites, to complement conservation agriculture interventions.
68		Costs of maintaining an offroad vehicle for the use of project participants.
69		Cost of purchase of an offroad vehicle for the use of project participants.
70		Consultancy cost for the establishment of a baseline study for scientific quantification of project baseline and indicators (see Annex IX).

71		Consultancy costs for performance of mid-term and final evaluations. Includes 1 national and 1 international consultant as well as travel costs.
72		Consultancy costs for audit of annual financial audit and statements. Estimated annual cost of US$ 3000.

Schedule of Disbursements

	Upon Agreement signature US$	One Year after Project Start US$	Year 2 US$	Year 3 US$	Year 4 US$	Total USD
Scheduled Date (Tentative)	October 2012	January 2014 (note 1)	January 2015	January 2016	January 2017	
Project Funds (note 2)	1 020 489	1 824 075	1 008 254	510 280	203 053	4 566 150
Implementing Entity Fee	86 742	155 046	85 702	43 374	17 259	388 123

Notes:

1 It is assumed that the Project Cooperation Agreement with the Executing Agency will be signed within one month of signing of the Project Agreement (which is expected to be signed two months after Board approval July 2012). The dates have been restricted because the first two project agreements have been signed and the assumption is that the following projects will be done faster. As a result it is expected that within 6 months of Board approval the inception meeting should take place hence January 2013 with one year therefore starting in January 2014.. Funds will therefore be expected to be received on the scheduled dates listed above.

2 Project funds expected after signing of the Project Agreement and subsequent years: Full annual budget plus first quarter of subsequent year.

Note on the use of the Implementing Entity Project Fee

Cambodia - Adaptation Fund MIE fee budget		
	Project	**MIE fee (8.5%)**
Project Costs	**4 566 150**	
Overall coordination and management		79 565
Oversight and management of project development and project implementation		100 136
Financial management, including accounting, treasury, grant and trust fund management		60 547
Information and communication management		21 347
Quality assurance including internal and external audits (Note 1)		38 812
Overall administration and support costs		87 716
Total indirect costs (Note 2)		**388 123**
Note 1: This portion of the MIE fees is used to oversee the M&E function of the project by the IE		
Note 2: Direct costs will be recovered from the project		

ANNEX XV: LETTER OF ENDORSEMENT.

KINGDOM OF CAMBODIA
NATION-RELIGION-KING

COUNCIL OF MINISTERS
Ministry of Environment

Phnom Penh, April 17, 2012

No: 151/c MoE

URGENT **Letter of Endorsement by Government**

To: **The Adaptation Fund Board**
c/o Adaptation Fund Board Secretariat
Email: SecretariataAdaptation-Fund.org
Fax: 202 522 3240/5

Subject: Endorsement for the project "Enhancing Climate Resilience of Rural Communities Living in Protected Areas of Cambodia"

In my capacity as designated authority for the Adaptation Fund in Cambodia, I confirm that the above national project proposal is in accordance with the Royal Government of Cambodia national priorities in implementing adaptation activities to reduce adverse impacts of, and risks, posed by climate change in Cambodia.

Accordingly, I am pleased to endorse the above project proposal with support from the Adaptation Fund. If approved, the project will be implemented by the United Nations Environment Programme (UNEP) and executed by the Ministry of Environment (MoE), Royal Government of Cambodia.

Sincerely Yours,

Tin Ponlok,
Deputy Director General,
Ministry of Environment
DA for the Adaptation Fund in Cambodia

Seen and approved
Senior Minister, Minister of Environment

H.E. Dr. Mok Mareth

No. 48, Samdech Preah Sihanouk, Tonle Bassac, Chamkarmon, Phnom Penh, CAMBODIA, Phone / Fax : 885-23 21 25 40