

Vietnam Low Carbon Rice Project

Proposal to AusAID

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31 July 2012

1. Executive Summary

The Vietnam Low-Carbon Rice Project (VLCRP) aims to help address two urgent global priorities: (1) reducing worldwide emissions of greenhouse gases (GHGs) far below their business-as-usual trajectory in order to avoid dangerous climate change, and (2) enabling poor and near-poor rice farmer populations in developing countries to improve their standards of living. Cultivation of rice – the world’s most-widely consumed food – releases significant amounts of greenhouse gases (GHG) into the atmosphere, thus contributing to climate change. Fortunately, there are techniques for reducing GHG emissions from rice cultivation, many of which can also directly benefit the small-holder rice farmers who are the primary producers of rice in Vietnam and around the world. Environmental Defense Fund (EDF) and our Vietnamese partners in government, academia and community organizations have initiated VLCRP to help address these priorities.

VLCRP seeks to significantly reduce GHG emissions from rice cultivation in a way that:

- decreases production costs and enhances yield, thus improving farm profitability
- provides supplemental farmer income
- provides additional short- and long-term co-benefits to the environment, including improving resilience to climate change

To achieve these goals, we will work with small-holder rice farmers in An Giang and Kien Giang provinces of the Mekong Delta to change the way they cultivate their rice crops by applying the “1 Must + 6 Reductions”¹ farming technique. By reducing seed density, water, fertilizer and pesticide/herbicide, farmers will lower both input costs and the release of two separate GHGs (methane and nitrous oxide). The decreased cost of farm inputs should improve farm profitability. And by rigorously quantifying GHG emission reductions, VLCRP will generate “carbon credits” that can then be sold to offset GHG emissions elsewhere, generating funds that are returned to participating farmers, thereby increasing their incomes.

VLCRP is a novel project for Vietnam that will improve the livelihoods of rice farmers and build community capacity. This pilot is intended to be fully replicable and designed for scaling up to improve rice production and develop emission factors for different production systems across different agro-economic zones. EDF requests AusAID grant support of AU\$1.28 million for the Vietnam Low Carbon Rice Project.

¹ “1 Must + 6 Reductions” is a farming technique where farmers use certified quality seed while reducing seed density, fertilizer, water, pesticide/herbicide, post-harvest loss and GHG emissions.

2. Situation Analysis

Worldwide, rice cultivation accounts for about the same fraction of human-caused GHG emissions as does the nation of Australia.² Vietnam is the second largest rice exporter in the world, providing around 16% of the world's milled rice exports,³ and approximately 31% of the country's overall GHG emissions result from rice cultivation.⁴ Most rice cultivation occurs in the Mekong Delta whose 3.9 million hectares (ha) account for 12% of Vietnam's total land area; about 1.8 million ha of delta land are devoted to rice production. Since 2005, the delta has annually produced about 20 million tons of paddy rice, which accounts for 53% of total rice production and 90% of the rice exported by Vietnam.⁵ The Vietnamese government's National Strategic Vision to 2030 for rice production and food security recognizes the Mekong Delta as crucial to food security, both for Vietnam and the world. However, rice production in the region faces growing threats from climate change, including drought, submergence due to sea-level rise and an accompanying increase in salinity. Until recently, Vietnam's chief focus for agriculture as related to climate change centered on adaptation. But in mid-2011, the Ministry of Agriculture & Rural Development (MARD) announced that Vietnam would seek to reduce GHG emissions from agricultural production by 20% by the year 2020. (Overall, 51% of Vietnam's GHG emissions are from agriculture.)⁶

In 2010, VLCRP was launched to evaluate and begin implementing mitigation opportunities for Vietnam's rice sector, building upon the experience of low-carbon farming projects undertaken by EDF and its partners in China, India and the United States. The project is the first in Vietnam to use international-standard methods to measure GHG emissions from rice cultivation in typical conditions in farmers' fields. In addition to EDF, initial partners in the VLCRP included Can Tho University's Mekong Delta Development Research Institute (MDI), the An Giang Department of Agriculture & Rural Development (AG DARD), and the Advanced Lab of Can Tho University (CTU) and Water Resources University (WRU). EDF provided technical assistance and initial funding for the project's start up phase. In November 2010, the project was implemented in 100 hectares in An Giang province for the winter-spring crop. For the summer-fall crop in 2011, the project was extended to 250 hectares in An Giang and 140 hectares in Kien Giang province (at which time the Kien Giang Department of Agriculture & Rural Development joined the initiative).⁷

Preliminary results have been encouraging. To date, VLCRP has successfully recruited institutional partners and 300 farmer households. The project has developed methods and materials for training participating farmers and scientists to collect and analyze relevant data. Research in the literature is also promising, reporting that alternative wetting-drying water management can yield GHG reductions by an estimated 30 % compared to traditional wet-irrigation practices where fields remain continuously flooded for the growing season.⁸ The establishment of institutional/farmer participation and

² Rice cultivation contributes about 1.5% GHG of global emissions – the same portion as Australia.

http://pdf.wri.org/working_papers/world_greenhouse_gas_emissions_2005.pdf (rice); http://pdf.wri.org/navigating_numbers_chapter2.pdf (Australia).

³ FAO, 2008. Global Statistics Services – Food Security Indicators. (calculated from FAOSTAT 1961-2008).

⁴ VINC, 2003. Vietnam Initial National Communication under the United Nations Framework Convention on Climate Change.

⁵ GSO, 2009 (Tong Cuc Thong Ke). So lieu thong ke, dien tich va san luong co hat. <http://www.gso.gov.vn/>

⁶ MARD, 2020. Giảm 20% lượng khí phát thải từ nông nghiệp. www.greenbiz.vn/tin-tuc/844/2020-giam-20-luong-khi-phat-thai-tu-nong-nghiep.html

⁷ These provinces were chosen because they have: (a) a high potential of rice production, with the highest rice yield in the Mekong Delta; (b) a very high density of small-scale rice farmers, from 1 -2 hectare per farm household; (c) excellent production per hectare; (d) availability of leading national academic institutions; (e) strong engagement and buy in from the local provincial board; and (f) a single ecological zone, which allows for scientifically credible results.

⁸ X. Yan et al., "Global Estimations of the Inventory and Mitigation Potential of Methane Emissions from Rice Cultivation Conducted Using the 2006 IPCC Guidelines," 2009, *Global Biogeochemical Cycles*, 23, GB2002, doi:10.1029/2008GB003299.

methodologies, as well as promising data trends, form a solid foundation for the project to be funded through this grant.

AusAID funding will support a 2.5 year pilot project building on VLCRP's successful 2010-12 start-up phase. (See details in Section 3.3 Project Strategy, ii.) Two EDF senior scientists who have substantial experience working on EDF's other international low-carbon farming project have been working closely with VLCRP partners to ensure the international standard on GHG emissions measurement, data processing and all protocols are in place. Despite variations in local economies, conditions and cultures in other parts of Vietnam, this pilot will create a transferable model with a set of draft protocols that can be used to improve small-farmer rice production while developing emission factors for different production systems across different agro-economic zones. While adoption of standards for a compliance market is beyond the scope of this pilot project, the draft protocol and third-party standards can provide a useful starting point as governments adopt standards for credits used for compliance purposes.

VLCRP generates distinct **development, environmental and climate co-benefits**. First, changes in rice cultivation practices not only reduce the input costs of materials and labor, but will improve crop yield, and thereby farm profitability. New practices should reduce water use and improve water use efficiency, thus reducing crop susceptibility to anticipated upstream changes in hydrology driven by both engineering and climate change. In addition, precision-fertilizer techniques may reduce nitrogen runoff into the Mekong Delta.⁹

Anticipated climate benefits result from changing paddy-rice cultivation practices to manage releases of two separate gases: methane and nitrous oxide. Both methane and nitrous oxide are produced by soil microbes in rice fields – methane by decomposing organic material under flood conditions and nitrous oxide by metabolizing fertilizer and manure nitrogen compounds as paddies are drained. Methane and nitrous oxide are potent greenhouse gases: they respectively trap heat an estimated 23 and 310 times more effectively than CO₂ when considered over a 100 year timeframe (which is the standard frame of reference). Over a 20-year timeframe, however, methane has an even stronger warming impact, estimated as 70 times that of CO₂ (its lower 100-year warming impact is due to its relative short lifetime in the atmosphere). Methane emission reductions are thus a particular priority.

Reduction of GHG emissions from changing rice cultivation practices will produce additional development benefits derived from the sale of “carbon credits.” These credits are a valuable commodity that can generate additional income for participating farmers and stimulate local economies. Carbon credits can be quantified and verified, then used to offset GHG emissions elsewhere. Initial buyers of VLCRP credits will likely include philanthropists or governmental entities from Vietnam or elsewhere who are interested in promoting low-carbon agriculture that benefits poor and near-poor farmers. In the medium term, however, a much larger number of buyers will emerge: businesses that are obliged to limit their own emissions under national or state regulatory programs. Such programs are now in operation in the European Union and New Zealand, and take effect in California and Quebec, Canada in January 2013. Both Australia and South Korea have recently adopted legislation mandating creation of such programs by 2015, and other nations are actively considering them as well. Depending on decisions made by policymakers, these programs can allow businesses to meet a portion of their compliance obligation by offsetting some of their emissions with carbon credits purchased elsewhere.¹⁰

⁹ Nitrogen runoff often results in increased algal growth in estuaries which can lead to low oxygen levels in bottom waters and to fish kills and other problems, a process known as eutrophication. Some evidence of algal blooms has been found in the Mekong Delta.

¹⁰ To ensure that the credits reflect real reductions, most voluntary purchasers of carbon credits require that the credits be certified by a well-regarded, third-party standard-setting organization, such as the Verified Carbon Standard (with the limited exception being philanthropic buyers who purchase uncertified credits in order to help “midwife” important projects at an early stage). In China, our projects were initially

EDF and our partners believe that VLCRP's work to reform rice cultivation practices in the country will demonstrate a "triple win" for Vietnam and beyond, integrating farm economics, environmental benefits and climate mitigation. VLCRP aims to build capacity, skills and economic benefits beyond those currently provided by government for the grass-root rice farmer community, local authorities, extension system and scientists beyond those currently provided by government. These include training in "1 Must + 6 Reductions;" collection of on-farm GHG emissions samples from VLCRP's experimental and control sites; laboratory analysis of those samples; collection of demographic and agro-economic data from participating farmers, including data on poverty and gender; statistical analysis of these data; and synthesis of data into findings of significance to participating farmers and to policymakers in the participating communities, at the national level, and indeed for many rice-growing regions worldwide.

Through VLCRP, EDF will greatly expand our understanding of the culture and practices of small-holder rice farming communities, providing practical lessons that will be invaluable in shaping the design and implementation of this and other low-carbon agricultural projects. The project will establish and coordinate a strong group of stakeholder advocates to share results of this pilot to drive national and local policy reform and support Vietnamese government's commitment to reduce GHG emissions from agricultural production 20% by 2020. The project also paves the way for small-holder rice farmers to access carbon markets in order to earn supplemental income.

With the exception of the new AusAID-funded Netherlands Development Organisation (SNV) project, we know of no other low-carbon rice farming project in Vietnam currently being planned or implemented other than VLCRP. We look forward to working closely with SNV to share learning as they implement System of Rice Intensification program. While the government in Hanoi is currently exploring mitigation strategies around agriculture with organizations including International Fund for Agricultural Development (IFAD), World Bank and Asian Development Bank, these discussions have not evolved to field activities to the best of our knowledge.

VLCRP will address issues of gender inequity through the creation of a database that will inform activities to improve equity in the target populations. We expect these activities to be implemented in late 2013-14. (See Sections 3.2 (Expected Outcome 6), 3.4 (Consideration of Marginalized Individuals) and 8 (Gender Equality)).

3. Project description

3.1 Objectives

The Vietnam Low Carbon Rice Project (VLCRP) is a pilot project designed to achieve three objectives:

- Improve community livelihood by training small-holder rice farmers in agricultural practices that decrease production costs, maintain or improve yields, provide environmental co-benefits and create additional income streams from sales of carbon credits.
- Demonstrate a community level pilot that (1) trains small-holder rice farmers to document changes in agricultural practices that reduce GHG emissions and (2) allows them to selling resulting carbon credits on the voluntary carbon market
- Build stakeholder and community capacity for scaling up the project and for transitioning to a broader array of sustainable funding sources over time; this includes the dissemination of project results by stakeholder advocates to policy makers for broader adoption of the approach

supported by international philanthropic buyers and funds generated from the green commuting program at the Shanghai Expo. In India, we are seeking local buyers for the emission reduction units; in the interim, international buyers are helping the project along.

The pilot project is designed to provide a scalable model for low-carbon rice cultivation practices that can be adapted for application in other regions of Vietnam and that will be potentially transferable to rice-production in other developing countries. Adoption of these techniques has the potential to improve the lives of participating farmers while simultaneously reducing emissions of GHGs from rice cultivation by an estimated 30%.¹¹ At scale, the program will advance long-term development objectives by providing additional income to participating farmers that can in turn stimulate local economic activity.

The project builds farmer and local community capacity. Small scale rice farmers in VLCRP will participate in community needs assessments, organization and planning. Agencies at the provincial and district levels will provide primary support for project implementation, management of project sites and monitoring of rice farmer practices by farmer organizations. Agencies at the community level will develop farmer organizations. EDF, MDI and Advanced Lab will serve as lead technical partners to develop and standardize farming techniques, GHG emissions measurement technologies, analysis and extrapolation, and guide community needs assessments and development activities.

In addition to producing farmer-community and GHG benefits, VLCRP advances two AusAID objectives by: (1) furthering Vietnam's human resource development, through partnerships with Vietnamese universities and research institutions, by providing training and education to local scientists, extension workers and rural populations through extensive data collection and analysis, and actual implementation of low-carbon rice practices, and (2) protecting the natural resources of the Mekong Delta by reducing use of water and synthetic fertilizer.

2. Expected Outcomes

We expect the following outcomes by the end of 2014:

1. Documentation of near-term benefits to farmers

1200 small-holder rice farmers will learn "1 Must + 6 Reductions" agricultural techniques that will provide savings in fertilizer, seed, water and labor. Participants will be trained in methods for data collection, and will record their results in farmer diaries for subsequent analysis.

2. Documentation of environmental co-benefits of low-carbon agriculture

By gathering baseline data and comparing it with farmer diaries and interim data collected during the project, we will document the economic and environmental co-benefits of using low-carbon farming techniques in rice cultivation. These data, when combined with mitigation benefits, make such initiatives compelling for many potential funders, whether those funders are carbon-credit buyers, governments or traditional philanthropic entities.

3. Emission reductions and associated analyses

VLCRP will have reduced GHG emissions from rice production through the use of low-carbon farming practices on participating farms. VLCRP will have quantified the emissions reductions that are made under typical farm conditions in the region. These data will be used to establish agricultural best practices at scale in the region and to generate a statistically valid model linking emissions reductions to specific agricultural practices. In addition, though not a component of this project per se, EDF plans to use these data to prepare a draft certification protocol covering emissions reductions from small-farmer rice production.

4. One or more completed sales of carbon credits

¹¹ X. Yan et al., 2009.

At least one group of carbon credits will have been verified, aggregated into a proffer-to-sell and purchased by a philanthropic buyer, with some funds flowing back to the participating farmers. Such a transaction will create a Vietnam-specific demonstration of how agricultural carbon markets can benefit local farmers and their communities

5. Creation of a database on gender equity and a plan to address gender issues

Expected outcomes include: (a) creation of an expanded data base for use by local authorities, the Women's Union, existing women's development groups and other community organizations and groups; (b) female and male community stakeholders who are trained to collect gender-sensitive data; (c) an increase in the number of women members of the VLCRP Project Management Board in each province; (d) an increase in women's participation in community groups in each province.

6. Dissemination of project findings and results to establish a strong group of VLCRP stakeholder advocates to drive policy reform

This project will build a diverse group of stakeholder advocates to support sub-national and national policies that will further the adoption of the VLCRP model, including community farmers, farmer organizations, government at local, provincial and national levels, academics and NGOs. These advocates will be armed with the strong science-based data necessary to educate and influence policy makers in Vietnam and beyond.

7. Development of local capacity

VLCRP will build local capacity by creating a cadre of trained advocates for new rice cultivation practices who can drive change and on-the-ground implementation by sharing rationale, knowledge and techniques.

3.3 Project Strategy

[Please see Figure 1 (page 9) for the VLCRP Project Strategy Framework.]

i. Community rationale

The production of rice in the Mekong Delta has come to serve as an economic engine for all of Vietnam. Well-situated amongst local and international trade routes, with a relatively well-developed infrastructure system and a base of leading universities and academic institutions from which to draw, the Mekong Delta has used its vast rice production as a means of integrating within the global trade community. However, even with this seeming prosperity in the region, the small size of land holdings means farmers still face economic stress, and the density of these holdings means that conventional farming is poised to lead to significant environmental degradation, including water scarcity and overuse of fertilizer. Coupled with the high amount of methane emissions reduction potential for the area, the Mekong Delta is an ideal location to pilot this project to reduce emissions and strengthen farmer incomes.

Provincial Departments of Agriculture & Rural Development (DARD) of the two participating provinces (An Giang and Kien Giang) are partners in the project, reflecting the strong support of local governments. Our partner, Can Tho University, a premier academic institution in Vietnam, has a strong research and development tradition that adds both local and international scientific credibility. As we look to scale up following completion of this pilot project, these academics and local officials are well-positioned to advise policy makers in Hanoi. With a broad base of engagement and strong backing from a variety of constituents, we believe that a successful pilot project that generates solid data will lay crucial groundwork for adoption of low-carbon rice production methods across Mekong Delta provinces and nationally.

Farmer incentives and high levels of motivation have driven the first phase of VLCRP. Encouraging results from the first four crops have generated buy-in from local authorities, farmers and farmer organizations. We have learned from our work training farmers on new practices and data collection and documentation during the early crop first seasons, and have fine-tuned our strategies as a result. The solid relationships we have built with farmers and their organizations will serve as a foundation from which to take this project to its next levels.

ii. How prior experience has shaped this project

The VLCRP project was preceded by a start-up phase of the same initiative, and the current project has benefited greatly from our ability to incorporate prior experience and lessons learned into every aspect of the planning. At the end of the start up phase, we conducted a full assessment of the lab and field protocols and reviewed the data collected for quality. Working from this analysis, we are now instituting improvements into the VLCRP pilot phase. Because much of this work is new, we have also learned that it is particularly important to invite input from a larger community, including local organizations, farmers, and major scientists in the field, of which we now have a growing cadre. (Please see specifics in Project Activities.)

Our work on low-carbon farming in India has taught us the importance of maintaining scientific rigor and paying specific attention to methodology in order to have a defensible conclusion on the resulting emissions reductions. We pay special attention to training and supervising lab staff and improving methodologies, and perform ongoing review of the data generated to ensure quality. We also learned that poor attention to detail has the potential to cause problems with farmer record-keeping. To address this concern, we assigned one farmer leader to every group of 10 farmers; the leader is tasked with ensuring the accuracy and details of the diaries from his or her group.

On the farmer engagement side, we have learned that it is essential to manage participants' expectations regarding increased income and explain to farmers that they should not enter into our programs primarily for carbon revenue. (Because one component of VLCRP is designed to demonstrate the value of carbon markets as a source of incremental funding to incentivize adoption of low-carbon farming practices, some participants assumed that vast sums of money would flow to them.) Instead, we work to ensure that they understand the full range of short- and long-term economic and environmental benefits – independent of a potential income stream from the carbon market – that may result from these practices, including improved yield, higher profits (such as from lower fertilizer costs) and greater resource efficiency (such as significant water reductions). To do so, we reach out through community organizations (including the Self-Administration Farmers Group, farmer clubs and other local groups).

iii. Why the proposed activities are expected to lead to the intended outcomes.

VLCRP's likelihood of success is enhanced by a project design that creates and strengthens broad cooperation among individuals, communities, NGOs, academia and government. Participants include small-holder rice farmers (who will be provided with training and support), community and international organizations, and partners at local, provincial and national government levels. Through collaborations with MDI and CTU, the project also utilizes premier university expertise. VLCRP is designed to use the existing infrastructure of the provincial DARD, with local authorities communicating, monitoring and disseminating results. Farmers already keep diaries for the existing DARD's existing training on "1 Must 6 Reductions" or the VietGAP standard, so this type of record keeping is not a new concept to them.

While there is support for mitigation by the Ministry of Agriculture & Rural Development, Vietnam has not developed a domestic carbon market. We believe the way to make progress is to demonstrate in-the-field that it is possible to both reduce GHG in agriculture *and* provide benefits to individual farmers.

While 2.5 years is not enough time to produce, verify and sell credits on a compliance market, our goal is to identify a philanthropic investor to purchase the VLCRP credits.

A primary goal of this project is the creation of a compelling case in terms of both development and climate benefits that will lay the groundwork for widespread implementation of low-carbon rice production. Our activities initially focus on generating data to support the creation of such a case by focusing on two governmental priorities: (1) reduction of GHG emissions from Vietnam's agricultural sector and (2) improvement of livelihood and income for small-holder farmers and their communities. The data analysis will then measure the feasibility and value of these initiatives and our stakeholder advocates will be in a strong position to encourage policymakers to further accelerate their deployment. Furthermore, our multi-stakeholder bottom-up approach will educate and empower farmers, and build local support and capacity for low-carbon farming practices.

iv. Relationship to EDF's and our partners' broader work

Low-carbon development is an integral component of EDF's work on international climate, which includes demonstrations of how carbon markets can provide a sustainable income stream to help incentivize adoption of strategies that have low carbon payoff. VLCRP complements EDF's other low-carbon rice projects now underway in China, India, and the U.S. The project also complements our broader low-carbon development activities in India which include household biogas installations, clean cook stoves, solar lanterns and drinking-water purification, in addition to agricultural initiatives.

EDF has a rich history of affecting policy in the U.S.; we were instrumental as part of a coalition in getting rice methodologies incorporated into the California Climate Action Registry (CCAR). We also educate and work with partners who work on region-specific climate policies in areas as diverse as South America and Asia.

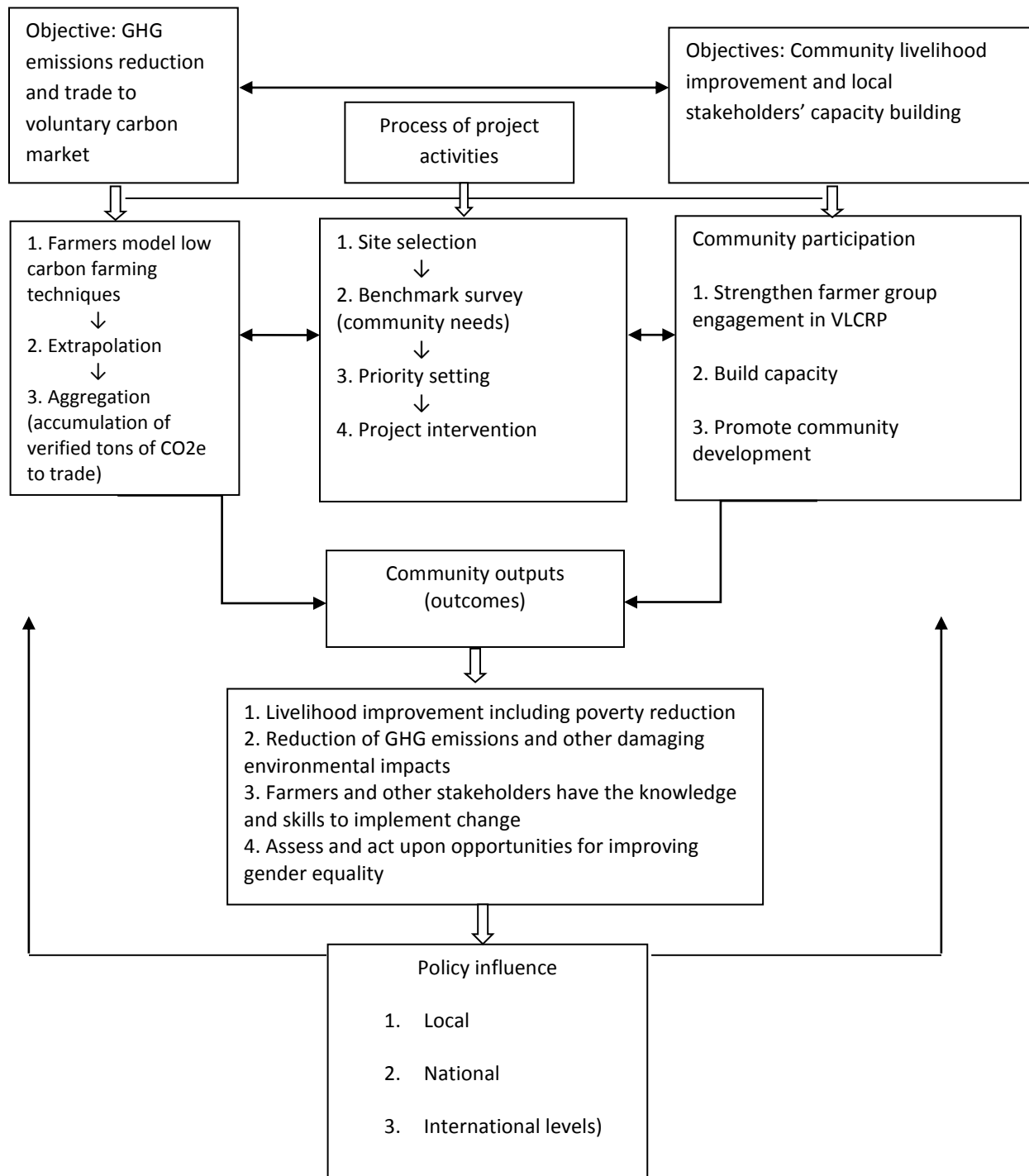
The Departments of Agriculture & Rural Development of both An Giang and Kien Giang provinces, our local-government partners in Vietnam, see VLCRP as contributing directly to improving the welfare of their citizens through enhanced agricultural productivity. VLCRP enables our academic partners to provide laboratory data analysis and evaluation in direct support of this outcome and to gain experience in performing such analyses to international standards.

v. Engagement with AusAID

VLCRP will engage with AusAID through fulfilment of our reporting obligations, and we are entirely open to other means of engagement. We plan to share lessons learned with the other parties involved in the AusAID-funded mitigation projects in Vietnam, and to learning lessons from those parties.

Figure 1

FRAMEWORK FOR VLCRP PROJECT STRATEGY*



* This Strategic Framework was developed collaboratively by all VLCRP project partners.

3.4 Project activities

(Please see Annex I: Activity Schedule for a breakdown of NGO and partner organization involvement in each activity. Contributions of partners are further illustrated in Annex V: Relationship Chart.)

VLGRP activities will include the following major components:

- **field agronomy:** physical/chemical data are collected from a small number of experimental and control plots
- **laboratory analysis:** gas samples from test plots are analyzed to determine GHG emissions levels
- **farming practises and farmer diaries:** farmer representatives are trained and implement experimental protocols while keeping detailed records of their practices and results
- **data analysis and model generation:** field-data measurements are extrapolated to activities reported in diaries; seasonal crop reports and scientific reports are generated and distributed as appropriate
- **carbon credit generation and sale:** an aggregator prepares a contract for sale of the carbon credits to an interested buyer
- **dissemination of results:** groundwork is laid for expansion to a regional and/or national scale, and eventually internationally
- **building capacity:** stakeholders are trained to better identify and address community needs and advocate for policy development
- **consideration of marginalized individuals:** data is collected to document inequities and programs developed to increase inclusivity

VLGRP is managed through two Project Management Boards (PMBs), one in each of the two participating provinces (An Giang and Kien Giang). Each Board is chaired by its Department of Agriculture & Rural Development (DARD). Board members are government officials, local authorities, and representatives of community associations and farmer organizations. The PMBs' mandate is to monitor and review the project's progress and results. They are required to meet at least once each year, and authorized to meet more frequently as needed. Other stakeholders (e.g., representatives from the Women's Union) are invited to participate as well.

Funding from AusAID will enable VLGRP to conduct a 2.5 year pilot project that builds on VLGRP's start-up phase (2010 to date). For context, VLGRP's main activities and accomplishments during its start-up phase can be briefly summarized as follows:

- i. Recruited initial groups of participating farmers, local government (province level) and local research institutions
- ii. Gathered available information on techniques for maximizing yield and minimizing use of water and synthetic fertilizer while reducing GHG emissions, and began implementing and refining those techniques at participating farms
- iii. Established an initial set of experimental and control field sites equipped to measure soil gas emissions and other key parameters
- iv. Developed initial protocols for collecting field data and training field technicians to implement such protocols
- v. Provided resources and training to the Can Tho University laboratory to conduct gas-chromatography analysis of the gas and soil samples

Data generated to date have been invaluable in training participants, calibrating equipment, and establishing methodologies and experimental crop cultivation practices. Building upon this initial work, the pilot project will produce scientifically rigorous data quantifying the greenhouse gas emission reductions and economic and environmental co-benefits achieved by the implementation of these low-carbon rice production practices. Equally important, the pilot project will show how such techniques can be implemented on a practical basis in the field.

Key elements and activities for the 2012-14 pilot project are described below. Data will be collected throughout the year and intensified during each of the two or three annual planting seasons – typically a winter/spring crop, a summer/fall crop, and sometimes an additional fall/winter crop (Aug–Nov).

Field agronomy and sample collection

Based upon literature research, VLCRP identified practices during the start up phase that could be expected to minimize GHG emissions from rice cultivation while maximizing yield and minimizing inputs. Based upon results of field trials, the set of practices included in the experimental treatment have been refined, and may be further refined throughout the 2012-14 pilot phase.

VLCRP established two field sites in An Giang based upon on local baseline surveys during the 2010-12 start-up phase. These sites have provided valuable lessons. During the 2012-14 pilot project, VLCRP will gather data at new field sites in the same region (in An Giang and Kien Giang provinces) that offer better water management controls. These sites were selected by all VLCRP partners based on criteria developed and experience gained during the start-up phase and include in each province:

- a control field managed using standard rice-cultivation practices
- an experimental field managed using sustainable low-carbon cultivation practices

Protocols for collecting samples of greenhouse gases from the experimental and control fields have been established and improved during the start up phase. Field samples will be collected throughout the year with higher intensity during the growing season and between seasons around events such heavy inundation and land preparation (e.g., plowing, mulching), using plexiglass chambers placed upon base frames to produce a gas-tight space over the rice paddy (the chambers are cubes one meter on a side). A time series of gas samples is drawn over a 30 minute period from the chamber using a syringe. The chamber is outfitted with a fan to establish a homogenous state within the chamber head space. Gas samples will be transported to Can Tho University for analysis within two days of collection.

In addition to gas samples, the field-based extension team in each site will collect field and crop data weekly (soil pH, water height and numerous characteristics of the rice plants) to document water management and allow evaluation of plant development throughout the growing season under the different experimental conditions. A major objective during the start up period has been to refine the sampling protocols such that they produce precise, accurate and reproducible data.

Laboratory analysis

Gas samples will be analysed for methane and nitrous oxide concentration using gas chromatography. During the start-up phase, VLCRP worked to develop gas chromatographic analyses protocols that are consistent with internationally accepted methodologies. We are on target to achieve that objective by the completion of the 2010-12 start-up phase.

Farming practices and farmer diaries

While EDF and our partners are monitoring overall field agronomy, 1,200 participating farmers in An Giang and Kien Giang (working on 520-760 hectares) will record details of their activities in farmer

diaries. The diaries consist of farm-specific data which documents water, energy and fertilizer use, cultivation practises (including tilling, seeding, mulching and plowing) and labor costs. This is an expansion from the 300 farmers who had previously participated during the start-up phase. The additional participants are currently being recruited through outreach conducted by MDI and DARD in each province, an effort that is expected to be completed by planting of the fall/winter crop (due to start in August 2012).

As during the start-up phase, local technical assistance teams will train participating farmers to implement low-carbon practices and correctly log their farming activities and outcomes in their diaries. Staff will organize and attend quarterly meetings with farmers and local partners to fine-tune low-carbon protocols and the status and progress of farmer diaries. In conjunction with DARD staff, MDI staff will perform ongoing quality-control analyses of farmer diaries, providing feedback to farmers and local partners as necessary.

Throughout the pilot project, we will keep recruited farmers engaged by expanding self-analysis activities, increasing community-based monitoring and helping to conduct workshops on best practices through local organizations. Initial feedback has shown indications of the project's economic benefits and while more information is needed, sharing these early findings with farmers is providing additional incentive for them to maintain their diaries. This data will be further solidified during the pilot phase.

Data analysis and model generation

As sufficient quantities of laboratory data on emissions and farmer diary data become available to provide statistical rigor, EDF and Can Tho University scientists will jointly develop an analytic model that integrates the two, thus calculating overall carbon reductions and non-carbon co-benefits from all participating farmer activities. The objective is to develop a model appropriate for use in subsequent expansions of VLCRP after conclusion of the pilot phase, as well as to rigorously quantify carbon credits generated by the pilot phase.

Though not within the scope of this grant, EDF plans to work with Can Tho University scientists to develop a preliminary draft of a certification protocol based on the model for submission to an established third-party standard-setting body or to a compliance market. After each season crop, agronomy and GHG measurement and analysis reports will be generated for documentation of the agricultural and economic effectiveness of each farming model and associated GHG emissions reductions as compared with the control model. Because final protocol may require three to five years of data to provide adequate statistical rigor, only a draft protocol will be developed during the 2012-14 pilot project. However, explicit consideration of the needs of the certification process will help ensure that the pilot project captures all of the relevant data.

Carbon credit generation and sale

We expect the VLCRP pilot to demonstrate the positive impacts of a well-designed solution to address climate change from rice cultivation. The project seeks a triple win – economic improvement, environmental co-benefits and mitigation – and goes one step further by linking the mitigation component to the carbon market.

Once the model produces sufficiently reliable calculations of the project's GHG emission reductions, those reductions will be aggregated from one or more crop seasons into a proffer-to-sell the reductions. The aggregator – an entity that has the trust of farmers and represents the farmers by bundling their individual emission reductions – will handle the procedural aspects of the contract for sale of the reductions.

EDF and the aggregator will identify one or more potential buyers for credits. This process can and should proceed even as earlier steps in the project are underway, in order to secure an agreement-in-principle with a potential buyer. Because these credits will not be certified (due to the current lack of a relevant certification methodology as explained above), EDF anticipates that the initial buyer will be a philanthropic or governmental entity that agrees to purchase the credits in order to stimulate further development of low-carbon farming in Vietnam.

Once the buyer(s) complete the transaction, any proceeds beyond the transaction costs will be distributed to participating farmers. Often, there are back-to-back aggregator-farmer and aggregator-buyer emissions reductions purchase agreements. However, because initial transaction costs may be high due to the pioneering nature of this work, initial net proceeds may be quite modest. As additional reductions are generated from succeeding crops (beyond the 2012-14 timeline of this pilot) and the project is linked to a standard, the above steps will be repeated, with greater efficiency, lower transaction costs, and higher net proceeds to distribute to farmers.

Dissemination of pilot-project information and results, and laying groundwork for post-2014 expansion of the project

As data from additional crop cycles are being gathered and analysed, VLCRP partners will reach out to farmer organizations, policymakers, academics, business leaders and other stakeholders to brief them on the project and its results. This is intended to lay groundwork for scale-up of the project post-2014 to include additional provinces and, ideally, a national initiative in Vietnam. A deeper strategy to this end will be developed towards the end of the project period.

VLCRP partners hold periodic meetings at the end of each crop cycle (Farmers Field Days), led by An Giang and Kien Giang DARDs and their extension system at the community level to disseminate results and share best practices and lessons learned. The Farmers Day meetings are held at or near the VLCRP site(s) so that attendees have the option to visit farmers' fields and hold discussions there as well. Farmers are the primary audience, and other invited participants include provincial and local officials, such as the Department of Natural Resources & Environment (DONRE), local community leaders and invited guests, including those from other provinces, who are interested in VLCRP. VLCRP partners and scientists from EDF, MDI and Advanced Lab of CTU will present the crop's agronomic and GHG emissions analysis to the attendees. Audience questions and discussion at these meetings are typically open and lively.

At VLCRP sites, DARDs and their extension system play primary roles in monitoring farming activities (i.e., the application of "1 Must + 6 Reductions," irrigation activities, farm records via farmer diaries, and agronomic and water level data records collection). MDI and EDF also monitor progress and farm record keeping at each project site regularly.

The An Giang DARD and its counterpart in Kien Giang will hold periodic meetings to brief provincial government audiences (e.g., Provincial Peoples' Committees, Provincial Agricultural Offices). Dissemination will also focus on national policymakers charged with achieving Vietnam's goal of reducing its overall GHG emissions from agriculture 20% by 2020 (announced in 2011 as previously noted).

EDF anticipates that its staff scientists, in conjunction with those from Can Tho University and perhaps other VLCRP partners, will attend select international scientific conferences, to both share information from VLCRP and learn of technical and methodological advances that can be incorporated into VLCRP's procedures. These scientists may also submit papers detailing VLCRP's findings on carbon and non-carbon benefits for publication in peer-reviewed journals, though such publications are beyond the scope of this grant.

Building stakeholder capacity to address community needs and advance policy

Building capacity is a critical tool for improving participants' skills and empowering stakeholders to assume greater responsibility and leadership roles in community development. The training program and workshops are models of "learning by doing," forging "farmer to farmer" connections, providing experience exchanges and site visits to project sites, and refining practices for strategically integrating activities to achieve project objectives.

Once the benefits of the project are clearly documented and it is clear that farmers, government and environment are all winners in this program, we will develop and implement a long term advocacy strategy. As project partners include prominent members of academia, government and the NGO community, we will have a network of policy champions poised and ready to advocate for the broad expansion of cultivation practices.

Consideration of marginalized individuals

By its very nature, this project involves close engagement with small-holder farmers in Vietnam, individuals who have typically been marginalized from the mainstream of the country's economic activity. Their voices will be heard through periodic meetings (as described above), as well as through feedback provided during training sessions.

During 2012-13, VLCRP will first create a VLCRP database on gender equity. (Please see details in Section 8 below.) Based on our findings and in conjunction with female and male community leaders, VLCRP will develop a plan to address gender issues through programs and activities, to be implemented in late 2013-14. Resources permitting, VLCRP hopes to devote special attention to women in VLCRP farming households who are disabled and/or poor or near poor. We will consult with local experts in the Mekong Delta (e.g., the local Women's Union and their existing Women's Development Groups) and CARE Australia whose AusAID-funded CCCAG project is based in An Giang and Soc Trang provinces and who have had several years of experience with gender equity analysis and programming

Children and individuals with serious disabilities are not likely to be active farmers though as members of farmer families, they may benefit indirectly.

4. Monitoring and evaluation

Monitoring and evaluation is integral to VLCRP. To achieve one of VLCRP's key objectives of reducing GHG emissions in a way that generates marketable carbon credits, VLCRP must collect information on the number and size of participating farms, as well as data on farmer compliance with VLCRP's low-carbon protocols. Such information is essential in calculating GHG reductions resulting from implementation of the protocols. Because VLCRP also seeks to demonstrate that the low-carbon protocols do not decrease (and may even increase) yields while also decreasing fertilizer and water use, data on yield, fertilizer use and water are also collected via farmer diaries. To ensure reliability of data, a key VLCRP component focuses on training farmers as to what information to record and how to do so in a systematic and consistent manner. MDI staff conducts this training, and continually reinforces it through on-site visits and quarterly meetings with participants, with additional meetings held as necessary. DARD staff and advanced farmers are trained through train-the-trainer sessions conducted in each participating province by Farmer Field School methodology, supplemented as necessary by updates that allow for assessment and adjustment as the low-carbon protocol is revised to achieve optimal results.

While VLCRP's pilot phase involves only 1200 farmers on 520-760 hectares per season (for a cumulative total of 2600 hectares over the five growing seasons), the project also seeks to lay groundwork for

subsequent deployment of low-carbon rice cultivation practices at a much larger scale. Such groundwork includes generating, evaluating and disseminating data to policymakers and others who are positioned to create incentives and/or make investments that enable rapid at-scale deployment of these practices. Because many of these audiences are keenly interested in promoting rural development in addition to combating climate change, VLCRP collects socioeconomic data on the participating families. These data are also of great interest to two of the core partners on VLCRP's team, the An Giang and Kien Giang Departments of Agriculture & Rural Development.

Specific data collected and generated by VLCRP include demographic data and agro-economic data.

5. Reporting

Every six months, EDF will submit a report on VLCRP to AusAID documenting project progress on outcomes, the status of performance indicators, lessons learned, any challenges to project implementation that were encountered, and how those challenges are being addressed. At the conclusion of the project, EDF will submit a final report to AusAID, reporting project findings and providing a final funds acquittal. All reports will be completed on templates provided by AusAID, and will follow AusAID's Timeline and Reporting Requirements for the Community-based Climate Change Action Grants Program:

25 May 2012	Draft Project Design
31 July 2012	Final Project Design
30 November 2012	Annual Plan for 2013, including July-October 2012 Progress Report
31 May 2013	November 2012-April 2013 Progress Report
30 November 2013	Annual Plan for 2014, including May-October 2013 Progress Report
31 May 2014	November 2013-April 2014 Progress Report
28 February 2015	Final Project Report

6. Risk management

To create a new model of intervention within fluctuating environmental conditions and economic markets, VLCRP will need to coordinate many different stakeholder and constituent groups; as such, there are inherent **program risks**. While we are working to collect a large amount of baseline data, we may face some difficulties in capturing the extensive reliable data (e.g., high-resolution soil survey maps, hydrology data and meteorological data) necessary to create a model for estimating GHG mitigation at large scales within the projected time frame. Because this is a multi-year project, we may also face challenges in sustaining farmers' interest and compliance with VLCRP tasks and protocols. To combat this potential obstacle, VLCRP will conduct intensive outreach and maintain constant engagement to ensure that farmers are informed and reminded of the benefits of the project. We use a community-based intervention approach/methodology as described in the Project Strategy Framework (page 9). VLCRP partners will also reach out to and build relationships with potential buyers of the project's initial carbon credits (most likely a philanthropic or governmental entity interested in stimulating further development of low-carbon farming).

A risk matrix providing a more complete overview of anticipated risks is attached.

To obviate **financial risk**, EDF links planning, budgeting and forecasting processes to manage accounting and programmatic requirements. A culture of accountability and transparency is maintained with independent auditors and experienced board member involvement. For decades, our internal control structures have successfully implemented FASB and GAAP rules for not-for-profit financial and accounting management.

7. Sustainability and capacity building

This project is the pilot phase of the VLCRP and is not intended to continue beyond the duration of the 2012-14 pilot initiative. Instead, VLCRP will demonstrate a scalable model of community-based, low-carbon rice production that can be employed throughout Vietnam and beyond. By delivering and documenting direct farmer economic benefits, greenhouse gas emissions reductions along with a host of social and environmental co-benefits, VLCRP's pilot phase will generate data demonstrating to the Vietnamese government (and others) that low-carbon rice farming within the framework of carbon markets is a economically sustainable way to address both development and environmental goals.

To build capacity for continued work, VLCRP will: (1) enhance the institutional capacity of Vietnamese local government officials and community organizations to implement and disseminate low-carbon rice methodologies that can be applied to other rice-producing regions ; (2) enhance participants' scientific and technical capacity in GHG measurement, analysis and statistical evaluation; and (3) generate data that supports a third-party certification system for carbon credits produced through low-carbon rice production methods, thus helping to create a broader voluntary market for such credits and laying groundwork for their acceptance into a still larger compliance market.

For scalability through policy, the program is designed to align with the interests and goals of the government of Vietnam as they relate to: (a) rural development, by improving the economics of farming; (b) climate change, by reducing GHG emissions and building local resilience to drought; and (c) environment, through reduction in fertilizer and water use, and improving soil fertility. (See activities above that address laying the groundwork to scale up the pilot project.)

To demonstrate the success of VLCRP in achieving project objectives, we would anticipate the need to accumulate research data from at least three replicated crops over three years. Given an AusAID grant period of 30 months (6 months for mobilization and 24 months for VLCRP intervention and research over 5 continuous crops), it is likely that continued research and statistical analysis will be needed. If necessary, VLCRP will seek additional support to bring this research to a robust conclusion.

8. AusAID safeguards and cross-cutting issues

Child Protection: No interactions with children are expected to occur in implementation of this project. Any that may occur will be subject to EDF's Child Protection Policy (copy attached). That policy comports with AusAid guidelines.

Environment management: As described throughout this proposal, a primary focus of the project is environmental protection through GHG reductions; reduction in water pollution is an important co-benefit. By lowering use of water, synthetic fertilisers and pesticides, VLCRP famers reduce environmental damages from pollution, and inefficient use of water.

Inclusive Development: This project is unlikely to directly affect people with disabilities and those affected by HIV, though they may be family members of the participating farmers and thus may benefit from the positive outcomes of the project. Insofar as feasible, VLCRP will add disabled or HIV-positive individuals to VLCRP's project management structure.

Gender Equality: VLCRP will analyse both qualitative and quantitative sex-disaggregated data to assess levels and impacts of gender (in)equality in rice and other agricultural work. The general perception of local authorities is that the current mechanization of much of small-holder rice farming is pushing women to pursue other types of farming and agricultural activities.

To address issues of gender equity, during 2012-13, VLCRP will first create a VLCRP database on gender equity. We will:

- review existing sex-disaggregated data regarding gender balance in agriculture and supplement with new data as necessary
- interview women and men in rice farming and other types of agriculture in An Giang and Kien Giang provinces. Through VLCRP's baseline surveys, members of farmer households in each of the VLCRP sites will be interviewed about gender issues to document the current status of women in local agriculture.
- meet with female staff currently working as Extension Agents in the Agriculture Extension Service and the Plant Protection Division of the Department of Agriculture and Rural Development

VLCRP will identify women and disabled people who have relevant experience and interest in VLCRP. Some will be invited to be members of the VLCRP Project Management Board or serve on local project management committees at the district and community level.

Disaster Risk Reduction: By reducing water demand, VLCRP will reduce rice farmers' susceptibility to water stress. By reducing GHG emissions, VLCRP is intended to reduce the array of disaster risks posed by climate change.

Displacement and Resettlement: VLCRP is not expected to cause or contribute to involuntary displacement and resettlement, and helps reduce the odds of it by mitigating climate change.