

TRAINING PLAN FOR C SEQUESTRATION PROJECTS

WESTERN KENYA INTEGRATED ECOSYSTEM MANAGEMENT PROJECT

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1. Introduction

Western Kenya Integrated Ecosystem Management Project (WKIEMP) has been initiated with support from the World Bank for implementation through a grant from the Global Environment Facility (GEF). The project, which became effective in July 2005, seeks to improve the productivity and sustainability of land use systems in selected watersheds in the Nzoia, Yala and Nyando river basins through adoption of an integrated ecosystem management approach. In order to achieve this the project will: (i) support on-and off-farm conservation strategies; and (ii) improve the capacity of local communities and institutions to identify, formulate and implement integrated ecosystem management activities (including both on-and off-farm land use planning) capturing local global environmental benefits. The project is based in Kisumu and is achieving its objectives through a community driven development process whereby communities decide on resources for infrastructure investments, technical assistance and implementation of ecosystem management activities.

KARI and ICRAF collaborated in the generation of baseline information that was used in the Project Appraisal Document (PAD) under a Project Development Facility (PDF). KARI requested ICRAF to further continue backstopping the project activities in the 2006/2007 and 2007/2008 work plans with the specific objectives of building capacity of KARI scientists and other local institutions to manage carbon assets including the establishment of a system to monitor and evaluate the biophysical impact of project activities, particularly the impact on net carbon absorption. The main objectives of this backstopping are to assist KARI to:

- a) Establish interventions that mitigate land degradation
- b) Evaluate and document the potential of different tree species to sequester carbon on degraded land
- c) Evaluate options for river bank protection
- d) Establish interventions that sequester carbon on agricultural systems
- e) Establish PAP intervention plots at several sites
- f) Establish a system for monitoring and evaluating changes in carbon stocks.
- g) Build capacity of KARI staff, other local institutions and communities to undertake monitoring and evaluation of changes in carbon stocks.

This report summarizes the plan for training of KARI staff and key partners including field and laboratory training.

2. Formal training through seminars and courses

The focus of the training program, as established in the PAD is to develop the knowledge and capacity of KARI staff and key partners in the design and implementation of carbon sequestration projects. The key areas for knowledge development are:

3. Use of GPS machines and software
4. Manipulation of data in a GIS environment
5. Carbon offset opportunities in agriculture and forestry
6. Carbon markets and how they function – the rules of the game
7. Financial analysis of carbon sequestration projects
8. Baselines, ex-ante projections of C sequestration potential of a project and carbon accounting
9. Project documentation

2.1 GIS training

GIS training will be organized in three training workshops in Kisumu for both ICRAF and KARI staffs in support of the monitoring and evaluation activities of the project and for facilitate project planning. The two training courses, each of a week in length were conducted on 25-29th June 2007 and 27-31st August 2007 attracted a total of over 20 participants. A third course will be offered on 14- 18 April 2008.

Module 1 - Introduction to GIS and GPS

This module will provide an introduction to GIS data capture and GPS data capture and downloading (using Ozi-explorer). Participants will be introduced to the use of ArcView in Data display (Vector, Raster, and GPS data). The course will conclude with data downloading and uploading and exchange in GIS and GPS receivers.

The key areas for knowledge development are:

- Basic concepts and principles of GIS and GPS, historical and current development trends, diversity in uses and cost impacts.
- Understanding and participate in GPS and Ozi-explorer settings, data capture and download.
- Understand and operate ArcView software in displaying different data formats, output products via layout items.

- Master and operate GPS-GIS links downloading-uploading procedures via Ozi-explorer and ArcView and out GPS with existing maps.

Module 2 - Spatial Analysis

This module will review GIS data capture in ArcView, including items associated with Project, View, Theme, Table, and Layout. The concepts of data geo-referencing and map projections will be covered. Participants will be introduced to geo-processing and spatial analysis tools which can be used in spatial modelling and data characterization.

The key areas for knowledge development are:

- Review key GIS items from training module 1 and operate ArcView in data display and outputs.
- Understand and perform map projections and data geo-referencing within ArcView tools and modules.
- Learn and use different spatial analysis tools for different GIS related activities.
- Learn and use spatial modelling concepts for different applications areas.

Module 3 - GIS and Remote Sensing

This module will review items associated with Project, View, Theme, Table, and Layout. Participants will be introduced to remote sensing and data analysis methods for remotely sensed data. These analysis tools will then be used to link remotely sensed data to ground data in a GIS environment. Strong emphasis will be place on data interpretation in the GIS environment.

The key areas for knowledge development are:

- Basic concepts and principles of remote sensing, historical and current development trends, diversity in uses and cost impacts.
- Satellite sensors and their properties in terms of spatial, temporal and spectral resolutions.
- Visual image interpretation procedures for different landscapes applications using different satellite image products.
- Digital image interpretation using ArcView and other remote sensing package.
- Integration of remote sensing products with GIS data for better landscape application and output.

2.2 Training in Bio-carbon offset opportunities

A two and a half day seminar will be organized to raise awareness of carbon offset opportunities in the agricultural sector and help technical services begin to design projects. The target of the training will be technical staff members that are likely to develop these types of projects in the future. The training will be offered in a modular manner. ICRAF will prepare a reading list for participants two weeks prior to the training. It is expected that participants will devote about 20 hours to preparation before the course is delivered. The training will focus on the technical aspects of how developing these types of projects differs from developing standard development projects. The course will be offered in a lecture and practical work format. The objectives of the course are:

- To raise awareness among the technical services working in western Kenya about the opportunities offered by carbon sequestration and emissions reductions projects.
- Offer detailed technical information to facilitate design of such projects.
- Assist participants to begin to design projects for their services.

Module 1 - Introduction to carbon markets – overview

This module will introduce the nature of biocarbon projects and explain how these projects can support sustainable development. Emphasis will be put on helping participants understand risks and opportunities associated with these projects.

This is intended as an introductory module providing coverage of the key biological and physical issues that need to be understood in order to develop projects. At the end of this module, participants will understand:

- The size and nature of carbon markets and the importance of carbon sequestration projects in these markets.
- Risks and opportunities associated with these types of projects.
- A typical project cycle for a carbon offset project.

Module 2 – The Carbon Cycle and GHGs

This module will focus on carbon cycling – fluxes, pools and sinks; forms of carbon (compounds, including carbon dioxide and methane); and other greenhouse gases (e.g.

nitrous oxide). Emphasis will be placed on key issues related to the carbon cycle that need to be understood in order to develop projects for the carbon market.

This is intended as an introductory module providing coverage of the key biological and physical issues that need to be understood in order to develop projects. However, trainees will be expected to come to the course with an understanding of basic ecological principles, having read background material. Therefore, the focus of the module will be more practical and oriented towards helping the students design carbon projects. At the end of this module, it is expected that the audience will be equipped to:

- Fill any gaps in information or basic understanding they may have on the carbon and GHG cycles, sinks and fluxes, and thereby be able to fully understand the subsequent modules, especially on measuring and combining and sequencing project types.
- Be able to “scan the horizon” for possible project ideas and innovative areas to explore.
- Identify how a project could combine different GHGs in its design.

Module 3 – Measuring CO₂, N₂O and CH₄

This module will acquaint trainees with the challenges of measuring these gases for bio-carbon projects, the potential of remote sensing and infrared spectroscopy, the importance of promoting community participation, and some notions on the cost-benefit trade-off when conducting measurements. It is unlikely that the course trainees will be involved in hands-on GHG measurement activities. However, a broad knowledge of how such measurements are undertaken will be invaluable, as measurement techniques can have a significant bearing on project design, project costs, project timelines and project staffing. Moreover, measurement in the bio-carbon field is a very diverse undertaking. Trainees will be made aware of the difficulties and challenges associated with measurement, and the approximations that are commonly made.

The emphasis of this module is very much on practical issues of measurement. At the end of this module, it is expected that trainees will:

- Have a basic understanding of the chemistry underlying different types of bio-carbon projects – in particular, an understanding of what compounds need to be measured and how these can be subsequently re-expressed in terms of ‘CO₂ equivalent’ units.

- Understand how GHGs are measured and quantified in different bio-carbon project contexts, and have a basic knowledge of the equipment that is used to perform these measurements.
- Appreciate the potential role that remote sensing can play in GHG measurement, and the strengths and weaknesses of this technology.
- Have an understanding of the difficulties of GHG measurement, and the inaccuracies that can result. Appreciate that there is frequently a cost-benefit trade-off associated with measurement and be able to resolve this trade-off in such a way that it doesn't jeopardize the rigor or eligibility (e.g. under CDM) of the project.
- Relate measurement needs to the technical skills required – and, in particular, have an appreciation of which measurement techniques offer some possibility to employ local labour, and what training would be required.

Module 4 - Non-Forest Sequestration

This module will focus on carbon sequestration on grassland, degraded land, and through zero-tillage practices and other projects. The emphasis will be on technical and market aspects to give a full appraisal of risks and benefits of this type of project. It will also address the carbon and financial potential of such projects through examples.

At the end of this module, it is expected that the audience will:

- Appreciate the wide array of possible non-forest sequestration projects.
- Understand the eligibility issues under current CDM rules and trends/ dialogue already in place for a post-2012 Kyoto regime, including a run down of who the key players are.
- Understand the risks from these types of projects (financial risks, non-compliance, monitoring challenges, complexity of project designs).
- Appreciate the expected benefits for achieving MDGs compared to typical afforestation/ reforestation projects.
- Understand the possibilities for enhancing financial returns from these types of projects.

Module 5 - Avoided and Reduced Deforestation

This module will focus on projects that generate credits from reducing deforestation or reducing forest degradation. Course content will deal with issues related to the assessment of baselines, additionality, and measurement. Given that the REDD (Reduced Emissions from Deforestation in Developing Countries) debate is moving away from just CDM-type projects, to the possibility of more broad national sector-based approaches, the module will also look at future prospects, providing an assessment of support for the post-Kyoto commitment period. The presentation will take about 45 minutes and there will be time to interact with trainees.

At the end of this module, it is expected that the audience will be equipped to:

- Articulate the definitions and concepts related to avoided and reduced deforestation
- Explain to both lay and technical audiences why avoided and reduced deforestation have been excluded from the CDM and how this might be reconsidered after 2012.
- Understand the particularity of issues such as baselines, additionality and leakage in reduced deforestation projects.
- Give examples, and describe the properties of, avoided and reduced deforestation projects that are operating.

Module 6 - Methane Mitigation

This module will focus on mitigating methane emissions through management of animal waste, wastewater, rice paddies, wetlands, and peatlands. The module will illustrate the diversity of options for this type of mitigation project. Measurement of methane will also be covered. It will provide examples of methane mitigation projects under the 4 systems. The presentation should cover methane mitigation projects that are likely to be of most interest to Kenya.

At the end of this module, it is expected that the audience will be equipped to:

- Identify opportunities for Kenyan methane mitigation projects.
- Evaluate the potential technical, situational, and economic viability of such a project.
- Understand project impact measurement and attribution.

Module 7 - Nitrous Oxide Mitigation

This module will focus on land management practices, notably fertilization, the calculation of emission factors, eligibility and economics of nitrous oxide projects, and future potential. The module will provide basic coverage of nitrous oxide sources in the landscape and the chemical changes N_2O can undergo that result in emissions (e.g. fertilizers, animal waste handling, fires, clear-felling, compared to industrial sources such as production of nylon and use in combustion engines). It will also provide an overview of various nitrous oxide mitigation projects. IPCC's work pertaining to generic emission factors should be presented, along with guidance on when these should be employed.

At the end of this module, it is expected that the audience will:

- Have a basic understanding of nitrous oxide as a GHG, and its sinks, fluxes and cycles.
- Have an understanding of the different types of projects, and future potential for including such projects a portfolio.
- Understand project impact measurement and attribution.

Module 8 - Project design

This module will focus on project design from the CDM point of view as this is the most rigorous approach. The carbon markets have developed a specific jargon that can be daunting to the newcomer. The audience will be introduced to the specific terminology of carbon project design and the actors involved in the different steps of the CDM project cycle. The module will discuss the eligibility criteria for a project. Emphasis will be placed on the contents of a PIN and PDD, two key documents required for registering a project. At the end of the module, the audience will:

- Know the definitions of key terms related to the project design cycle.
- Understand the CDM project development cycle.
- Understand how to evaluate the criteria for determining project eligibility.
- Know the types of information required in a PIN and in a PDD.

Module 9 - ERPAs – how they work

This module will focus on the mechanics of emissions reductions purchase agreements (ERPAs). Emphasis will be placed on the obligations of the buyers and sellers. The audience will be introduced to the different types of VERs and CERs for carbon offset projects. The special conditions around expiring CERs will be discussed and the influence of these conditions on pricing will be discussed. At the end of the module, the audience will:

- Know the difference between VERs, CERs, tCERs, and ICERs.
- Know the responsibilities of buyers and sellers with respect to delivery and use of CERs.
- Understand the different pricing options of CERs.

Course implementation

The course will be given as a series of lectures intermingled with a number of practical activities. Modules 1 through 7 will be delivered in standard lecture format to begin the course. This will be followed by 4 to 5 hours of practical work by each of the technical services represented at the training to identify potential projects within their current portfolio of activities.

The final two modules will be delivered at the beginning of the second day. Work on project conceptualization will continue following these presentations. The participating organizations will work on developing their project ideas into a PIN.

3. Practical technical training for KARI staff

3.1 Measurement and monitoring

ICRAF's landscape measurement and impact assessment system for the Western Kenya Integrated Ecosystem Management Project (WKIEMP) has the objective to provide an orientation to project managers on the types of data that need to be collected, the manner in which these data are to be collected, analyzed, and interpreted to:

- Meet the needs for ongoing technical monitoring of implementation of the project; and
- Determine project baselines and attribute project impact.

The methodology is built around the use of “Blocks”, 10 x 10 km in size. The basic sampling unit used in the system is called a “Cluster”. A Cluster consists of 10 “Plots”. The centre-point of each cluster in LDSF is randomly placed within a “tile” in each block. Sampling plots are then randomized around each cluster centre point, resulting in a spatially stratified, randomized sampling design. Both the number of plots per cluster and the cluster size may be adjusted depending on the specific purpose of the survey being conducted. For example, 1 km² clusters are useful for large-area reconnaissance surveys; whereas, 10 ha clusters may be more appropriate for more detailed project-level surveys.

All field officers have been given an orientation to the field methods for data collections. Several smaller seminars to KARI Project staff:

- Socioeconomic baseline: Introduction course to the socio economic database. (November 2006)
- Biophysical baseline: Training in vegetation classification and use of the biophysical datasheet. (February 2007)
- Field measurement techniques: GPS and GIS training (1 week course at ICRAF) end June: All FO’s, livestock officer, and M&E team
- Micro-catchments mapping in Lower Yala – Sindundu

One member of KARI’s staff (B. Waruru) has been selected for intensive training in the methods and analytical techniques and will use the methods for his PhD project. He will be given detailed training in the field and laboratory methods, as well as the advanced statistical methods for analyzing this data. He will be supervised by Dr. Keith Shepherd.

3.2 *Non-CO₂ greenhouse gases*

The current emissions of non-CO₂ greenhouse gases from the project blocks will be estimated using the methods described in the IPCC “Revised 2006 Guidelines for National Greenhouse Gas Inventories” and “Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories”, also published by the IPCC. Non-CO₂ gases will only be accounted for in the project specific baseline. Although the IPCC methods are designed for national inventories, in the absence of approved methods for project-based estimations, we have adapted these national methods for the project area. However, the level of aggregation implicit in this method is not very applicable to the objectives of the project. We will attempt to develop a better approach to estimating these fluxes at the project level over the life of the project.

One KARI staff member for the Kakamega Station (C. Njeru) has been working with the team for the past year and has been involved in the sampling and analysis of gases. He will continue to work with the team in the coming year. Additionally, KARI has indicated that it would like to train at least two more staff members on this. As we are set to begin the next phase of sampling, we will incorporate these staff members in the coming months into the activities and scale up the sampling regime.

4. Conclusion

One of the key backstopping roles that ICRAF is playing in this project is that of capacity building for KARI and other technical services in Kenya in the area of carbon finance. Participation in the carbon market will require a new set of administrative and institutional arrangements at the local and national level. This will require a reliable, and transparent management structure, as well as a community based system for use of the credits for the collective benefits of the community. According the Project Implementation Plan, the Project will provide funds to create the scientific capacity in KARI to monitor and evaluate change in carbon stocks in the project area, with the eventual aim of gaining experience on how to participate and trade carbon credits on the international trading market.

The training outlined in this plan is designed impart the specific knowledge to these technical services so that they can support communities and NGOs to develop these types of projects. The training outlined in this plan targets three levels:

- Technical capacity for the WKIEMP project team to be more effective in carrying out their duties in the Project.
- Awareness raising and information transfer about the scope of carbon sequestration projects and how to develop the appropriate documentation for registering such projects.
- Detailed technical training on the key issues of project development, and in particular on carbon measurement and monitoring.

The next step is to make this training plan operational. Whereas ICRAF has the technical knowledge to organize the training workshops, KARI holds the training budget in the Project. Thus, once this plan is accepted by KARI, the two institutions need to do the financial planning and ensure that training deliverables are produced in a timely manner. The Project should also liaise with the World Bank and link this training programme to the PHRD grant that was given to NEMA to support capacity building in other related

technical services in Kenya and to other on-going World Bank financed NRM projects in Kenya. Officers from NEMA, KEFRI, the Forest Service and MoA will likely benefit from the training programme outlined in section 2.2.

We believe that Kenya has a bright future in carbon sequestration projects. A new project funded through UNEP by the Spanish Government will facilitate capacity building in the area of avoided deforestation. Many of the technical issues will be the same, particularly with respect to measuring carbon stocks and GHG emissions and attributing project impact.