THE GAMBIA AGRO-ECOLOGICAL VILLAGE DEVELOPMENT PROJECT

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Submitted by

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In partnership with

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Acronyms

AEV – Agro-Ecological Village
CBO- Community Based Organizations
CEN – Canadian Environmental Network
CIDA – Canadian International Development Agency
CRD – Central River Division
FA – Farmer Associations
FDG – Focus Discussion Groups
FSTP - Farmer System Training Program
GAEV – Gambia Agro-Ecological Village Development Project
GEAD –Gambia Ecological Development Project
IITA – International Institute for Tropical Agricultural
IYIP – International Youth Internship Program
MDG – Millennium Development Goals
MPT- Multi-Purpose Trees
MTS – Mayon Turbo Stove
NARI – Gambia National Agricultural Research Institute
NATC - Njawara Agricultural Training Centre
NBD – North Bank Division
NERICA – NEw RICe for Africa
OJC – On the Job Coaching
PAP – Project Action Planning
PIT – Project Implementation Team
PLAR – Participatory Learning Action Research
PMC – Project Management Committee
PM&E – Project Monitoring and Evaluation
PMT – Project Management Team
PRA – Participatory Rural Appraisal
PSC – Project Steering Committee
PTT – Project Technical Team
REAP-Canada – Resource Efficient Agricultural Production-Canada
USAID – United States of America International Development
VATG – Village Aid-The Gambia
VDC – Village Development Committee

1.0 Project Proponents and Collaborative Agencies

Resource Efficient Agricultural Production (R.E.A.P.) - Canada

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REAP-Canada is an independent, research, education and development organization based in Ste-Anne-de-Bellevue, Quebec, Canada. REAP-Canada has 19 years experience working with farmers, scientists and the private sector to create greater sustainability in farming systems to advance rural development, both in Canada and abroad. REAP-Canada has been working on Agro-Ecological Village development with Philippine partners since 1997 in projects sponsored by the Canadian International Development Agency (CIDA) and USAID, and since 2002 with the government of China sponsored by the Shell Foundation. The organization has a leading expertise in working with communities on sustainable farming and renewable energy systems development through participatory on-farm research and development, and capacity building through the support of farmer-to-farmer training networks. In 1999, REAP-Canada was awarded by the Canadian Environmental Network, The International Environment Award for excellence in programming under the theme of Climate Change mitigation.

Njawara Agricultural Training Centre (NATC)

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Njawara Agricultural Training Centre (NATC) is a non-governmental organization in the Gambia established by the Njawara community for the purpose of training farmers in sustainable agro-forestry techniques to improve farm production and profitability while promoting sustainable natural resource management. Since 1990, NATC has worked to develop its in-house training capabilities and now has a compound for residential training with 6 hectares of sustainable agriculture demonstrations on site. Their flagship project is a Farming System Training Program (FSTP) for short-term adult training and long-term youth training where farmers spend up to nine months in training at the institute. The 6-hectare site includes training areas and demonstrations for nursery establishment, soil fertility and management, live fencing, gardening, orchard and woodlot management and small animal husbandry. Through this project, NATC is looking to expand its outreach to communities to compliment its current centre based training and plant material improvement programs.

Village Aid – The Gambia (VATG)

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Based in the Lower Saloum District of the Central River Division for the past 17 years, Village AiD- The Gambia is the only international agency operating in one of the most impoverished areas of the Gambia. Its program began with infrastructure development projects and has expanded to food security and literacy and gender development programs. VATG targets the development of marginalized communities in the Gambia through integrated, self-supporting programs such as REFLECT literacy circles, the Village Action Fund micro-finance scheme and agricultural development through the support of small-scale community gardens. Village AiD's mandate is to support the most marginalized rural people in the Gambia, particularly women, in becoming active citizens in their communities and in creating a viable, sustainable well being and future.

The Gambia National Agricultural Research Institute (NARI)

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The National Agricultural Research Institute (NARI) is the Gambia's principal agricultural research and development institute focusing on the advancement of livestock, horticulture, agronomy and agro-forestry systems. NARI recognizes the high cost of the traditional extension systems for agricultural research and development existing in the Gambia and is interested in continuing to develop its experience with participatory approaches for plant material improvement and on-farm research as a strategy to increase its impact in the country. It is presently supporting the Participatory Learning and Action Research (PLAR) approach for rice improvement in the Gambia. Through years of research and extension, NARI has a developed understanding and resources to support plant material improvements in rural communities in the Gambia. The involvement of NARI's agricultural scientists in the partnership will provide an additional level of technical capacity building to the Farmer-to-Farmer training networks being established.

2.0 Local Context/Needs Analysis and Environmental Degradation in the Gambia

The Gambia is one of the most challenged nations on the globe. In the year 2002, the Gambia ranked 160th out of 173 countries in the Human Development Index (measuring indicators such as quality of life, life expectancy, education and income), with nearly 60% of the population below the international poverty line and the highest population growth rate in the world at 4.2%. Gambia's economy is under-developed as it has limited natural resources, a narrow economic base and underutilized human resources. In a 1998 government study into strategies for poverty alleviation, 91% of extremely poor households were dependent on agriculture with 75% of the rural population experiencing a chronic food deficit for at least 2 months of the year during the rainy season from July to August, when income sources are also scarce.

There is a compelling need to diversify farming in the Gambia. Nearly 75% of the rural population are subsistence farmers growing crops such as groundnut, millet, corn, beans, and sesame, along with animal husbandry, rice farming and small-scale vegetable gardening. Crop

production is mostly undertaken by men during the rainy season while rice farming and vegetable gardening commonly occurs in the lowland regions and is the main responsibility of women. The intensive cropping of groundnuts by both small-scale and large-scale farmers has left the national economy vulnerable to international market fluctuations and resulted in serious food security and decline in soil quality. Since the 1970's, world prices for groundnut have rapidly declined, leaving Gambia's export industry in financial crisis. Because of this they have maintained a negative trade balance and continue to rely heavily on international aid organizations for social and economic development. With an emphasis on cash cropping, farmers have to use input-intensive farming practices in order to sustain yields. They also lack the food crops necessary to feed themselves and are therefore more reliant on capital in order to purchase food for personal consumption. The country as a whole is also becoming more reliant on food imports to feed its rapidly growing population. Diversifying farming systems in the region would increase the soil's fertility, enhance crop production, suppress weed growth, inhibit pests and diseases, reduce use of chemical inputs and improve the health and nutrition of farmers and their families. It would also increase food security for families and offer significantly more opportunities for the incorporation and full participation of women in all aspects of food production from planting to marketing and value added processing.

In addition to the dire social and economic conditions, the environmental quality of Gambia is in a long-term trend of ecological decline. Farm practices contributing to declining soil fertility and increasing desertification include mono-cropping, planting up and down the slope, crop residue burning and leaving the fields fallow after harvest. Lack of soil cover and erosion control is also causing topsoil to be lost into watercourses during heavy rainfall events or by intense winds. Forests are being heavily denuded by the growing need for fuel wood, dry-season livestock forage, farmland development and the burning of agricultural fields. Free range sheep, goat and cattle rearing is also found throughout the Gambia and is devastating to the integrity of the countryside as it destroys crops and limits farmers cropping options, while also being destructive to permanent vegetation. Significant decreases in crop production (most farmers in the targeted communities are reporting half the productivity of 10 to 20 years ago) and increasing population pressure in the rural areas is leading to the early exhaustion of food stocks. Farmers are subsequently forced to search for income to supplement household food requirements for the few months leading up to the next harvest. This period is increasingly being known as the "hungry season."

A holistic and integrated approach is required to respond to these interrelated challenges of environmental degradation, diminishing natural resources, reduced agricultural productivity, rapid population growth, hunger and high poverty rates. New efforts are required to implement effective sustainable rural development models to respond to these problems.

3.0 Background for Phase 1

CIDA provided funding for an Exploratory Phase Mission to the Gambia. The Exploratory Phase of the Gambia Agro-Ecological Village Development Project (GAEV) examined opportunities to create partnerships and strengthen the partners current efforts in ecological farming systems and sustainable community development. In August 2003, the Executive Director and a Project Manager from REAP-Canada met with NATC, VATG, farm leaders, and government officials in

Gambia to discuss in detail how to advance ecological farming in the Gambia and to learn of the particular development needs of the local communities. REAP-Canada staff also had meetings with Agronomy and vegetable research scientists at NARI to discuss opportunities for plant material improvement through participatory plant breeding and local adaptability trials in the North Bank Division (NBD) and Central River Division (CRD). In addition, since September 2003, six REAP-Canada interns supported by the CIDA International Youth Internship Program (IYIP) have been working in the Gambia to support programming with NATC and Village Aid, with two more to be stationed there in the next year. Through the exploratory phase and internship program, the basis for a solid partnership has been established. The partners and local communities have made strong commitments both to build project activities that promote sustainable agriculture and community development and to learn and develop from each other. Each organization brings to the table unique achievements and areas of specialization that will advance the others and bring about positive advances in the international development community.

Conclusions developed through partner, beneficiary and stakeholder dialogue indicate that an integrated development approach is required to respond to challenges in the Gambia including the environmental degradation and lack of income generating opportunities. The Exploratory Phase deepened interest in the potential of the Agro-Ecological Village (AEV) Model in the local communities. REAP-Canada has developed the *Agro-Ecological Village Model* to support rural communities through the creation of self reliant, integrated and ecological food and energy systems. This model has been successfully implemented by REAP-Canada and its partners in the Philippines funded by CIDA and in China funded by the Shell Foundation. The general characteristics of Agro-Ecological Villages appropriate for agrarian communities in the Gambia are outlined and compared to conventional approaches in Table 1.

Table 1. An Agro-Ecological approach to rural development

	Ecological System	**Conventional System**
	• *Emphasizes self reliance & empowerment through maximizing on-farm resource development* • *Market development oriented towards import displacement* • *Minimizes human impact on local environment & biosphere*	• *Emphasizes export markets to pay for imported goods* • *Approach leaves communities vulnerable to external forces* • *Degrades natural resource base locally and increases greenhouse gas emissions*
Food Supply	Internal and plant based, emphasizing farm fresh production of in- season vegetables, rice, corn, root crops, fruit, fish and eggs	Food imported into community including rice (through loans), canned and dry fish, meat, pop, noodles, crackers, etc, imported livestock feeds
Soil preparation and on-farm hauling	Draft animals like donkeys which reproduce	Tractors that require maintenance and replacement, and are fueled with diesel and gasoline
Nitrogen Fertility	Intercropping, nitrogen fixing legumes, BNF varieties, mudpress, soil mineralization, donkey, cow and horse dung	Purchased urea fertilizer
Minerals	Minimal erosion, recycling of rice hull ash and mudpress, donkey, cow and horse dung, good soil structure	Purchased Potassium and Phosphorus fertilizer

Seeds	Community seed banking of open pollinated seeds, new seeds assessed in trial farms, ongoing on-farm plant improvement	Purchased hybrid seeds, no local adaptation trials, seeds derived from corporations, transgenic seeds being developed
Weed Control	Use of local organic treatments such as neem tree solutions, mechanical weeding devices, crop rotation, good soil fertility management, mulch farming	Herbicides and tillage
Insect control	Biological control strategies, resistant cultivators, balanced fertility	Insecticides
Disease Control	Resistant cultivators, diverse cultural management strategies	Fungicides
Irrigation	Modest requirement and efficient usage, provided by alternative water supply options	Gasoline/diesel powered pumps
Crop drying	Uses solar or biomass energy	Fossil fuel powered crop dryers
Marketing	Emphasizes internal self reliance first, then import displacement in local markets and value added processing	Monoculture production emphasized and sold to distant markets in the country or exported
Household cooking	Rice hull cookers, solar powered cookers, efficient wood stoves, biogas, all biofuels derived from the farm	LPG fuel stove, open fire cooking, kerosene as fire-starter, fuelwood gathered off farm or purchased
Electrical power	Low requirement, renewable sources explored if feasible	High requirement and from fossil fuel based mega-projects
Housing	Mud bricks, farm derived wood, rammed earth	Cement block housing

Over time, a community's adoption of an Agro-Ecological approach will:

- Provide farming families with food security, increased income levels and improved nutrition
- Enable more active participation of both men and women on farms and in local economies
- Increase income generating opportunities in rural areas
- Ensure the long-term productive capacity of the land for food production
- Improve surface and ground water quality and quantity
- Reduce health risks to food producers and consumers
- Decrease greenhouse gas emissions
- Help protect and restore biodiversity

Central to the AEV approach is the conviction that ecological land management and community organizing for self-sufficiency form the basis for sustainable community development. This model emphasizes participatory development processes as a means to improve the social, ecological and technical infrastructure of communities. From past experience, this strategy has proved to be the logical evolution for rural development programming in agrarian areas. Please refer to Figure 1.

Figure 1. The 5 major activities of Agro-Ecological Village development

4.0 Project Rationale

The stakeholders and local communities were actively engaged in the visioning and planning process to ensure the relevance of project activities and the likelihood of local acceptance and contribution. Local participation was sought before the project was conceived through meetings during the Exploratory Phase and Focus Group Discussions conducted at village level in January 2004. The outcome of these efforts was the development of a proposal with the following goals and objectives, defined as a viable response to local problems, interests, goals, objectives and interest.

Project Goal:

To promote Agro-Ecological farming methods in some of the most impoverished areas of the Gambia as a means to reduce poverty, enhance food security, increase self-reliance, promote gender equality and reduce environmental degradation through the utilization of participatory approaches including ecological farm planning for diversification, farmer-to-farmer training, on-farm research and plant material improvement programs.

Project Objectives

To establish and build the capacity of farmer's organizations, complete a Participatory Rural Appraisal (PRA), begin a Project monitoring and Evaluation (PM&E) program and utilize participatory processes and support gender development for all project activities.

1. *To train farmer trainers on agro-ecological farming methods, establish a farmer-to-farmer training network and develop training modules to support the development of ecological farming systems in the Gambia, and assist communities in the development and implementation of ecological farm plans.*
2. *To establish learning farms/gardens support participatory on-farm research to improve the plant material base and introduce improved plant varieties of vegetables, field crops, grasses and tree species, and develop ecological farming practices such as intercropping, sustainable livestock management, agro-forestry and appropriate technologies.*

The principal project objectives that were initially developed have been expanded in order to facilitate the Project monitoring and Evaluation process. Table 2 gives an overview of both the principal objectives initially identified by the Project Proponents (as above) and the more detailed objectives followed by the Project Management Team (PMT) and project beneficiaries during project implementation.

Table 2: Overview of main and specific project objectives

Principal objectives	Detailed Objectives	Timeline
1. To establish and build the capacity of farmer's organizations, complete a PRA, begin a PM&E program and utilize participatory processes and support gender development for all project activities.	Participatory Action Planning - Identification of goals, responsibilities and project activities for each management level	Nov-Dec/04
	Selection of VDC representative to the PMC for each beneficiary village.	Jan/05
	Formation of farmer associations in each beneficiary village	Feb/05
	Capacity building for farmer organizations through training.	Jan-Feb/05
	Identification of watershed issues and formation of sub groups for regional environmental problems	Feb-Mar/05
	Conduct PRA in each village	Oct-Nov/04
	Train Community Organizer on data collection for baselines	Oct /04
	PM&E framework set in place	May-Jul/05
	Selection of 40 base line respondents	Nov- 04

	Baseline study conducted	Nov-05
	Baseline data analysis	Dec-May-05
	Develop and implement project gender strategy	Jun – Dec, 2005
2. To train farmer trainers on agro-ecological farming methods, establish a farmer-to-farmer training network and develop training modules to support the development of ecological farming systems in the Gambia, and assist communities in the development and implementation of ecological farm plans.	Develop training modules	May-Jul/05
	Initial training of farmer trainers	May-Jul/05
	Perform farmer to farmer trainings	Jul-Oct/05
	On the job coaching of farmer trainers	Jul-Oct/05
	Technical support to farmer initiatives	Jun-Oct/05
3. To establish learning farms/gardens support participatory on-farm research to improve the plant material base and introduce improved plant varieties of vegetables, field crops, grasses and tree species, and develop ecological farming practices such as intercropping, sustainable livestock management, agro-forestry and appropriate technologies.	Planting of vegetables for rainy season harvest	Jun-Jul/05
	Planting of field crops	Jul/05
	Implementation of ecological techniques (including intercropping, vegetables/grain legume production, soil management, IMP and livestock management)	Jun-Aug/05
	Technical support for the implementation of ecological methods and plant material improvements (rice, vegetables, agro-forestry and forage	June – Oct/05
	Participatory on-farm research	May-Jul/05
	Develop Individual farm plans for first-liners farmer trainers and Community farmers.	May–Jun/05
	Learning farm establishment & implementation	Jun-Oct/05
	Research in to improved efficiency of Mayon Turbo Stove (MTS) and different fuel types/combinations	May-Oct/05
	Research in to market for MTS in beneficiary communities	Jul-Oct/05
	Promotion of MTS	Aug-Oct/05
	Disseminate information to the public through conferences, publications, websites and presentations to interested parties	Sep/04-Oct/05

5.0 Project Beneficiaries

The main beneficiaries of the program are the impoverished small farmers living in Lower Saloum District of the CRD and the Lower Badibu District of the NBD in the Gambia. They are amongst the most impoverished farmers in the country and far from the more affluent and developed coastal areas of the west. Household income is below the national average for small farmers. Forty-three percent of households in the CRD were identified as "extremely poor," defined as unable to access economic resources to satisfy basic material needs. The villages and small towns in this region typically have no running water or electricity, few clinics, limited schools and few working opportunities outside subsistence farming. Young people in the region often migrate to the capital in search of improved employment opportunities.

Community Selection

Community selection took place before phase 1 approval. This was made possible through the relationship developed with southern partners during the Gambia Ecological Agriculture (GEAD) Project completed in early 2005. The following criteria were used to select the beneficiary communities:

1. Demonstrated need for increased food security and improvement of farming systems
2. Internal organization and farmer leadership and proven dedication to improving economic situation, addressing gender issues, and the utilization of agriculture to address food security issues.
3. Agricultural similarity and complementary resources and knowledge that can be shared between other villages
4. Healthy relationship with other villages historically cooperating in regional activities.
5. Secure land tenure and a keen interest in improving the communal village area.

Gunkuru Wollof and Jahawur Mandinka in the Lower Saloum District of the CRD and Torro Bah in the Lower Badibu District of the NBD were chosen as the three beneficiary communities. Village meetings initially took place with representatives from each beneficiary community to engage them in the development of this project and familiarize them with the AEV approach. Participants included members of the Village Development Committee in Lower Badibu and Learning Circle Committee in Lower Saloum, as well as village heads, local farmers, and other villagers. Participants were eager to explore the opportunity to develop farmer associations, participate in farmer-to-farmer training, and sustainable farming practices. Enthusiastic discussions regarding project implementation occurred during and after the sessions.

Background information on the villages was obtained from the village meetings, interviews with villagers, select farmers that previously participated in training programs with NATC and villagers that were engaged in VATG's literacy program. Additionally, focus group discussions identified farmers from surrounding villages who were involved in previous farmer-to-farmer trainings organized by the Department of Agriculture, and who were enthusiastic about encouraging the activity again with more relevant and specific training. Their background proved beneficial in developing training methods adapted to the local situation.

<u>Lower Saloum</u>

The first phase of the GAEV project directly involved 100 households (approximately 800 people) from the two communities Gunkuru Wollof and Jahawur Mandinka in Lower Saloum (Table 3). Several families usually live in one compound of up to 30 people; each family is housed in different units or rooms. As such, targets and outputs focused on the number family units involved. The project also indirectly reached all of the communities in this area in which VATG extends agricultural support as the technical background and knowledge gained through the project was transferred through the communities via staff, trainers and community organizers. As well, agricultural activities coordinated with surrounding villages provided immediate economic benefit to the collaborating communities.

Table 3. Population statistics of selected communities in the Lower Saloum District		
	Gunkuru Wollof	**Jahawur Mandinka**
Total Population	252	549
Male	134	275
Female	118	274
Boys (5 to 19) in School	15%	49%
Girls (5 to 19) in School	9%	48%
Under 5 yrs old	31%	19%

Village Aid is working with half of the communities in the Lower Saloum Division through their ongoing literacy programming. Only the two communities Gunkuru Wollof and Jahawur Mandinka were selected as direct beneficiaries of the GAEV project, however, it is anticipated that other communities in Lower Saloum will also receive benefits in the future through the Farmers Associations that have been established.

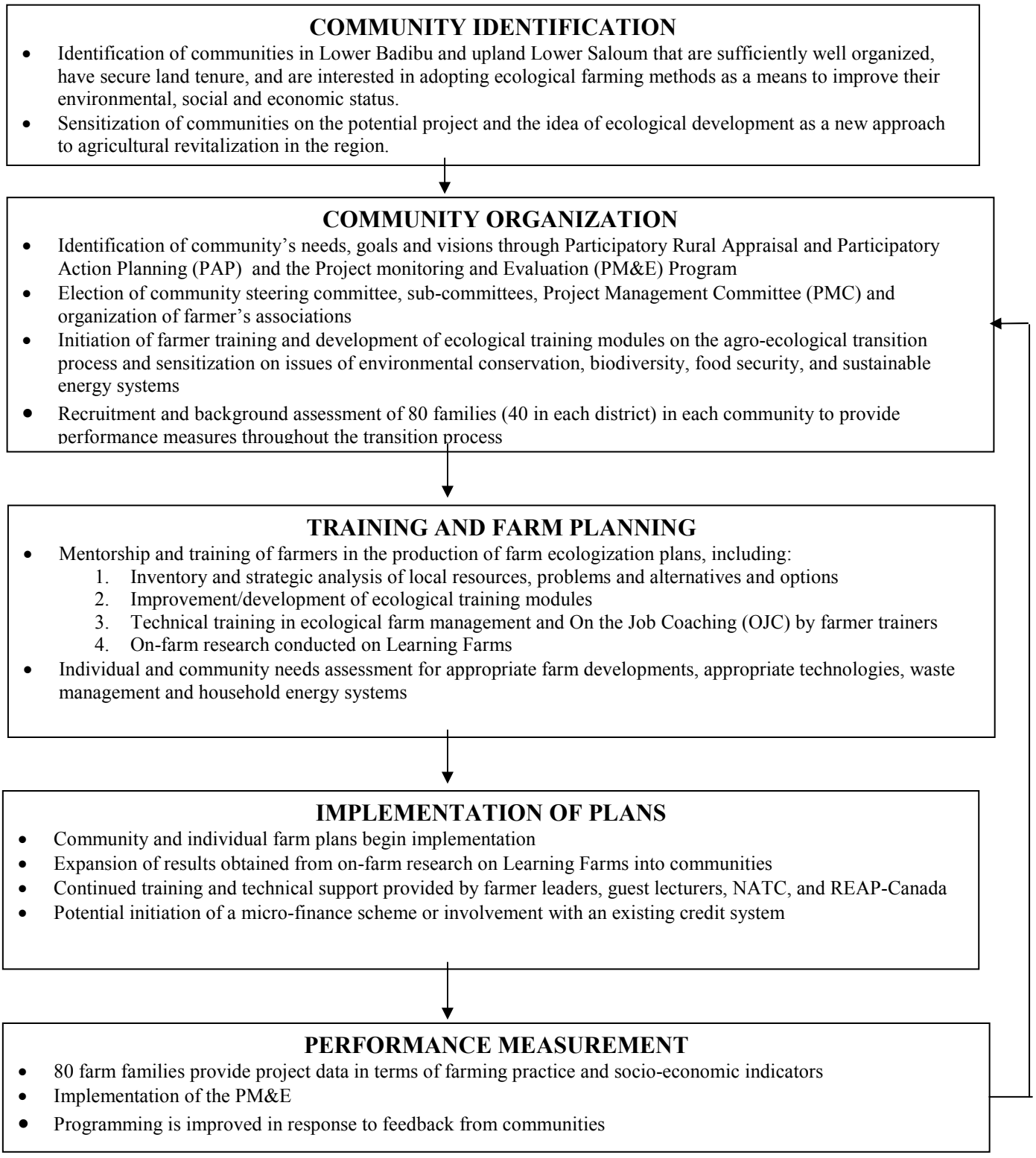
Lower Badibu

The project directly reached approximately 50 families in the community of Torro Bah**,** population 700, located in a lowland ecosystem in the North Bank Division. Other indirect beneficiaries included farmers and their family members in surrounding villages. The project also indirectly reached all of the communities in this area in which NATC extends agricultural support as the technical background and knowledge gained through the project was transferred through the communities via staff, trainers and community organizers.

6.0 Workplan for Project Activities

There are five basic steps in the implementation of the Agro-Ecological Village Development Model: community identification, community organization, farm planning process, implementation of plans, and performance measurement. For illustration and greater detail of these steps, please refer to Figure 2.

Figure 2. The 5 step process of Agro-Ecological Village implementation



6.1. Community Organization

6.1.1 Community Based Organizations

The PRA process examined the internal institutions operating in Gunkuru Wollof, Jahawur Mandinka and Torro Bah. Knowledge of these institutions was necessary for effective project planning, especially since some of them were included in project management and implementation. Generally, internal institutions, locally referred to as *kafos*, are small-scale committees that depend on community resources for their activities, and tend to have poor organizational development and a lack of strong management structures.

Of the internal institutions identified, the most relevant was the VDC. Village Development Committees were newly established in the Gambia for the purpose of providing a suitable conduit for development agents to engage local communities directly. VDCs coordinate all *kafo* activities and are seen as the main decision making body in the village. Before VDCs were established, village elders (*alkalos*) were the main contact point for entry into a community, a system recognized to be somewhat unrepresentative of the community's interests. The support and involvement of the VDC was critical to any development effort undertaken in the Gambia.

Village Development Committees (VDC) were new to the Lower Saloum area. As such, members of the community-level literacy circle committees were used to organize the first meetings. Village heads, farmers, marginalized groups and anyone interested were invited to participate. The Focus Group Discussion (FGD) format was used to conduct the discussions, and the topics included an introduction to REAP-Canada and ecological farming followed by discussions on village history, landscape change, traditional and recent farming practices, information sharing between farmers, and food security. The project involved the local VDC's throughout project start-up and implementation, including their input into the selection of the farmer trainers, the content and logistics for the training program and the development of the learning farms.

6.1.2 Farmers Associations

One of the most important long-term contributions of the AEV model is the establishment of local farmers associations. The purpose of these associations is primarily to give the farmers larger influence by producing more cohesive goals and objectives as well as to develop local capacity for community action and to continue project activities and impacts long after the project is completed. The CBO's (Community Based Organizations) called Farmers Associations (FA) were formed in each of the beneficiary villages and were capacitized through training programs. They were responsible for community resource mobilization as well as the even distribution of project inputs/implements to the local farmers and farmer trainers.

At the beginning of project implementation, the communities were sensitized about the formation of FAs. Meetings were held in each of the villages to create awareness around the opportunities for such associations. Community members expressed their need for such organizations and decided to establish their own organizations providing open and voluntary membership to all villagers. Having registered the first few members, executive committee positions (i.e. president, vice president, secretary, cashier, auditor and adviser) were selected for each village FA. In addition, each organization developed a full constitution outlining basic bylaws regulating

membership contributions, meeting attendance, group activities, conduct, and management of funds. Following these developments, each FA submitted its application to the Anthony General Chambers for recognition as a legal institution. Please refer to Table 4 for more information regarding the membership breakdown of each Farmer Association.

Table 4: Membership in Local Farmers Associations

Community	Organization Members (to date)		
	Male	Female	Total
Torro Bah	8	27	35
Jahawur Mandinka	59	141	200
Gunkuru Wollof	63	87	150
Total	**130** (34%)	**255** (66%)	**385**

Although the FAs were established on schedule, development in Torro Bah was slow due to a lack of previous community organization as shown in the total membership of its FA. Project staff worked in collaboration with the Department of Community Development through trainings to increase awareness of farmers on the importance of FAs and increased membership is anticipated.

6.1.3 Farmer Trainers

At the beginning of the project, 20 key farmers, both male and female, were identified to act as farmer trainers to other farmers in the local villages. Eight farmer trainers were selected in Torro Bah and 6 in each of Gunkuru Wollof and Jahawur Mandinka. The PRA's first identified potential farmer trainers and sensitized the community about the qualifications desired in a farmer trainer candidate. VDCs were then used to officiate over selection of candidates for farmer trainers and, together with the PMC, later finalized the lists by the end of 2004. This was done in a timely manner to ensure farmer trainers could be trained adequately within the timeframe of the project.

Since their selection, the farmer trainers have been actively involved in project implementation, and were in constant communication with the community and VDC members, acting as the main interface between the project and the community. Farmer trainers have been trained on introductory topics in the ecological farming course. Other potential farmer trainers have also been identified and will build their skills so that one day they may conduct trainings themselves. Of utmost importance to the project team was the involvement of both men and women to participate equally in trainings, both as trainees and as trainers. Through the development of this farmer-to-farmer network, village farmers had the opportunity to gain confidence through participating in and facilitating farmer-to-farmer trainings. The involvement of women as farmer trainers has upgraded their status in their respective communities: the communities are realizing the significant role they play and their willingness to disseminate information.

6.1.4 Farmer Technical Groups

One aspect of the Agro-Ecological Village model for sustainable community development is the establishment and capacity building of farmer technical groups specialized in certain agricultural techniques or approaches over time. These groups are designed to enhance the confidence of local people in creative thinking, emphasizing traditional knowledge. Mixed groups related to gender

specific activities (such as gardening, groundnut production) have been encouraged. The members of these groups were local community farmers that participated at their own interest and accord.

There was some level of specialization with the farmer technical groups established for the GAEV project. Most of the women have specialized in either vegetable or rice production and were responsible for providing technical support and advice to other women farmers in the project areas. Other farmers specialized in fodder production, groundnut, cassava and orchard production or animal management.

The technical groups provided effective, participatory and consensus-based methods in dealing with environmental and socio-economic issues. They selected relevant topics for brainstorming; elaborated discussions and field-testing; researched new information and techniques; and fostered teamwork and cooperation within and between the various farmer groups and local partners.

The technical groups were incorporated in the Project Technical Team (PTT), made up mostly of farmer trainers, other farmer representatives and technical persons from NARI. Capacity building of the PTT was an ongoing process throughout project implementation, and naturally supported the establishment of a farmer-to-farmer training network. This network was principally managed by farmer trainers. Already, the PTT has assisted in creating the social infrastructure to ensure project sustainability after the project is completed by linking farmers in surrounding communities and providing information on ecological farming methods and important new agricultural trends.

6.1.5 Capacity Building of GAEV Project Team Members

Capacity building for staff was crucial to effective implementation of the GAEV project. Capacity building began with the recruitment of a project manager (Mr. Sutay Njie), PM&E officer (Mrs. Kelly Taboureh), project accountant (Marley Jallow), and female community organizer for Torro Bah (Ms. Fatou Panneh). At VATG, capacity building involved the recruitment of a project manager (Abdoulie Jallow), PM&E officer, (Mr. Maye Jawara), project finance officer (Ms. Binta Manneh) and community organizers for Gunkuru Wollof and Jahawur Mandinka (Mr. Majuma Kanteh and Ms. Kaddy Jatou Jallow, respectively).

Staff trainings immediately followed the selection of new staff members (Table 5). Trainings were not exclusive to PMC and PIT members, and included NATC and VATG staff that supported project activities. Members of the Multi-disciplinary Facilitating Team, made up of extensionists from different government departments, were invited to join in order to promote project linkage with government activities. Trainings were intended to improve knowledge and skills in participatory project implementation and monitoring. Sessions exposed staff to ecological principles and different ecological farming practices and techniques while equipping them with the technical background required to grasp project objectives and facilitate project implementation in their respective roles. Trainings for staff included the following:

- Introduction to ecology and ecological agriculture
- Farm and baseline data collection, data analysis and PM&E
- Report writing and proposal development

Table 5. below outlines staff trainings delivered and participation rates.

Table 5. Overview of GAEV staff trainings

No.	Subject	Date	Training Topics	Participants			
				Organization	Female	Male	Total
1	Introduction to ecological agriculture	Dec 16-17, 2004	-Ecological Agriculture -Definition of key terminologies (environment, ecology, ecosystem, biosphere and biodiversity) -Water and energy cycle -Relationships in the eco-system -Agriculture in the Gambia -Factors affecting the environment -Ecological farm practices -Principles of eco-farming -Sustainable agriculture	NATC VATG VATG extensionists	1 2	 4 8	15
2	Baseline data collection	Dec 10 - 11, 2004	-Problem identification -Practice of structural survey in rural areas -Questionnaire development for baseline study -Review of questionnaire	VATG	1	3	4
3	Proposal development & Report writing	Sept 15th & 16th 2005	- What is a report - Why report writing - Contents of a report - Information collection - Simple reporting format - Stages in proposal development - Contents of a good proposal	NATC	1	1	2
4	Practical training on manual spraying methods to combat locust infestation	Aug 22nd 2005	- Health precautions associated with use of a Knapsack sprayer - Spraying techniques - Calibration of sprayers - Types of chemicals used	NATC VATG	2 8	2 1	13
				TOTAL	**15** (44%)	**19** (56%)	**34**

6.1.6 Participatory Rural Appraisal

The PRA took place in September of 2004. It was successful in revealing the communities' agricultural concerns and identifying potential members for community-level committees and farmer trainings. It also increased the capacity of the local organizations to perform their own ongoing appraisals in a flexible and dynamic manner. The problems, causes, copping strategies and opportunities of the community members were analyzed. Their development goals and strategies were outlined, identifying specific activities, targets, and monitoring indicators. The PRA was contracted to Mr. Burang Danjo and a team of PRA practitioners, who organized and oversaw the planning and implementation of the PRA. The PRA Team consisted of:

- Burang Danjo, PRA team leader
- Dawda Kebbeh, VATG Director
- Abdoulie Jallow, VATG GAEV Project Manager

- Kebba Lowe, VATG Deputy Manager
- Kaddy Jobateh, VATG Women's Advocacy Officer
- Massaneh Ceesay, MDFT Kaur
- Sutay Njie, NATC GAEV Project Manager
- Marley Jallow, NATC Accountant
- Mariama Taboureh, NATC PM&E Officer
- Adama Sallah, NATC Kerr Ardo Community Organizer
- Mariama Ceesay, NATC Njawara Community Organizer
- Roger Samson, REAP-Canada Project Agronomist
- Labib El Ali, REAP-Canada Gambian Project Officer
- Sean Sloan, REAP-Canada International Intern
- Shelly Juurlink, REAP-Canada International Intern

The PRA team took one day for PRA planning, followed by four days of activities in each village. First, one day of project sensitization was held in each community, followed by two days of field investigations and preliminary data analysis, then one day of plenary exercises in each community. The objectives of the PRA were as follows:

- To analyze the agro-ecological systems of the two villages
- Identify problems, causes and solution
- Identify key areas where improvements could be made
- Develop an action plan for implementation

The field investigations consisted of:

- Transect walk across a cross-section of the village and its surroundings in order to develop an understanding of village space eco-systems
- Venn diagrams to understand community links and relationships with other institutions
- Resource mapping to look at different resources available to the community and their current use to the community
- Seasonal calendars (crops and vegetables) to assess the seasonality of different activities
- Trend lines to indicate important changes in the communities including food security, environmental health, forest cover and precipitation
- Gender analysis on roles, activities, and resources to find out who has ownership, access and control of the community's resources
- Flow charts to understand problems and causes
- Poverty assessment to clarify basic conditions in the communities, including incomes and expenditures

The plenary discussions involved a large group of at least 40 participants, encompassing adults and youths of both sexes in nearly equal numbers. The large groups were often broken up into smaller focus groups that were responsible for a specific topic identified by the larger group to be of main concern to the community. The small groups then assembled to present their findings and engage in a group categorization exercise. The plenary discussions generally followed the following sequence:

- Identification of general community concerns and specific agricultural development constraints
- Revealing the causes to the identified problems
- Brainstorming on possible solutions for the causes of the agricultural problems
- Project Action Planning

The sessions also presented an opportunity for REAP-Canada to sensitize the community about the project's mandate and the issues that it can address. In this way the community was free to openly discuss all their pressing issues, while maintaining a level of awareness about what can be practically accomplished through an ecological agriculture development project. This was found to be an effective way to familiarize the community with the project structure and its purpose. The PRA report includes detailed tables, diagrams and documents progress through PRA implementation. In summary, the most pressing issues raised by the community included the following (in order of importance):

- Poor soil fertility
- Degrading environment
- Lack of adequate farm implements and inputs
- Lack of improved planting materials
- Striga infestation
- Crop pest and disease
- Low crop yields
- Salt intrusion
- Soil erosion
- Termite attacks in the vegetable gardens

6.1.7 Baseline data/information collection

Prior to the commencement of implementing ecological farm practices, baseline data was collected in each of the villages. This was meant to establish the baseline status of beneficiaries, providing information critical to the development of project activities, and to act as a benchmark for future evaluation and end of project impact assessment. A total of 30 baseline respondents were interviewed in Gunkuru Wollof and Jahawur Mandinka (15 each), and 20 in Torro Bah. The respondents were chosen at random and evenly selected from across the communities including men, women, farmer trainers and community farmers. The survey covered areas which reflected the objectives of the project. They included:

- Knowledge and awareness on ecological farming
- Existing farm practices known and practices, their advantages and disadvantages
- Cost of production
- Production levels and productivity
- Average crop yields by crop
- Ownership, control and access to farm implements
- Animal rearing systems
- Constraints faced by farmers
- Income and expenditure analysis

Please refer to Annex 4 for a full report of the baseline findings. As a summary, the following conclusions were found from analysis of the baseline data:

- The majority of respondents were illiterate in the official language (English), though some (mainly men) are literate in Arabic.
- Peoples knowledge about organic farming systems is very limited and training is needed in order to increase farmers understanding of ecological farming practices.
- Knowledge of current farming practices is mostly inherited from previous generations. That is why advantages or disadvantages of many farming practices may not be expressly known. Though some of the advantages and disadvantages mentioned by the respondents are indicative of their years of experience, additional training would make their farming systems more ecologically sound and productive, with the farmers improving their management and control over their agricultural situation. Critical analysis of local farming systems is an important training need.
- Groundnut cultivation occupies more than half of all farm fields, which is a cash crop.
- Most of the farming labor is derived from household / family level which means not much cash is spent on this.
- A cost-benefit analysis of the farming inputs and outputs indicates that the current system is not economically beneficial. This is due to the high "estimated" value of labor inserted into the analysis for which the farmers are not actually paid as most labor is performed by family members. When considering this analysis however, it is important to note that it is only groundnut that is actually sold for a profit. All other crops are grown as food and eaten in the household directly instead of purchased. Therefore, their actual value is underestimated considering what it would actually cost the family to purchase these essential goods in the market with their earnings.
- Most of the respondents are keeping some animals. Traditional animal rearing systems are based on the free ranging system. To make farming systems more integrated and ecological sound, training in improved animal management systems is a necessity, especially to make the best use of the animal manure in order to raise soil fertility levels. Use of animal manure is more common in Torro Bah, though additional training can make the farmers more efficiently use this widely available resource.
- Lack of farm implements as well as seeds is a major constraint to farmers. Any support in this area would really help farmers to improve in their farming activities.
- Low soil fertility levels (and therefore poor yields) are a large problem in most villages, particularly Gunkuru Wollof. This issue is known and emphasized by the farmers themselves. The low yields indicated in this report are likely connected with this poor soil fertility management. Proper ecological methods will improve soil fertility and therefore productivity if applied appropriate on their farms. Soil fertility management is not really practiced. More than half of the respondents are not supplementing any lost of soil nutrients by organic or non organic fertilizer. In contrast however, almost half of the respondents also indicated they use animal manure on their farms, which is far more than the number of respondents who applied non-organic fertilizers.

6.2 Farmer-to-Farmer Training and Farm Planning

6.2.1 Farmer to Farmer Trainings

The farmer-to-farmer training process allowed local farmers to take the lead in community capacity building. The investment in empowering and training farmers generated a high capacity to continue the development process. Additionally, the investment in strengthening the farmers' institutions and developing bottom-up training programs to compliment the traditional top-down infrastructure were key features that will help continue the development process in communities beyond the project's lifespan.

During the initial phase of this project, 20 key local farmers were identified to act as lead trainers to the other farmers. The farmer trainers selected are experienced farmers who have proven their dedication to the advancement of farming, were highly motivated and had a progressive and resourceful community development orientation. Eight farmer trainers were selected in Torro Bah, 6 in Jahawur Mandinka and 6 in Gunkuru Wollof. There was equal representation of male and female farmer trainers in each village. Farmer trainer selection was done by the members of the community and the VDC. The criteria for selection included land ownership, involvement in farming, permanent residence in the community, willingness to sacrifice time for others, willingness to take measured risks and adopt new techniques, and influence in the household.

Farmer-to-farmer training was initiated by directly providing farmers with structured trainings and on-the-job coaching. Farmer trainers benefited from being the first to work with improved plant materials and ecological methods on their learning farms. They took the lead in adopting the AEV development model and strengthening the farmer-to-farmer training network on ecological methods and principals. The farmer-to-farmer training activities were carried out on the learning farms where a successful ecological farm practice had been demonstrated.

6.2.2 Training Module Development

The capacity of farmer trainers was developed through a ladderized (step-by-step) training program, where technical sessions were presented in an order of increasing difficulty. Sessions were structured around ecological farming training modules adapted to the Gambian agricultural situation, climate, and environment. The language was modified to fit local education models and levels of literacy. The participatory, problem-solving nature of the training program was designed to energize the farmers and encourage them into action in their communities. This was followed up by technical trainings on ecological farming, including field trips to learning farms that employed sustainable agriculture principles at various stages, mentoring through farm visits and individualized on-the-job coaching by trainers.

The PRA and PAP sessions carried out in the communities were useful in initially identifying key areas of interest for module development that would benefit the local farming communities with trainings customized to each community's needs. The PM&E officer was very active in assessing the appropriateness of the trainings by comparing both the participants' and trainers' expectations and feedback. The analysis was used to modify future lesson plans.

Table 6 documents a complete list of training modules completed and their sources. Some of the existing modules were initially developed through the GEAD project but have been improved and modified during the GAEV project. The modules were subjected to continuous review and

refinement to suit different beneficiaries and local customs. In addition, with their increasing experience project partners contributed to module development.

Table 6: GAEV Farmer Training Modules
Agro-Ecological Village Project Orientation
PRA (Participatory Rural Assessment)
Staff training on the principles of ecological farming
Staff training on baseline data collection
Introduction- Principles of ecology and sustainable agriculture - Ecological Principles -Agriculture in the Gambia -Ecological Farming
Soil Fertility and Organic Components of Soils -Introduction to Soil Fertility and tropical soils -Soil Properties ▪ Physical ▪ Chemical ▪ Biological -Organic components of soils ▪ Organic Matter ▪ Composting ▪ Manure management
Cropping Systems -Basic Principles -Benefits of cropping systems -Examples of Crop Rotations -DIFS (Diversified Integrated Farming Systems)
Green manures and cover crops
Disease, Pest and Weed Management*
Soil and Water Conservation
Livestock Management
Agro-forestry and nursery management
Horticulture and Dry Season Vegetable production
Cassava and sweet potato production
Food processing, preservation, storage and marketing
OJC (On the job coaching/mentoring)
Hungry season food security
Leadership and Group (CBO) Management
Gender*
Plant improvement (adaptability, farmer-led breeding)*
Seed conservation, plant material propagation and multiplication*
Sesame production & orchard development*
REFLECT Literacy Method

**modules have been incorporated into larger training topics*

6.2.3 Training of Farmer Trainers

Several training sessions were designed for the project and aimed at building the capacity of the farmer trainers, who then acted as facilitators in the farmer-to-farmer training programs. During

the course of the project the following training subjects were addressed. Table 7 outlines the details of this training program.

Table 7: Overview of GAEV Trainings Delivered for Farmer Trainers

No.	Subject of Training	Topic	Date	Location	Male	Female	Total
1	Introduction in ecological agriculture	- What is ecological agriculture, its principles and disadvantages - Basic Agro forestry - Adult learning - Water and nutrient cycle - Relationship between humans and the environment - Moving towards ecological farming	Dec 16-17/04 Feb 22-23/05	NATC VATG	4 6	4 6	20
2	Group management	- What is a group? - Leadership selection - Leadership roles - Management Skills - Recordkeeping - Communication skills - Resource mobilization & utilization - Role of CBO in project implementation and village level organization	Mar 10-11/05 Dec 13-14/04	NATC VATG	4 6	2 6	18
3	Dry season vegetable Production	- "Hungry Season" Problems and sources of income and food during these months - Overview of skills to increase production - Site Selection - Nursery Preparation - Bed Preparation - Compost making - Sowing, transplanting and spacing	Nov 4-5/04	NATC	2	2	4
4	Food processing and preservation	- The importance of food preservation for income generation and health improvement - Materials required for food processing - Hygiene during food processing - Processing of vegetables and fruits into jams including preserves from cassava, tomato jam, papaya, baobab and sorrel and pepper sauce.	Mar 17-19/05	NATC	0	4	4
5	Gender for CBO leaders – Part I	- What is gender? - Gender tree - Gender roles and inequity - Gender and development - Obstacles to women's involvement in development work and decision making	Jan 31/05	NATC	3	1	4
6	Gender for CBO leaders – Part II	- Gender stereotyping - Gender and Islam - Women in development - GAEV gender strategy	Aug 15-16/05	NATC	10	11	21
7	Soil fertility management	- Introduction to soil - Biological properties of soil - Organic matter and its importance - Organic component of soil and various cropping systems - Organic fertilizers and compost - Nursery management in the wet season	Jun 17-18/05	VATG	7	7	14

		- Vegetable production in the wet season					
8	Soil and water conservation	- Analysis of soil erosion problems in the field - Solutions to problems; soil conservation practices - Transect walk - Analysis of field visit	Oct 29-30/04	NATC	4	4	8
9	Pest disease control / Soil conservation	- Definition of pests and diseases - Types of pests and diseases - Nature of damage caused to crops - Various control methods - Cultivation of resistance - Modes of disease transmission - Economic impact of pests and diseases - Soil and its importance to crop growth - Soil conservation - Effects of various farming systems on soil conservation - Soil and water conservation management	Jul 29-30/05	VATG	7	7	14
10	Livestock management	- Concept of animal management - The characteristics of a suitable site for animals - Feeding - The reproductive systems - The digestive systems - Animal improvement - Animal management systems - Breeding systems	Dec 21-23/04	NATC	4	4	8
11	Agro-forestry and nursery management	- Concept of agro-forestry - Farm boundaries and live fencing trees - Characteristics of good species - Nursery management	Dec 21-23/04	NATC	4	4	8
12	Cassava and sweet potato cultivation	-Land preparation -Manure application -Cultural practices -Pest and disease management	Aug 15, 16th 2005	NARI NATC	4	4	8
	TOTAL				**65** (50%)	**66** (50%)	**131**

Specific trainings on the following topics were not performed separately since they are integrated into other training modules and extension programs:

- Green manures and cover crops
- Weed management control
- Plant improvement (adaptability, farmer-led breeding)
- Seed conservation, plant material propagation and multiplication
- Sesame production & orchard development

During implementation, the project held a total of 131 individual training sessions with farmer trainers through 15 training sessions. In these meetings, 50% of the participants were female. NATC hosted most of the trainings because of their previous experience with the GEAD project and their high capacity to deliver such trainings. VATG began to develop its capacity around the training of trainers after the structuring and staffing of VATG was completed. Training of farmer trainers was carried out by NATC and NARI staff, as well as agricultural specialists and technicians from other agencies. Besides the meals provided, farmer trainers received no reimbursement. This ensured that the interest of participants was in the education provided, not in

immediate monetary compensation. Aside from official trainings, farmer trainers were also being supported by On-the-Job Coaching during site visits and by individual visits to the training center at NATC. They were in frequent contact with the project coordinator, project manager, and community organizers and received feedback and updates on the local farming situation.

6.2.4 Farmer Trainings

Systematic training of the farmer trainers with training modules using the ladderized training method began in May of 2005. Leadership and group management trainings were also delivered in coordination with the establishment of the FAs. Before then, Agro-Ecological Village orientations were the first exposure farmers had to the ecological farm principles from REAP-Canada. The PRA also offered many opportunities for clarifying basic ecosystem principles and ecological agriculture approaches with the farmers. During implementation, the project included a total of 75 individual training sessions held with community members. In these sessions, 53% of the participants were female. Please refer to Table 8 for a complete list of the GEAD farmer trainings conducted to date.

Table 8: Overview of GAEV Trainings Delivered to Community Farmers

No.	Subject of Training	Topic	Date	Location	Male	Female	Total
1	Introduction to ecological agriculture	- What is ecological agriculture? - Principles of ecological agriculture - Moving towards ecological farming - Advantages of ecological farming - Water and nutrient cycle - Role of trees and tree planting	May 17/05	NATC VATG	10	10	20
2	Group management	- Why form a group - Role of CBO - Leadership selection criteria - Rules and regulation - Group activities	May 18/05	Torro Bah Gunkuru Wollof	16	10	26
7	Soil fertility management	- Introduction to soil - Soil identification - What is OM - Preparation of compost - Land preparation for upland crops	June 10/05	Torro Bah Jahawuru Mandinka	9	16	25
12	Cassava cultivation	- On the Job Coaching: Field visit	Aug/05	Torro Bah	0	4	4
	TOTAL				**35** (47%)	**40** (53%)	**75**

The trainings provided through the farmer-to-farmer network provided an avenue for farmers to learn new innovations from their peers. This has proved quite successful since farmers associate less risk with new ideas from other farmers and adopt them more quickly than from any other source. During the trainings, farmers exchanged ideas and views on their practical experience, knowledge and success stories. The program was very useful in supporting the adoption of ecological farm practices as farmers learnt from their neighbors and peers facing the same environmental and economic situations as themselves. The farmer trainers carried out the farmer to farmer trainings on their learning farms so that the other farmers could see the actual results of the

new farm practices. They also visited farmers on their farms and helped them to apply some of the new knowledge they had gained. Women's participation as both trainers and participants in the trainings was very high. They are now proving extremely committed in transferring the knowledge and skills they have acquired to their fellow farmers.

6.2.5 Farm Planning

The communities underwent sufficient training in basic ecological agriculture principals and engaged in a simple farm diversification planning process. The initial stage involved the training of the farmer trainers in ecological farm management. The farmer trainers then provided support to other farming families to create simple action plans for their individual farms, including workplans and predicted expenditures for the proposed farm transformation and diversification. Farmers then adopted sustainable farming strategies, including how to conserve water and soil, improve local soil quality and minimize the use of synthetic pesticides and fertilizers. Individual farm transformations included intercropping, diversified vegetable and grain legume production, organic rice cultivation, improved crop rotations, recycling of farm crop residues, application of animal manure on farm lands, use of neem powder, and sustainable agro-forestry activities. The farm planning process provided the basis for farm transformation.

The ecological food footprint analysis was used to develop local farm planning. This was a simple and effective tool that provided a relevant and clear representation of household food consumption by first quantifying the amount of land required to grow the main agricultural components of household food requirements. Annual household consumption amounts (kg) were divided by production levels (tonnes/ha) for each crop to give the land requirements in hectares for each food component. The food footprint for each crop was then summed to give the total land area required to feed a household.

Farmers already understand the importance of better planning of farm activities**.** The low level of literacy amongst the farmer trainers has affected effective planning processes. Literacy training sessions assisted in improving the participant's reading and writing skills, and in advancing farm planning.

The details of farm plans included the following:

- Crops planned to be grown
- Area covering each crop
- Seed requirements (internal or external)
- Implement requirements (internal or external)
- Agro-forestry practice and trees to grow
- Cropping systems and rotations
- Soil improvement practices

These plans gave the PMC and PIT an idea of how the farmer trainers developed their farms during the rainy season and how best to introduce agricultural methods and improved plant materials into learning farms. Planning tools such as seasonal calendars, the food footprint, transect maps, workplans, cropping systems and rotation information, 5 and 10 year land use goals, and predicted expenditures were used in the farm planning process.

6.2.6 Women and Trainings

It was essential that women were enlisted as trainers in the farmer-to-farmer training program. The purpose of this was threefold. First, it built the capacity of individual women as trainers. Second, it engaged women as active participants in the project and, ultimately, in the community. Third, women are most receptive to learning from other women. This was one of the most challenging aspects of the programming as the women in these communities were poorly educated and painfully shy. However, we recognized that the involvement of women in every aspect of the project was fundamental to the improvement of the quality of life for the farmers, for the cohesion of the communities, and for overall project success.

Participation of women in farmer trainer trainings was equal to that of men with an average participation rate of 50% women in the trainings, and 50% of farmer trainers being women. This was an extremely encouraging turnout in light of the heavy workload that women are under all day long and is an indicator of their commitment to the project and the improvement of their community. It also indicates the effectiveness of the trainers and facilitators in involving women in the training sessions and making them of benefit to both genders.

The GAEV project shifted traditional roles by putting valuable knowledge in the hands of women and through specializing farmer trainers in topics of their interest. Through farmer training women gained the confidence to voice their concerns and opinions on topics which men have traditionally dominated. Women developed their potential to secure their own livelihood through increased and sustained agricultural production, thereby gaining some measure of economic independence even during the post-project period.

6.3 Learning Farm Development and Plant Material Improvement

6.3.1 Learning Farm Establishment

Learning farms broaden development efforts by integrating several key ideas and farming techniques on one “regular” farm. By avoiding the concept of a terminal “Model Farm” with one external model farmer, learning farms place local farmers and their farms at the center of learning in the community. Farmers feel the terminology “Learning Farm” is progressive as it does not create an image that a farm is “fully developed or perfect” or encourage arrogance within a community. Farmers want to put the emphasis on farmer trainers creating a small commercial farm that is sustainable without outside support so that the development process can be feasibly replicated by other farmers. Learning farms are not communal spaces, but are meant to demonstrate that environmentally sensitive changes can be made by “regular” farmers on their “average” budget to significantly increase food security and diversity of nutritional sources, and restore soil fertility.

The project learning farms were coordinated by farmer trainers or other interested farmers that were willing to share their experiences and ideas. In this way, the farmer trainers spend time working on maintaining and improving their own individual farms while strongly supporting community initiatives and the sharing of information and plant materials in the community. This established a stronger connection between the test trials and the ecological trainings, and has been ideal for farm visits and “out of class” field trips.

Each of the 20 farmer trainers volunteered to allocate a portion of their farm for the development of ecological farm practices. Farmer trainers were the first among the community to participate in the Introduction to Ecological Agriculture training course and, as such, were the ideal candidates for taking on learning farm activities. The average size for these plots was 0.25 ha for upland crops but smaller in the rice fields and in areas used for seed multiplication. The plot sizes on the learning farms were minimal due to the risk associated with allocating a family's entire production area as a trial farm for new ecological practices and the introduction and testing of new varieties. The AEV model does not encourage farmers to take risks with their food security while testing out new cultivars; therefore small test areas were emphasized.

The farm plans were coordinated under the guidance of farmer leaders, village coordinators and REAP-Canada, NATC, VATG, and NARI support staff. The learning farms were created in late May and early June when the rains began in the project area. Table 9 details the crops and practices that were implemented on the learning farms.

Table 9. Overview of Crops and Ecological Farm Practices Implemented on Learning Farms

Type of Crop	No. of Female's			No. of Male's			TOTAL	Ecological farm practices applied
	Jahawur Mandinka	Gunkuru Wollof	Torro Bah	Jahawur Mandinka	Gunkuru Wollof	Torro Bah		
Rice	1	2	4		1	1	**9**	• Application of groundnut shells and compost in place of chemical fertilizers • Introduction of improved short duration variety (NERICA)
Ground nut		1	4	2	1		**8**	• Organic seed dressing with neem powder • Intercropping with sorghum/millet and cowpea • Alley cropping with *Acacia albida* • Farm boundaries with *Gliricidia*, *Cassia simea*, *Cordila pinata* for wind breaking • Restricted burning of previous crop residues
Early millet		1	2		1		**4**	• Intercropping with cowpea for n-fixation and Striga suppression • Application of groundnut shells for Striga suppression and soil fertility improvement • Alley cropping with *Acacia albida* • Farm boundaries with *Gliricidia, Cassia simea, Acacia nelotica*
Maize	1		1				**2**	• Intercropping with cowpea for Nitrogen fixation and cover cropping for Striga and weed suppression • Application of groundnut shells for Striga suppressions and soil fertility improvement • Compost application • Alley cropping with *Acacia albida* • Farm boundaries with *Acacia nelotica*, *Cassia simea, Parkia biglobosia* • Introduction of improved short duration varieties (Jeka)
Sweet potato & cassava	1		4			4	**9**	• Crop diversification • Promotion of drought resistant crops to improve food security
Fodder Bank						1	**1**	• Introduction of fodder grasses such as *andropogon, brachiaria* and *stylosanthus* • Introduction of fodder trees such as *gliricidia* • Semi-intensive livestock demonstration • Live-fencing for livestock operations
Vegetables	2	3	2			1	**8**	• Promotion of live fencing (agro-forestry practices) • Crop diversification. • Income generation. • Introduction of improved varieties

During the planting/growing season farmers were involved in several activities on their learning farms including developing and recording new techniques and crop materials. Crop trials for various agronomic traits, performance and yield were performed on new and previously tested varieties to confirming characteristics of varieties with high adaptability to local conditions. Livestock systems were developed based on priorities identified by the community through the PRA process. The overall goal was to encourage farmers to take a more active role in developing participatory on-farm research as a tool for accelerating their plant and farming systems improvement. Through this process, farmers gained a better understanding of the links between themselves and their environmental conditions. Please refer to Table 10 for actual average yields per hectare for different crops grown on learning farms.

Table 10. Overview of average yields of crops grown on Learning Farms

Crop	Average yield Baseline study 2004 (kg/ha)	Average yield learning farms 2005 (kg/ha)	Number of learning farms assessed
Rice	451	1614	7
Groundnut1[1]	937	1978	8
Early millet	541	1347	6
Maize	320	1629	2
Vegetables	n/a	n/a	-
Sorghum	n/a	n/a	-
Total			23

Land ownership in the Gambia is not restricted to men. However, the traditional patriarchal hereditary structure makes it very difficult for women to find themselves the beneficiaries of land inheritance, which is the common system of acquiring new farm land in poor rural communities. The GAEV project addressed this gender inequality by including land ownership or secured long-term accessibility to family land as a key criteria for farmer trainer selection. Currently, at NATC land ownership is a standard criterion used in selecting adult and youth students to ensure wide and long-term impacts. Women who have successfully completed the agricultural training at NATC were almost always respected in their rural communities as having the right to develop their own farm and farming skills. Furthermore, in the case of flood-land for rice-production, it is common in the Gambia for owners on large tracts of land to permit poorer families to cultivate their land for the year. No learning farms were established through this system, though it does allow for even the poorest families to experiment with ecological methods with land that would otherwise be left fallow.

6.3.2 Collection and Distribution of Improved Plant Materials

NARI's cooperation with NATC and VATG in this project provided an opportunity to further the development of the participatory plant material improvement program as a means to respond to the urgent need for improved materials in the harsher areas of the Gambia. Varieties of improved plant materials and crop varieties were collected for the development and establishment of learning

[1] The low groundnut yield is due to the poor quality of groundnut seeds supplied to the farmers. Poor germination rates led to poor yields. Though additional to the groundnut yields per hectare the farmers harvested additional sorghum, early millet of cowpea as intercrop.

farms. The following improved seeds and plant materials were collected, distributed and planted at the beginning of the growing season.

- Vegetables: eggplant, sweet pepper, hot pepper, okra, tomato, cowpea, pigeon pea, Jordan black bean, sweet corn, eggplant lettuce, cabbage, bitter tomato, onion
- Fruit: melon, sorrel, mango, cashew, orange, pawpaw, banana.
- Forage Grasses
- Agro-forestry: *Gliricidia, Cassia samia*
- Rice: NeRicA
- Cassava and sweet potato

Additionally, improved plant varieties of the following species were introduced and cultivated through various methods of intercropping at the beginning of the growing season.

- Improved maize varieties (Jeka) intercropped with cowpeas/pigeon peas
- Groundnut (7333) intercropped with Sorghum, millet or cowpea/pigeon peas
- Millet intercropped with grain legumes

Plant materials were distributed through the FA's. These associations had guidelines for local seed-banking, with the successful varieties multiplied and distributed throughout the communities.

6.3.2.1 Vegetable and fruit production

In collaboration with NARI, new varieties of principle vegetables were introduced under ecological management. Women vegetable growers in Torro Bah and Jahawur Mandinka were particularly active in embarking on dry season vegetable production. Farmer trainers in all three communities planted fruits and vegetables on their own learning farms, however in Lower Saloum an additional 0.5 ha vegetable garden was created for a rainy season vegetable demonstration. VATG supported farmers in Lower Saloum with seeds for cowpea, pigeon pea, pepper, sorrel, cabbage, onion, okra, bitter tomatoes, big tomatoes, mango, cashew, orange, pawpaw and banana. VATG continued to multiply the sweet potato provided by NARI during the last rainy season. The project supported farmers in Torro Bah with tomato, sweet pepper, lettuce, eggplant and cabbage seeds and onion seedlings. These crops were of higher preference as they adapted to the local conditions and attracted good market prices.

Following crop maturity efforts were made to identify cultivars with pest resistance and drought tolerance, as these are major problems found in local vegetable production. The identified cultivars will be multiplied by farmers in the future. The development of community seed banks and local seed distribution will continue to be supported by the trials on the learning farms and community gardens and the training of local farmers in seed conservation and plant material replication.

Table 11. Vegetable production – list of types and varieties and overall performance

Vegetable	Performance
Onion	Onion performance during wet season has not been very good. It performed well at vegetable stage before bulbing. The leaves were very good and attracted good market but due to continuous rains, bulbing was hindered. Onions in general in the

	Gambia are easy to grow, they do not suffer pest or disease attack. They are recommended to be grown on a larger scale, with seed availability as the largest restricting factor.
Cabbage	The Coppenhagen market variety performed better than the KK cross during the rainy season. This variety is recommended for upscale.
Lettuce	Performance during the wet season just as good as during the dry season.
Tomato	Performance during the wet season just as good as during the dry season but attracted more pests.
Bitter tomato	Performance was much better than during the dry season. This is recommended as important for food security.
Hot and Sweet peppers	Performance during the wet season was quite good and women generated a lot of income from these crops.
Jordan black bean	Poor performance: no fruits up to the end of the rains.
Sweet corn	Good performance.
Garden eggplant	Good performance.
Cocoyam	Good performance and not preferred by animals.
Kang Kong	Failed due to poor attendance by farmers.
Norman Pole snap beans	No germination at all.

6.3.2.2 Forage Grasses and Stray Animals

A major problem in the Gambia is stray livestock, which is one of the most significant impediments to the advancement of sustainable farming. Fundamental to resolving this problem is to develop a more productive fodder production system by either grazing or cut and carry forage production. An assessment was done by REAP-Canada of the available forage production options for the North Bank Division and Lower Saloum Division. The most common livestock for food production were goats (dual purpose milk and meat) and sheep for meat production. Currently there is limited emphasis on fodder improvement in the Gambia although livestock play a major role in the agricultural economy.

The most promising grass species identified by REAP-Canada for the region were *Brachiaria, brizantha* and *Andropogon gayanus*. *Brachiaria brizantha* (Toledo variety) is the main species used for grazing in central Brazil and is highly successful for improving milk production and farm income in the dryland areas of central America. The main advantages identified with *Barcharia brizantha* in studies on tropical milk production was that it had low neutral detergent fibre and lignin contents, leading to increased intake and rate of digestion. *Andropogon gayanus* was a native species to the Gambia and was already being used in the villages for erosion control berms. The main use suggested for *Andropogon gayanus* was as a supplementary species as it provides forage later into the dry season than *Brachiaria brizantha*. Also, *Andropogon gayanus* is better adapted to low fertility soils. As many of the farmers cannot afford fertilizer, *Andropogon gayanus* can be readily adopted by all farmers. In the dry season the most viable dry season fodder grass identified was fodder cane. This species was used in central and South America and was best when chopped to maintain livestock during the lean months. Sources of *Bracharia brizantha* and several other warm season grass were sourced from the Dairy Research Centre in Los Banos Laguna the Philippines.

Several promising species of legumes were identified to mix with the fodder grasses to improve forage production and quality and reduce the need for nitrogen fertilizer. *Acacia albida* is a local leguminous tree species. It sheds its leaves and fruit at the end of the dry season/beginning of the rainy season, providing significant fodder for grazing animals. Forage legumes identified as promising species for legume-grass mixtures included *Stylosanthus guianesis* (variety Stylo 184) and *Arachis pintoi*. These species would require controlled grazing or cut and carry management to maintain stands. They are excellent choices for farmers to avoid the need for nitrogen fertilizer; however they are more difficult to maintain and require further management skills.

Another recommended tree fodder for production and multiplication is Gliricidia. This tree was tried in the project area and proved to perform well. Semi-intensive livestock trainings were delivered to farmer trainers and community farmers, and some semi-intensive livestock demonstrations were established at the project sites. A community member from Torro Bah undertook a semi-intensive livestock management system and was supported by the project.

Bracharia brizantha, Stylosanthus guianesis and vegetative materials of *Andropogon gayanus* (native variety) seeds were provided to NARI for assessment in the Gambia. The materials were planted at the onset of the rainy season in May and assessed for viability. The feedback from NARI indicated that the seeds were not viable even though they were tried under several conditions. Therefore, trials on learning farms were not possible due to lack of survival.

A lack of fencing materials increased damage to the test-plots by livestock. Live-fencing, the practice of planting thorny species in tight rows, was the most promising option to alleviate this problem. A number of species including *Acadia laeta* and *Zuzuphus mauritania* had previously been assessed at NATC and seedlings of the most promising species were made available to farmers for multiplication.

6.3.2.3 Agro-forestry

Nurseries for multi-purpose trees (MPTs) are being raised at NATC for agro-forestry activities. The long-term goal is to develop agro-forestry systems like the Parkland System initiated in Senegal, which involves appropriately spaced native trees to increase soil fertility and reduce wind and water erosion. As well, the trees provide economic benefits such as fuel wood, fodder production, building materials, fruit/food production and environmental benefits such as soil erosion control, wind breaking, nitrogen fixation and live fencing.

Agro-forestry practices were employed in learning farm development and trainings. The establishment of tree nurseries in the Gambia is best begun in January in order to transplant seedlings at the ideal time during the rainy season. Seedlings from the project tree nurseries which begun last year were used on the learning farms during the 2005 planting season. The initial results can be seen in the Table 12 below however, the ideal time to assess survival rates is the beginning of the next rainy season in June 2006.

Table 12: Overview of Multi-Purpose Tree (MPT) Species planted in the GAEV project

Name of tree species	Use and purpose	Village	Total number of trees	Survival (%)

			planted	
Malifara	Live fence around community garden	Gunkuru Wollof	149	96
		Jahawur Mandinka	60	
Gamtel Tree(Holisera)	Windbreak for learning farm boundaries	Gunkuru Wollof	78	100
		Jahawur Mandinka	75	
Leuceana	N-fixing tree, fodder, wood source and windbreak for learning farm boundaries	Gunkuru Wollof	60	93
		Jahawur Mandinka	188	
Sour Lime	Fruit production and shade provision in households	Gunkuru Wollof	60	100
Cashew (early variety-Guinea Bissau)	Fruit production and shade provision in households	Gunkuru Wollof	200	100
		Jahawur Mandinka	41	
Eucalyptus	Windbreak and wood source on farm boundaries	Jahawur Mandinka	90	100
Acacia Leita	Live fencing	Torro Bah	200	95
		Total Trees Planted	**1201**	**97**

6.3.2.4 Rice production

Even though rice is the staple food in the Gambia, its production was quite low in the two project villages due to low soil fertility, increasing salinization and declining rainfall in the region. In particular, Jahawur Mandinka experienced high salt intrusion in their rice fields due to lack of rainfall throughout the year. Women, who are the main rice growers, grow low-yielding local varieties on a very small scale. The introduction of New Rice for Africa (NERICA) raised the potential for increased rice production in rural Gambia. The NERICA rice is a short duration (early maturing) improved rice variety. It is drought tolerant and easily adaptable to the local environment. NARI distributed NERICA seeds to the farmers for testing and multiplication at the beginning of the rainy season in May. Adaptability trials were established in the AEV communities and on the individual farms of the farmer trainers to determine the suitability of these strains compared to present plant materials in use by the communities. During the period under review, the performance of this crop was highly impressive according to the participatory field research collected. Alasan Gaye, one of the farmers growing the rice commented "if the trend of things remains the same till harvest, I expect three to four times my usual harvest." Average yield data collected from the learning farms indicates that indeed the yields for NERICA increased three times above the baseline yields previously achieved by farmers. This could have increased further if plantings were not delayed by late delivery of seeds from the NARI material propagation centre.

The application of groundnut shells in the rice fields were not tested during this project due to limited access of peanut shells in the Lower Saloum area. However, the application of animal manure was tested due to easier access to this material at the project sites. This technique improved plant growth, plant development and the water holding capacity of the soil.

6.3.2.5 New cassava and sweet potato

As part of our collaboration with NARI, new sweet potato and cassava cuttings were provided to farmers in the project's beneficiary villages at the beginning of the rainy season in May. This

improved farmers' access to a diversity of crops that were adapted to local conditions and contributed significantly towards attaining food self sufficiency and food security. At the time of writing this report the cassava was still doing well even though the rains have stopped. This shows its tolerance to drought/dry conditions. The sweet potato was doing equally well but late delivery from the NARI material propagation centre resulted in late planting and digging is yet to take place. It is hoped that successful plant materials will be multiplied for more farmers to access them in the future.

6.3.2.6 Intercropping

Several intercropping initiatives were developed during the growing season from May to August, including the following:

Maize intercropped with cowpea and pigeon pea
The main source of food for most people in the project villages is millet and maize (corn), pounded and processed into *cherre*. Any attempt to reduce poverty through securing food self sufficiency in these areas must include the promotion of sustainable cereal production. In view of this, the project introduced an improved, early maturing, high yielding maize seed (Jeka variety) to farmers in the area through collaboration with NARI. In addition, improved cowpea and pigeon pea seeds were provided to farmers for multiplication and eventual use as a supplementary food source. The new maize variety performed well and growers anticipate good harvest. The practice of intercropping will provide farmers with a second harvest from the same land and access to a more varied food supply.

Groundnut intercropping with sorghum, millet, cowpea or pigeon pea
Groundnut monocropping is the main income generation crop in the Gambia. Although this increases income generation, it also increases the risk of significant crop loss due to pest and disease outbreak, makes farmers vulnerable to international fluctuations in commodity prices and leads to long-term degeneration of the soil. To reduce the risk of groundnut seed shortages as experienced previously country-wide, farmers were advised to intercrop groundnut with sorghum, millet, cowpeas or pigeon peas. Sorghum acts as a windbreak for groundnut, yields well, and has minimal impact on shading of the groundnuts when it is planted with wide spacing. Through the GAEV training program, local farmers became aware of the advantages of intercropping, which include the double harvests that can be collected, the nutrient supply and higher soil nitrogen provided by the legumes and wind and soil erosion control.

Millet intercropped with cowpea
Another need that was identified by the local partners during the project was to develop a successful system for millet intercropping. Farmers generally do not like working in millet as it is highly abrasive and believe that the shiny millet leaves increases heat stress. After reviewing the research literature it appeared several systems needed to be assessed in 2005. Field tests have indicated that cowpeas seemed to work better than groundnuts as an intercrop. According to International Institute for Tropical Agriculture (IITA), a promising system is two rows millet and four rows cowpeas. Cowpea is sown 2-4 weeks after millet planting. Both the millet and cowpea varieties need to be optimized for the system. IITA researchers identified cowpea varieties that were highly suppressive of striga, and this trait was incorporated into leading varieties in West Africa. Other advantages of the system are increased nitrogen supply, reduced potential for pest

incidence, ease of management of the intercrop and spreading of the harvest labour as the crops are harvested at different times.

6.3.2.7 Bokasi Fermented Organic Fertilizer Production

Production of Bokasi Fermented Organic Fertilizer and Indigenous Micro-Organisms (I.M.O.'s) was begun in the communities and lead by REAP International Intern David Crowley. Bokasi is an organic fertilizer originating from Japan and now famous around the world. It is a fermented organic soil amendment that contains indigenous microorganisms from local soil and worm casings, which are beneficial to plants and can dramatically increase soil fertility. Microbes are multiplied on a substrate of carbonized agricultural residues (typically burnt rice hull) with high populations obtained by adding sugars from natural fruit juices and other sources. Bokasi is ready for use after only 2 weeks of fermentation and preparation time and composed of low-cost, locally available materials. It can be used both as a basic fertilizer and also as a supplementary fertilizer during fruiting stages and can significantly assist the transformation to ecological farming by minimizing the yield losses and risk normally associated with this conversion.

The efforts during the GAEV project focused on introducing this practice to the farmer trainers and NATC staff and adapting the production process to materials available in the local communities. NATC hosted hands-on demonstration sessions of producing carbonized rice hull (CRH), IMO production and worm casing collection, eventually evaluating a half-tonne recipe for Bokasi production. Bokasi manuals obtained from the Philippines were used to deepen and strengthen the trainers level of understanding during the duration of the activity. A fertilizer trial on vegetables comparing the effects of Bokasi with chemical fertilizers and traditional manure-based compost was also established with the results to be reviewed by the farmers in several months time.

6.3.3 Farm Inputs and Implements

Farm inputs and implements were major concerns to farmers in the communities. An ecological orientation favours the introduction of sustainable, low-cost, environmentally friendly inputs and implements. This is a foreign concept to many farmers in the Gambia as they have been traditionally exposed only to heavy chemical fertilization for increased production and associate progressive implements with mechanized equipment. In line with AEV principles to ecologically improve the production capacity of the farmers and farmer trainers, the farm inputs and implements listed in Table 13 have been provided by the project.

Table 13: Overview of farm inputs, implements and plant material provided to farmer trainers

Item	Quantity	Beneficiaries		
		Community	Male	Female
Ewe for semi intensive livestock management	3	Torro Bah	1	0
Groundnut seeds	400 kg	Torro Bah	3	4
	70 kg	Gunkuru Wollof	1	1
	40 kg	Jahawur Mandinka	2	0

Cowpea seeds	6 kg	Gunkuru Wollof	3	3
	6 kg	Jahawur Mandinka	3	3
	10kgs	Toro bah	2	1
Seeders	4	Torro Bah	1	0
Assorted vegetable seeds	400 g	Torro Bah	0	6
Onions seedlings	40 rows	Torro Bah	0	6
Sine hoes	2	Torro Bah	1	1
Horse Carts	3	Torro Bah	1	2
Donkey Carts	1	Torro Bah	1	1
Donkey	1	Torro Bah	2	0
	3	Gunkuru Wollof	1	2
	3	Jahawur Mandinka	1	2
Cassava cuttings		Torro Bah	4	4
Potato vines		Torro Bah	4	4
SUB- TOTAL			31	40
		TOTAL	**71**	

6.3.4 Research and promotion of energy saving cooking devices

To alleviate their dependency on fuelwood, villagers were exposed to alternative fuel stoves. Developed by REAP-Canada in the Philippines, the Mayon Turbo Stove (MTS) allows for efficient combustion of rice hull and other bio-residues. Crop residues that are widely available in rural areas of the Gambia were evaluated for efficient combustion. NARI engineers initially demonstrated that the larger version of the stove (MTS 7000) could adequately boil water and prepare local foods.

Fifty Mayon Turbo Stoves were produced for the project in the Banjul with local workshop artisans trained on production of the stove. The stoves were then distributed to local villages (Table 14) and included training sessions on stove use. Villagers tried several different crop residues as fuel sources to determine which ones are most appropriate for their local needs. Initial testing has had them experimenting with rice hull along with crushed groundnut, millet husk, baobab seed shells, corn cobs, small sticks and cow dung. During these pilot burns the stove was found to most efficiently burn the rice hull, millet residues and crushed groundnut shells, both together and separately. However, it was found that there was a general lack of supply of these important residues in each of the beneficiary communities. The baobab shells, corn cob and dung, common throughout the area, were found to burn adequately but did not represent any efficiency or pollution reduction gains when used alone in the MTS compared with a traditional 3-stone fire. However, they could work well when combined with millet, rice or peanut residues.

Most villagers evaluating the stove also commented that they would require a larger version of the MTS with a bigger fuel hopper and pot holder to adequately heat the large, heavy pots used to feed households of 10-15 people. During initial testing it was also found that the materials used for stove construction are subject to corrosion due to the rigorous cooking requirements of Gambian households, and may not last for the expected 3 years. Stainless steel could be used to construct the inner cone to increase durability. Some initial comments from users also reflected that a more comprehensive training program on stove operation would particularly benefit users. The selling price of D650 (roughly $28.90CDN) was considered high by some users and recommendations

were made for training metal workers close by to reduce the cost. Testing of the stove will continue for efficiency and adaptability at the household level by the farmers themselves.

Unfortunately some quality control issues arose with welding at the production shop. Of the 50 stoves produced, the first 25 performed well but the last 25 had a welding seal which was not closed, which created combustion problems when the models were piloted in the communities. To resolve this, 22 stoves were returned to the workshop to seal the welds. Initial testing of the sealed stoves showed that they now seem to be performing according to design and arrangements are being made to transport them back to the communities where they will be distributed as planned for further testing. Overall, it was felt that the MTS could have a major impact on the lives of women in the Gambia, who have to walk many kilometers a day in order to fetch firewood from the rapidly dwindling supplies in the local forests. However, for maximal success, MTS implementation programs would have to be focused in rice-producing communities.

Locally available materials such as corn cobs, baobab shells, cow dung and fuel wood could also be burned in an improved efficiency stove. During the course of the project, staff began working with and promoting one such model, the Rocket Stove, based on an original from Niger that was acquired during a Canadian Environmental Network (CEN) supported Renewable Energy Conference in Nigeria in 2004. It is simple and uses roughly one third of the fuel required by a traditional 3-stone fire. There is also less smoke production, which makes it less harmful to women and encourages long-term use by reducing soot/creosote build-up on stove and pot surfaces. NATC, NARI, local technicians at the Gambia Technical Training Institute and the MTS manufacturer, have all been involved in discussions for the development of this stove and are currently working out terms of reference that will eliminate the quality control and delivery problems associated with the production of the MTS stoves in the production of the Rocket Stove, with trials being planned for the near future. Successful design and production of such a stove would be incredibly well received in all project villages.

Table 14: MTS Distribution in Lower Saloum and the North Bank Division

Community	# of stoves	Comments
Jahawur Mandinka	6	Stoves distribution is linked with the existing credit union in so that members can access the stoves. Fuels used were reported to be early millet husks, baobab shells.
Gunkuru Wollof	9	Distributed into the community through the Project Management Committee. Fuels used were millet husks, baobab shells, corn cobs, and small sticks.
Kaur	5	In Kaur, the stoves have been distributed to the management committee of the food processing group credit union. This committee is responsible for issuing of the stoves on short term loan to its members.
Torro Bah	3	3 stoves were initially distributed in the community however quality control issues at the production shop created combustion problems and the other stoves ear-marked for the area were withheld for repair.
Ballanghar Kerr Jebel	5	Community members
Total	**28**	*22 additional stoves are currently being repaired and will be distributed afterwards (17 are with NATC and 5 are with NARI).*

7.0 Project Management

7.1 Project Management and Implementation Structure

The main methodology used in implementing this project was a participatory one. Consultation and collaboration with key stake holders including the primary target communities with the NATC, VATG and NARI staff guided the implementation of project activities. A bottom-up approach was used where farmers' ideas and suggestions were translated into project activities in accordance with the project objectives. To integrate this input, the partner organizations, REAP-Canada, NATC, VATG and NARI, together with farmer trainers and representatives from the local VDC's have formed committees such as the Project Steering Committee (PSC), Project Management Committee (PMC), Project Implementation Team (PIT) and Project Technical Team (PTT) responsible for the overall direction and management of project. These committees were responsible for the overall direction and management of project responsibilities, implementation, research and field activities as well as support for different aspects of project implementation. Also Farmers Associations (FA) were formed in each of the beneficiary villages and trained to increase their capacity in the management of a Community Based Organization (CBO) and in the organization of training programs and learning farms.

Project Steering Committee (PSC)
The PSC includes the Canadian partners REAP-Canada, NARI, VATG and NATC. The committee has been responsible for the overall supervision and coordination of the project implementation, field operations, and finances. They are also responsible for the joint project review, assessment and planning, and direction setting and policymaking.

Project Management Committee (PMC) (2 teams, one at NATC and one at VATG)

The PMC is responsible for local management and implementation of the project at the county/township level. The PMC is headed by the local project implementing partners from NATC, VATG, NARI, REAP-Canada (including interns) and the local VDC's. The PMC also includes the local finance officer, community organizers and farmer trainers.

Project Implementing Team (3 teams, one per community)

The PIT is composed primarily of local community organizers, village group leaders, farmer trainers and farmers, local government extension personnel, and other technical persons from NARI and elsewhere. The PIT has been facilitating project implementation coordination of activities and conducting technical trainings and on-the-job training/coaching. They have been responsible for the field implementation and on farm research and provided a link between the community and the PMC. They were involved in recording the technical trainings (topics, locations, participation, women) and other community activities such as the development of field-level implementation. They also provide feedback and reports during the project assessment and planning sessions on the status of their work to the local project coordinator and PMC.

Project Technical Teams (3 teams, one per community)

The PTT is composed of local farmer's leaders, farmer trainers, local government extension personnel, other technical persons and farmers from the farmer technical groups. The PTT is responsible for assisting and conducting technical trainings and on-the-job training/coaching, and involved in the field implementation and technical aspects of on farm research. They provide feedback and reports during the project assessment and planning sessions on the status of their work to the PMT.

Farmers Associations

Three Local Community Based Organizations (CBO's) known as Farmers Associations have been established, one in each of the 3 communities. They are responsible for community resource mobilization and managing the distribution of inputs/implements from the project to Farmer Trainers and other local farmers. They are also responsible for communicating activities and results of the projects into the communities. These associations were very active in resource mobilisation and coordination. They were also very active in engaging members to actively participate in project activities, and also as a base for unity in the communities. Some of the associations which have registered with the Attorney Generals Chambers have enhanced the legal recognition of these associations and are beginning to attract other funding.

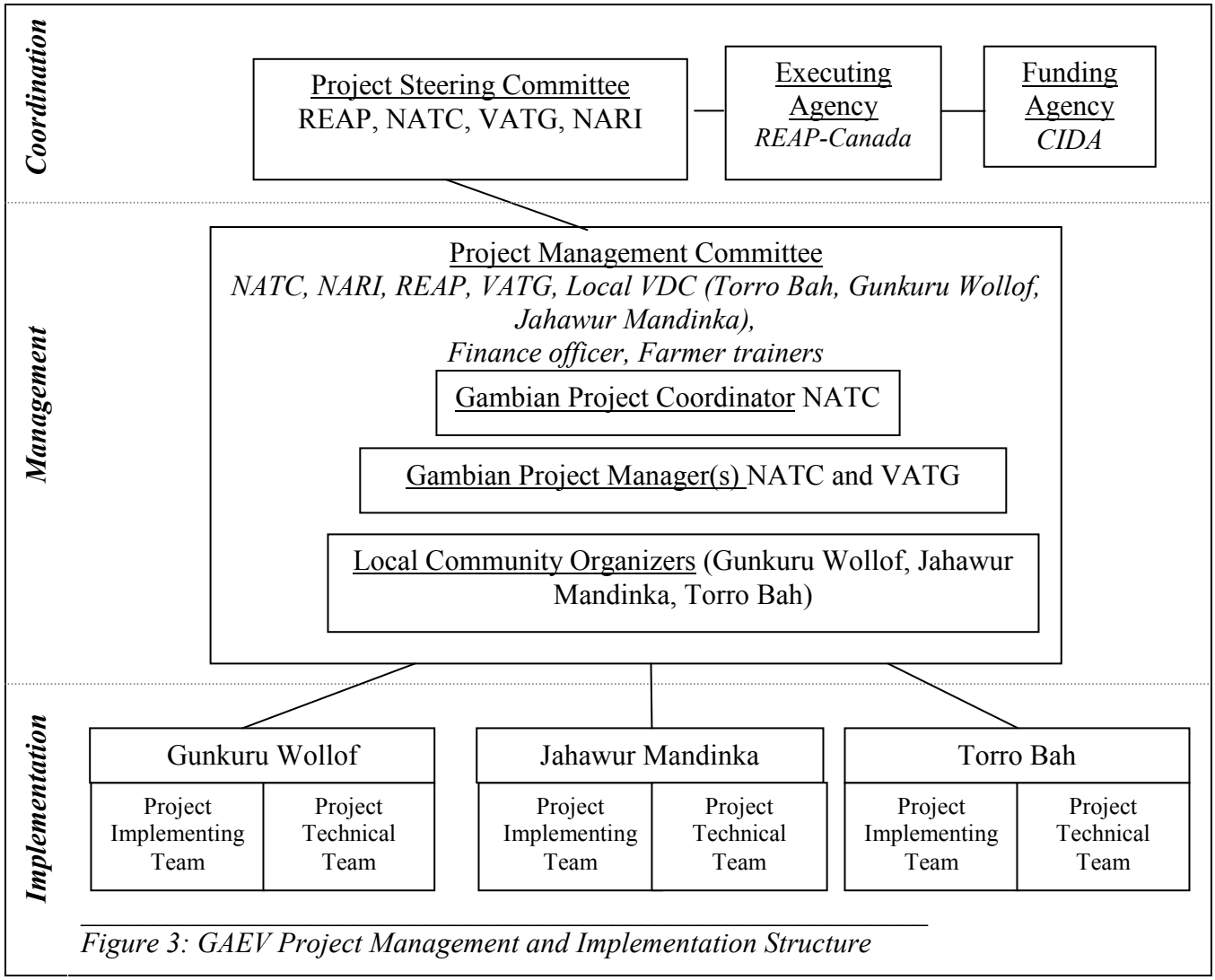


Figure 3: GAEV Project Management and Implementation Structure

Table 15: Official GAEV Project Management and Implementation Team Members			
Team or Committee	**GAEV Project Official Team Members**		
Project Steering Committee	Mr. Roger Samson Ms. Claudia Ho Lem Mr. Badarra Jobe Mr Sutay Njie Mr. Ansumana Jarju Mr. Dawda Kebbeh		
Project Management Team	Mr. Roger Samson Ms. Claudia Ho Lem Gunkruru Wollof VDC Jahawr Mandinka VDC Torro Bah VDC Mr. Badarra Jobe Mr. Dawda Kebbeh Mr. Sutay Njie Mr. Abdullai Jallow	Mr. Ansumana Jarju Mr. Mye Jawara (M & E Officer) Ms. Mariama Taburay(M & E Officer) Ms. Binta Manneh (Finance Officer) Mr Marley Jallow (Finance Officer NATC) Mr. Majuma Kanteh (Gunjuru CO) Ms. Kaddy Jatou Jallow (Jahawur CO) Ms. Fatou Panneh (Torro Bah CO) Farmer Trainers	
Team or Committee	Gunkuru Wollof Official Team Members	Jahawur Mandinka Official Team Members	Torro Bah Official Team Members
Community Organizers	Mr. Majuma Kanteh	Ms. Kaddy Jatou Jallow	Ms. Fatou Panneh
Project Monitoring and Evaluation Officers	Mr. Mye Jawara	Mr. Mye Jawara	Ms. Mariama Taburay
Project Implementing Team	CO of Gunkuru Wollof Village, group leader, government personnel, NARI technical staff, farmer trainers	CO of Jahawur Mandinka Village, group leader, government personnel, NARI technical staff, farmer trainers	CO of Torro Bah , group leader, government personnel, NARI technical staff, farmer trainers
Project Technical Team and Farmer Trainers	Ms. Hoja Mbaye Ms. Njetti Jallow Ms. Hata Ceesay Mr. Ebrima Ceesay Mr. Babou Mbye Mr. Amadou Sallah	Ms. Jarai Dabo Ms. Jankey Sama Ms. Kumba Jallow Mr. Malick Njie Mr. Musu Kumba Gaye Mr. Samba Bah	Mr. Modou Loum Mr. Kebba Jallow Mr. Abdoulie Bah Ms. Juldeh Bah Ms. Jailah Bah Ms. Hawa Bah Ms. Fatoumata Bah Mr. Alsan Gaye

7.2 Resource Requirements

7.2.1 Project Staff

During the initial stages of implementation, local staff were hired or dedicated to the project for the upcoming year. Efforts were made to ensure a strong representation of women on the project

teams and the project achieved 44% women representation (5 male & 4 female). The details for project staff are as follows:

Gambian Project Coordinator - Mr. Badarra Jobe, Director, NATC.
Responsible of coordinating staff to implement field level activities, conducting field monitoring and evaluation, act as the link between project field officers, relevant NATC staff who have a role in the project activities and REAP-Canada and network with other like-minded groups who can further the projects goals and objectives.

NATC Gambian Project Manager – Sutay Njie
Responsible for the overall management of the project, resource mobilization, coordination of field level activities and facilitate the process of progress reporting in the NBD. The project manager responsible for Torro Bah is based at NATC in Njawara, but worked closely with the directors of VATG and NATC on data consolidation in the Gambia for submission to REAP-Canada. He has been responsible for ensuring the smooth implementation of programs/ activities in line with the plans and budget allocations. As the manager of the project, he was also responsible for the on the job coaching of staff with a view to maintaining efficiency in their performance. The manager also maintained a close link with NARI for the timely implementation of planned activities.

VATG Gambian Project Manager – Abdullai Jallow
Responsible for the overall management of the project, resource mobilization, coordination of field level activities and facilitate the process of progress reporting in the CRD. The project manager responsible for GAEV implementation in Gunkuru Wollof and Jahawur Mandinka is placed at the VATG office in Kaur, however he worked closely with the directors of VATG and NATC on data and financial consolidation in the Gambia for submission to REAP-Canada. He was also responsible for the on the job coaching of staff to maintain efficiency in their performance.

Project Monitoring & Evaluation Officers – Mariama Taburay (NATC) & Mye Jawara (VATG)
Responsible for the development of the PM&E framework and all monitoring and evaluation activities of the project and compilation of field workers monthly reports. The PM&E Officers also worked with the project managers and the project coordinators in developing reports for submission to REAP-Canada.

Gambian Community Organizers – Majuma Kanteh, Kaddy Jatou Jallow and Fatou Panneh
Based in their respective local community, they were responsible for facilitating organizational strengthening activities, project analysis, the necessary social activities to prepare for technical training and the training activities. They were also responsible for coordinating activities with the local project officers, including monitoring field implementation activities and trainings.

Project Accountant – Marley Jallow (NATC) and Binta Manneh (VATG)
Responsible for the monitoring and consolidation of Southern Partners expenses and the development of a financial plan to allocate the flow of expenses during the year.

NARI Agro-forestry Program Leader/Focal Point (coordinator)– Ansumana O. Jarju
Acted as the focal point representing the Director of NARI in the participation of the project. Responsible for the coordination of all NARI activities and responsibilities as contained in both the partnership agreement and the activity schedule. Consulted with all the relevant Program

leaders at NARI and coordinated the implementation of all the required research activities at the project site. Throughout the project he maintained a close link with the project management at NATC to keep track of progress.

VATG Project leader– Mr Dawda Kebbeh
Mr Kebbeh is the country Programme Manager for VATG and supervised the activities of the VATG project manager and provided him with direction when necessary. He worked closely with the project coordinator, Mr. Badarra Jobe, in ensuring streamlined implementation of the GAEV in both Lower Baddibu and Lower Saloum.

Canadian Project Manager – Claudia Ho Lem, REAP Canada
Responsible for overall written and financial reporting of the project to CIDA and supervision of project management and implementation. Also responsible for facilitating appropriate arrangements for the roles and responsibilities of the Canadian partner.

Canadian Agronomist – Roger Samson, Executive Director, REAP Canada
Provided technical agronomical guidance and was responsible for co-facilitating appropriate arrangements for the roles and responsibilities of the Canadian partner.

7.2.2Training Support

External Farmer trainers / advisors
Expert team from NARI enlisted to train the farmer trainers in the farmer-to-farmer training program.

Farmer trainers
Local farmers selected and trained to deliver project trainings to community on sustainable agricultural techniques including soil and water conservation, re-vegetation, and diversified farming.

Canadian Staff Field Missions to the Gambia
The REAP-Canada GAEV Project Agronomist and Project Officer conducted a project field mission in October of 2004 to participate in the PRA's in the communities and develop the project work plan for the first year of the project. Additionally, four CIDA-funded Canadian interns arrived in the Gambia, two in August 2004 and another two in October 2005, to provide project support and monitoring for 6 month periods at a time.

7.3 Project Workplan

At the outset of the project, a PAP session was held involving the PSC and the PMT to develop a detailed workplan, finalized in November 2004 and based on information collected in the PRA. It identified milestones and expenditures associated with the completion of each activity, organized under project objectives and was reviewed on a monthly basis to monitor the project's overall progress and conduct strategic planning. Participatory action planning sessions addressed necessary community organization structures and project sustainability with respect to the establishment of farmer-to-farmer training networks. Schedules were developed for farmer training sessions and the development of training modules.

7.4 Project Monitoring, Evaluation and Reporting

Participatory Monitoring and Evaluation (PM&E) maintained by the community members, farmer trainers and Project Monitoring and Evaluation (M&E) Officer is also an integral part of Agro-Ecological Village development. The PM&E program was implemented on two levels: both within the staff and with project beneficiaries. Following the completion of the PRA and the establishment of a community monitoring structure, program officers and support workers were responsible for reporting issues encountered at the community level to their respective organizations, PMT and PIT on a monthly basis. This fed into the monthly updates taking place between the southern partners and REAP-Canada, and was used to track immediate progress and any issues that arose, ensuring effective and timely management. Southern partners reported quarterly to REAP-Canada, providing an analysis of the activities and outcomes including individual financial reports. REAP-Canada was responsible for annual reporting to CIDA, based on its field visits, phone updates, quarterly reports, and frequent communication that took place between project partners.

The PM&E Framework for the GAEV project was developed with the beneficiaries and included the objective statements, the output performance indicators, data sources and risk assumptions (both internal and external). This program was continuously used to monitor important indicators, validate the action plan, assess the direction of the project, make management adjustments, elucidate procedures and ensure the ongoing capacity building of the community. A PM&E framework was developed by the farmers and the PM&E officer to assess the development of the learning farms by having the farmers develop their own criteria for plant material adaptability and appropriateness to the local region. Tables for tracking indicators were prepared, reviewed by the whole staff and adopted for regular monitoring. PM&E at village level involved CO's acting as intermediates to collect and report data as most of the farmers involved are illiterate. As staff have been receiving training on record keeping and PM&E during group management trainings they understand the importance of monitoring and evaluating their activities, particularly the on farm activities. The PM&E Officer has been compiling farm data from learning farms which have been fed back to the farmers. A Participatory Review and Reflection Program was also conducted in the 2 communities, giving the beneficiaries the opportunity to consider the effects of the program themselves. The process has been documented via video for increased outreach of the project approach and impact.

Careful monitoring of performance indicators is essential to the success of the Agro-Ecological Village development programming. For this portion of the project, performance was measured through baseline data collection from 50 families in the communities. Thirty baseline respondents were interviewed in Gunkuru Wollof and Jahawur Mandinka and 20 in Torro Bah. Selection of the respondents was done at random and included men, women, farmer trainers and community farmers. These families were recruited during the community-organization phase of the project, and were relied upon throughout the course of farm development to provide baseline measures and indicate project performance through a PM&E process. Efforts were made to ensure that these families were representative of the larger group of beneficiaries in terms of socio-economic status, household size, education level, farming experience and land ownership. Information contributed from these families indicated the degree of project success while providing feedback through which programming can be improved.

8.0 Gender Equality and Gender Analysis

It is evident that women in the Gambia have very difficult lives and are in tremendous need of support programs. Women are in charge of all household duties as well as the labour intensive task of growing supplementary food, which includes the cultivation of most of the fruits and vegetables consumed by the family over the entire year. Women have little access to cash as it is traditionally men's responsibility to grow family cash crops and manage revenues. Women often have to get loans from their husbands to purchase seeds and fertilizer for the food crops they grow or for ordinary household goods. During the dry/fallow season, men's work does not require them to spend nearly as much energy as women do during their day and are often found lounging beneath baobab trees. Additionally, women are often forced into socially difficult arrangements through the historical custom of polygamy, early marriage and traditional values that favor men. This puts a strain on family relations and often increases household size dramatically. As a result of these limitations, women in the Gambia have very little decision making power and are often marginalized in their own homes and communities. GAEV initiatives emphasized support for bridging the gap between men and women as the project gender strategy.

The transition of the targeted communities to Agro-Ecological Villages has shown great potential to improve the quality of life of women, men and their families. The target of 25% female participation was exceeded with female participation in trainings at 50%. Efforts were made to facilitate both male and female participation in all decisions regarding farm development and project management. Both men and women were equally represented in the participatory rural appraisal process and baseline data collection, contributing valuable information through which the project was evaluated and strengthened. Baseline information was collected in a gender-segregated manner to better understand potential impacts of the project on each sex, age groups and socio-economic bracket. The project management achieved gender-balance with 44% of the project staff being women. The local project team was successful in recruiting a female project monitoring and evaluation officer and two female community organizers. The Canadian project manager is also female and 50% of the farmer trainers (4 in Torro Bah, 3 in Jahawur Mandinka & 3 in Gunkuru Wollof) are women.

Gender was a cross cutting issue that was mainstreamed throughout the implementation of project activities. A gender strategy was developed for the project that emphasized lessening the economic, social and educational gap between men and women. In so doing, the most marginalized women were given more consideration in order to achieve the greatest female empowerment in the communities.

The gender strategy has gained some success in that women are increasingly involved in decision making processes in the community. Their participation in training sessions has improved as well as their access to various types of agricultural inputs including improved vegetable seeds, plant materials (i.e. cassava and sweet potato cuttings), draft animals and donkey carts, which with proper management can dramatically improve their household income. Women received improved access to sine hoes and seeders, which can substantially decrease their manual labour in the fields as these are not usually available to them during production periods and allow them to engage in other activities. In addition, women greatly benefited from improved, early maturing rice varieties introduced by NARI. Enhanced rice production can dramatically improve the lives of women, for it is their sole duty to provide the family with this primary food source, and growing rice is a very

labour intensive activity which occupies most of their time. If rice harvests are poor, women must borrow money from their husbands in order to feed the family, although recently men have begun helping women with the rice production as they realize if the harvests are poor they must provide cash for food and they want to avoid cash expenditures on behalf of the women. If the labour associated with rice production was decreased, women would be able to focus on other activities including vegetable production to increase the income they generate.

Women also received various forms of support such as the provision of assorted rainy season vegetable seeds, which were planted and are expected to improve the household situation during the "hungry season." Project initiatives have encouraged women to increase their knowledge of ecological practices and apply it in their everyday farming activities.

9.0. Problems encountered, lessons learned and recommendations

The stray animal issue is one of the primary problems limiting agricultural development in the country. Although this was beyond the scope of the beneficiary villages, the GAEV project took steps towards convincing farmers that more intensive livestock management is crucial under the more difficult conditions of a growing population. To effectively tackle the problem, the project sensitized all the cluster villages on the need to control animals and provided practical means of intensive livestock management and fodder production. A farmer trainer in Torro Bah was supplied with three animals to begin a semi-intensive livestock management system in that community. The farmers organizations have been encouraged to continue the process with animal breeding programs and intensive animal rearing systems.

Limitations with literacy were found with some farmers, who had difficulty reading the training modules and developing farm plans and record keeping. The REFLECT literacy training sessions made some headway in aiding participants in reading and writing but further effort is required for long-term improvement. Some work was done in translating the modules into the local languages (Wollof and Fula), and farmers were supported in farm planning so as to improve understanding of farm management and literacy at the same time.

Problems in communications still exist, including an erratic power supply and irregular computer and e-mail access but the situation has been improved since last year. The difficulties in communication still requires that the partners, project staff and REAP-Canada interns are required to spend up to two days of travel to Banjul to ensure important communications with Canada are completed. The situation was improved with the installment of a telecommunication line at NATC, improved solar power capacity, purchase of a new laptop and access to internet through a local internet service provider. VATG also installed a phone line and solar power system. However, the new internet connection at NATC has still proven troublesome as the frequency of disruption is high and the low speed connection makes it impossible to send larger documents. VATG is still using diesel generators to power the computers when the solar system does not provide enough electiricty, which leads to unreliable access due to a restricted fuel supply. To reduce delays in sending and receiving email messages, an agreement was established between the Worldview Office in Kerewan to check NATC emails and print any messages from Canada. Although international communications have improved, consultation between NATC and VATG has still been limited due to the unreliable telephone network in the country and extremely poor road conditions coupled with lack of reliable transport. Transport is a prerequisite to ensuring effective

communication and, therefore, NATC has recently secured one pickup truck and a motorcycle to aid in communication.

There were delays in the collection of baseline data due to the inexperience of the newly hired CO's coupled with language barriers in translating or explaining the surveys to the farmers. To avoid this in the future and build staff capacity, baseline training was given to project staff. There exists a lack of in-house capacity to statistically analyze the baseline data. NARI has agreed that their socio-economic unit will train project staff in computerized data entry and statistical analysis so that they will be able to collect and analyze this and future data.

There were some delays in project activity implementation due to advance-payment of services requested. In the production of Mayon turbo stoves, there was a delay in fabrication once the first payment had been made. All further payments were withheld until all of the stoves ordered were manufactured. Delays in submitting and correcting the PRA report also occurred once the private contractor had been paid for his field work but before he had produced the final report. Afterwards, a policy was established ensuring that all contracts and consultancies entered into between GAEV project staff and private consultants require payment upon delivery, along with a schedule for follow-ups to ensure project activities are completed in a timely manner.

Although 50 Mayon Turbo Stoves (MTS) were produced and tested successfully in the project villages, as mentioned above in section 6.3.4 there were three problems identified during the pilot period. Quality control issues arose with 22 stoves having a welding seal that was not closed, which created combustion problems when the models were piloted in the communities. The stoves were returned to the workshop to seal the welds and they now seem to be performing according to design. During pilot burns the stove was found to most efficiently burn the rice hull, millet residues and crushed groundnut shells, however, there is a general lack of supply of these important residues in the beneficiary communities. Baobab shells, corn cob and dung, common throughout the area, were found to burn adequately in the MTS but did not represent any efficiency or pollution reduction gains. These abundant residues would be most efficiently burned in the Rocket Stove, which has also been piloted in the communities. Finally, most villagers evaluating the stove also commented that they would require a larger version of the MTS with a bigger fuel hopper and pot holder to adequately heat the large, heavy pots used to feed households of 10-15 people. Larger versions of the MTS could be produced if it was most appropriate for average families.

Although the farmers' associations were established on schedule, association development in Torro Bah was slow due to a lack of previous community organization, as shown in the total membership of the association there. Project staff worked closely with the Department of Community Development to provide adequate training and raise awareness within the group, which resulted in improved cohesion in the community.

Another difficulty in project implementation was the delay on the transfer of funds, a result of the hold the Gambia Trust Bank places on funds when they arrive in the project account. Since this delay was not foreseen in the payment schedule, inputs were not delivered to the project management team on time. To overcome this, REAP-Canada began processing overseas transfers 2-3 weeks early to ensure project funds were available to partners in the south. The project partners are committed to ensure the project is implemented in a timely fashion.

After one year of project implementation, project staff, farmer trainers and the local community groups have become familiar with the concept of the Agro-Ecological Village and have already enhanced their capacity in terms of adapting ecological farming to the region and improving agricultural productivity. Project impacts would be greatly amplified if current efforts were to continue now that the difficult tasks of establishing the project framework, community networks and training of the farmer trainers have been completed. If continued, project extension and outreach could flourish with the momentum that has been developed on the ground.

The Project Management Committee (PMC) has observed that the Agro-Ecological Village is a very successful way to support development in rural communities in the Gambia. The AEV assists in providing immediate benefits to the farmers through improved crop, fodder and other plant materials and management techniques, while at the same time impacting long-term development by assisting with farm planning, supporting community infrastructure development and improving the farmers capacity to understand sustainable farming systems. The AEV pilot project is successful here and is recommended for replication in other parts of the North Bank Division, the Gambia, West Africa and the world.

10.0 Public Engagement

Efforts have been made to ensure the public becomes aware of the AEV development approach, with the methods and results of the GAEV project broadcast locally on the community radio in Kerewan NBD and Saloum Division, nationally throughout the Gambia and internationally in Canada and Nigeria. In the Gambia this includes outreach to the local outlying communities, as well as furthering ties and networking between other developmental and governmental organizations both locally, and nationally in the Gambia to improve their understanding of holistic agricultural programming.

Nigerian Outreach

Energetic Solutions was a conference held in Calabar, Abuja and the Niger Delta in Nigeria from November 21 to 27, 2004 (www.onesky.ca). This conference included representatives from Africa, the Americas and Europe, and was a follow up to the WSSD and Bonn Renewables conference to address the Millennium Development Goals (MDGs) and issues of energy and development. The Energetic Solutions conference was a success with over 100 participants in Abuja and 65 for the conference's duration. Mr. Roger Samson, Project Agronomist and Mr. Sutay Njie, NATC Project Manager both attended the conference and increased their capacity around agro-forestry species for energy applications including Euphorbia which is being used for hedgerows in Mali to produce liquid fuels for lighting and cooking. Mr. Samson and Mr. Njie also investigated improved woodstoves, bringing one back to Gambia from Niger, promoted the project and demonstrated Mayon Turbo Stove in Nigeria.

Canadian Outreach

Over the years REAP-Canada has participated in considerable public outreach, both within Canada and internationally. Public presentations, seminars, articles, a newly revised website (www.reap-canada.com) and an annual newsletter by the organization have exposed a wide audience to their programming. REAP-Canada's office location on the Macdonald campus of McGill University provides an ideal location to increase awareness of the project to the university community and to

introduce students to the field of sustainable development. REAP-Canada regularly attends conferences in Canada where project results are shared.

REAP-Canada is part of the Canadian Environmental Network (CEN) and other associations which often host conferences and events where public engagement opportunities exist. The CEN has 27 years of experience in facilitating networking among environmental organizations both within and outside of Canada with over 800 member groups involved in environmental issues. In 2005, the CEN International Caucus invited Mr. Badarra Jobe to participate and speak at the International Guelph Organic Conference (http://www.guelphorganicconf.ca) January 20 to 23, 2005. Mr. Jobe participated in a full day farmer/scientist workshop and presented a workshop on: Agro-Ecological Village: Development in the Gambia during the conference. During this time in Canada, Mr. Jobe also presented a seminar to the International Development Class in McGill University's Agricultural Economics department, which was also open to other interested students and members of the Gambian community in Montreal. This public outreach opportunity was particularly fortunate as Mr. Jobe's travel previous attempt to obtain a travel visa to Canada had been denied. However, through developed links with the Canadian Embassy in Dakar, Senegal and improved preparations this visit was made possible, facilitating future visits by project partners.

REAP-Canada also hosts an IYIP funded by CIDA. This program has already sent 6 interns on 6-month secondments in the Gambia, working to support project implementation and transfer international skills and information. When the interns arrive back, they promote our projects and the Internship program through CIDA's Youth Zone opportunities. Two more interns are scheduled to be placed in the Gambia next year.

The project outcomes will continue to be shared with others in the development community, both in the Gambia and abroad, so that any lessons learned may be applied elsewhere. A development primer on AEV programming has been completed in cooperation with our Chinese AEV project partners. This production details specifically what is needed, and what methodology should be used to encourage rural communities to become more self sufficient through sustainable agriculture and ecological production methods. The primer also includes lessons on how to assess community needs, develop a custom training program, gender issues, energy use and biofuel consumption, and ecological means to achieve greater self-reliance.

11.0 Project Research and AEV Sustainability

The project is anticipated to improve the lives of farmers living in environmentally degraded environments through the widespread adoption of sustainable agriculture techniques and other capacity building activities at the community level. The Agro-Ecological Village Model has been implemented because it is locally adaptable and is based on the transfer of sustainable agriculture techniques to whole communities. It has strong potential to spread to other communities in West Africa facing similar agricultural constraints. As the benefits of sustainable community development are realized, the people will have greater household self-reliance through increased income and opportunities.

Over the long term, the project will result in an improved quality of life and a reduction in environmental degradation to the rural farmers targeted as the immediate beneficiaries. It will also develop their social and community networks, improving relations between government offices,

technicians and farmers, and between men and women. It will improve the agronomic practices currently being used in remote rural areas and empower rural peasants to take a more active role in their development process through the PRA, farmer-to-farmer training and on-farm trials. The investment in strengthening the farmers' institutions and bottom up training programs are key features of the AEV that will help continue the development process in communities beyond the project's lifespan. The investment in empowering and training farmers generates a high capacity to continue local development. Increased farm income will allow farmers to reinvest capital into newly identified opportunities. The emphasis on ecological farming systems, environmental rehabilitation, and training and capacity enhancement will also ensure the long term protection and regeneration of the agro-ecosystems from which the rural communities economies can continue to evolve.

The Agro-ecological Village development model is distinctive in its ability to bridge the communication and information gap between the masses of peasant farmers, research institutes and the local government. Through its participatory approach and holistic design, it innovatively integrates environmental, agricultural, economic, social and gender development through capacity building, training, education and information exchange. It also demonstrates tangible development measures including farm planning, trial farms and seed distribution. It is a simple and effective model, proven in the Gambia, Philippines and China, and is relevant to almost any rural agrarian community setting. Its participatory methodology allows for high levels of beneficiary ownership, creating long lasting and sustainable results in the community.

ANNEX 1

PROGRAMMES-PROJETS / ANNUAL PROGRAM-PROJECT PROGRESS REPORT

Project Title: The Gambia Agro-Ecological Village (GAEV) Development Project

Direction et Division/ Direction and Division **Partnership Branch/ESDP** *Section:* **Agriculture** *Agent de l'ACDI / CIDA Officer:* **Amélie Pruneau**

Partenaire de la DGPC / CPB Partner: **Resource Efficient Agricultural Production (REAP)-Canada**

DÉBUT / START: August 2004 **FIN / END:** January 2006	**PRIORITÉ(S) / PRIORITY(IES):** 40% the environment, 20% women in development, 40% basic human needs	**RÉSULTAT(S) D.G. / BRANCH RESULT(S):** Alleviation of poverty in rural areas by implementing environmentally friendly measures.	**PAYS / COUNTRY(IES):** *The Gambia*
Total Budget: $100,000 **CIDA Contribution**: $ 75,000		**OBJECTIFS / OBJECTIVES:** To assist rural communities in the transition to Agro-Ecological Villages through participatory approaches including participatory assessment and evaluation, farm planning for diversification and ecologization, farmer-to-farmer training and the establishment of learning farms.	**BUT(S) / GOAL(S):** To reduce poverty, enhance food security, reduce environmental degradation and encourage the development of gender sensitive self-reliant agrarian communities in some of the most impoverished areas of the Gambia through the implementation of the AEV model

EXPECTED OUTPUTS	ACTUAL OUTPUTS	VARIANCES
1. PRA, PAP and PM&E activities undertaken and local agricultural constraints and community priorities identified action plan adapted for ecological agricultural production. 2. 30 farmer-trainers (25% female) trained and the participation of local farmers in farmer-to-farmer trainings. 3. Adaptability trial and learning farms established for rice, agro-forestry, grain legumes, vegetables and warm season grasses and ecological farm management methods. 4. 30 Individual farm plans created for the selected farmer trainers	1. PRA was conducted in September of 2004. PRA report, detailing agricultural and development constraints and priorities of communities, completed and delivered to Project Proponents. Results of PRA used during Participatory Action Planning sessions, resulting in the finalization of a project workplan and action plan for ecological agriculture development. Monitoring and Evaluations Officer recruited, and PM&E framework developed, PM&E launched with a baseline study. PMC, PIT's, PPT's and Farmer Trainers Associations formed. Goals, responsibilities, and activities of each committee defined in project Workplan. 2. 20 farmer trainers trained on ecological methods using ecological farming training modules adapted for the Gambian environment through the GEAD project. To date, a total of 131 individual farmer-trainer trainings have been delivered with an average of 50% female participation; and a total of 81 individual farmer trainings have been delivered in the community with an average of 53% female participation. 3. 22 learning farms/gardens successfully established, applying the methods introduced in farmer training in different soil conditions and on a diversity of improved field crops and vegetables, including maize, millet, sweet potato, cassava, rice, and groundnut. 71 farmers were able to access the improved vegetable and crop materials for the learning farms. Learning farms were also established to demonstrate agro-forestry species, legume-grass mixtures and fodder grasses such as *Gliricidia, Cassia samia* and several other warm season grasses. 4. 20 initial farm plans created and implemented by farmer trainers in both communities. Plans for learning farm expansion were developed with farmer trainers after trainings on soil quality improvements, crop yields and food security management.	1. Actual outputs coincide with expected outputs. PRA results were used in the entire PAP processes. Action plans developed were accomplished. PM&E frame work developed and implemented All other structures formed and roles identified. 2. The farmer trainings were on schedule with most activities planned during the growing season to facilitate 'on the job' coaching. The number of farmer trainers has been reduced from 30 to 20 due to the smaller size of the communities in Jahawur Mandinka and Gunkuru Wollof, with plans for more inputs to go directly to community farmers. 3. This activity was on schedule with actual outputs coinciding with expected outputs. 4. This activity was on schedule. As there were only 20 farmer trainers due to the smaller size of the communities, only 20 farm plans could be produced, in contrast to the initial 30 plans proposed, since farmers had to complete the training course before they were able to develop a farm plan.
EXPECTED OUTCOMES	**ACTUAL OUTCOMES**	*VARIANCES*

1. Communities build capacity in organization and rural development and project activities address needs of the communities and reflect local potential with increased local ownership. 2. Information exchange between farmers is increased and capacity of farmer trainings in training other farmers and spreading knowledge on sustainable agricultural practices is increased. 3. On farm research on improved plant varieties of vegetables, field crops, and tree species, and development of ecological farming practices such as intercropping, sustainable livestock management and agro-forestry. 4. Increased farm diversification away from groundnut monocultures, improved crop rotations and increased soil quality.	1. Farmer Associations established and trained on group management, leadership, constitutional development, record keeping, communication, resource management, and PM&E activities. The farmer-to-farmer training network process also organized the community around ecological agricultural and a holistic community approach to development. A project workplan developed that incorporates community priorities identified through the PRA. Action plan developed that schedules ecological agriculture development activities in the communities and the roles and responsibilities of project participants, including beneficiaries. 2. All farmer trainers participated in trainings to enable them to undertake improved ecological farm management. With the farmer training network already established, farmers are expected to greatly increase their capacity in sharing knowledge between them by continued trainings and on-the-job coaching through the Farmers Associations. 3. The"hungry season" learning gardens already established testing dry season vegetables and fruits such as such as eggplant, sweet pepper, hot pepper, okra, tomato, cowpea, pigeon pea, Jordan black bean, sweet corn, eggplant lettuce, cabbage, bitter tomato and onion. Crop species such as corn, rice, millet, groundnut and fodders were planted, adopted and assessed during the growing season, beginning in May. In total, 71 farmers were able to access these improved seed varieties. Additionally, 1201 improved tree species for food, fodder and environmental benefits were planted during the project. 4. Trainings incorporating knowledge such as crop diversification, soil quality and farm planning and management taken by farmer trainers and demonstrated on learning farms.	1. The increase in community organizational and development skills is most noticeable through the increased capacity of the farmer training network and the local farmer associations in mobilizing and training the community, particularly in Torro Bah. 2. Information exchange between farmers is occurring at a rapidly increasing rate, as expected for a farmer-to-farmer network that is in a community without any previous infrastructure. 3. On farm research is on schedule with actual outputs coinciding with expected outputs. 4. Learning farm development occurred at pace with the training of farmer trainers on AEV principles and different ecological methods and practices that can be applied on learning farms, as well as the availability of improved plant materials.
EXPECTED IMPACTS	**ACTUAL IMPACTS**	**VARIANCES**
1. Improved ability of local communities to address problems over the long term and sustaining of project initiatives after project completion 2. Trainings encourage the widespread implementation of sustainable farming by both men and women in North Bank and Central River Divisions. 3. Preliminary agricultural diversification provides for increased food security and improved variety of crops produced to supplement nutritional requirements and environmental improvement. 4. Improved understanding of ecological farm management practices by local communities and enhanced ability for farmers to critically assess their personal farming strategy for the future	1. Management structures created through subcommittees and farmer groups emphasize the ongoing nature of the ecological practices and participatory methods used in the farmer-to-farmer training program. Plant material improvement and learning farm establishment led by farmer trainers of the community, with the support of project teams. The transfer of AEV methods and technical knowledge through farmer-to-farmer training and learning farm development has developed the confidence in ecological agriculture that will allow the community to approach future agricultural constraints together and holistically. 2. Sustainable farming methods transferred to beneficiaries during the first half of the project are already being implemented in the form of learning gardens during the "hungry season." Increased communication between farmer trainers and community farmers through the Farmer Associations has created the mechanism for the spread of ecological principles within the beneficiary communities. 3. At this early stage of AEV implementation, the learning farms and gardens have been initiated to diversify crops in vegetable gardens and farmland and increase food security, especially during the upcoming rainy season. Farmer trainers have actively dedicated portions of their farmland to ecological farm development, minimizing risk by balancing it with a long term focus on food security and economic development. 4. Increased understanding of ecological methods among farmer trainers is evident through the interest generated by the ecological training program. Increased communication among farmer trainers and community farmers is developing greater interest in ecological agriculture practices and the AEV approach.	1. Community development is occurring at pace with project implementation plan. 2. Spread of ecological orientation and understanding of ecological principles and methods is occurring as expected at this stage of AEV implementation. 3. The PM&E framework was used to record and assess the progress of the introduced ecological methods and varieties at increasing food security and diversifying crops. Short term learning farm development occurred as expected, with long-term results not expected for several years. 4. Understanding of ecological farm management spread as much as could be hoped in the space of one year, with the development of the farmer-to-farmer training network, learning farms, and farmers associations already certain to leave a lasting impact in the communities.

Cross-cutting Themes	EXPECTED OUTCOMES	ACTUAL OUTCOMES
IFD & ÉG / WID&GE	• Increased participation of women in farming communities, including increased access to farming implements and inputs, economic independence through land and production ownership, and increased representation within the sustainable agriculture movement. • Increased literacy through exposure and application of written materials in local languages.	• Women having equal opportunity to participate in project activities and act as agents of change through inclusion in project management and implementation. The quality of life of women is expected to improve beyond the lifespan of the project as women engage more fully in the sustainable agriculture movement and take advantage of new agricultural developments • At least 10 women in total are farmer trainers and 50% of trainings delivered have been to women. • Feedback from women indicate their involvement in and enjoyment in the hungry season vegetable production. Specifically, women also benefited from increased access to vegetable seeds and improved rice varieties. • Women were also exposed to improved cooking technology, including the MTS to reduce cooking time and limit exposure to indoor air pollution and decrease labor required to collect firewood.
ENVIRONNEMENT / ENVIRONMENT	• Increased understanding of sustainable agriculture techniques and the importance of the environment and diversification in farm management. • Reduced air pollution from crop burning and household cooking • Reduction in the use of synthetic pesticides • Increased on-farm biodiversity • Restoration of savannah woodland habitats	• Environmental issues are integrated into all community activities. • Project activities focused on long-term rehabilitation of the land while still allowing short term solutions for farmers to combat poverty and unstable weather by diversifying crop production and planting MPTs and improved vegetable and field crop varieties. • The use of natural pest control methods by farmers in both communities to reduce the concentration of synthetic chemicals in the regional land and water. • Tree planting, 981 trees planted including Cashew, *Cassia simea*, *Gliricidia*, *Leuceana leucecophala, Malifara, Holisera*, Sour lime and Eucalyptus. These species were selected as they serve multiple functions including soil erosion control, wind breaking, fodder production, nitrogen fixation, live fencing and fruit/food production. • Increased understanding of the importance of environmental issues by local peoples through the ecological training program and the learning garden/farm establishment.

ENGAGEMENT DU PUBLIC / PUBLIC ENGAGEMENT	• Domestic and international public exposures to programming to encourage support for development	• Domestic and international presentations and publications inform a large and varied audience of this project that increased public support and engagement in development activities in the Gambia, Nigeria and Canada • Mr. Roger Samson and Mr. Sutay Njie attended the Energetic Solutions conference in Nigeria and increased their capacity around agro-forestry species for energy applications while promoting the GAEV project and demonstrated bio-energy technologies such as the Mayon Turbo Stove. • Mr. Badarra Jobe of NATC participated at the International Guelph Organic Conference, presenting a workshop on: Agro-Ecological Village: Development in the Gambia. Mr. Jobe also presented a seminar to the International Development Class in McGill University's Agricultural Economics department. • REAP-Canada also hosts an International Youth Internship Program (IYIP) funded by CIDA, with interns promoting the GAEV project through CIDA Youth Zone opportunities. • The project and its achievements posted on the new REAP-Canada website www.reap-canada.com

LESSONS LEARNED

1. Careful and community approved recruitment of project staff members, ensuring a diversity of backgrounds, age groups, and equal gender representation creates a dynamic working and learning environment. Problem solving, even under time constraints such as the approach of the planting season, is enhanced through increased commitment to projects that incorporate deliver a sense of ownership to all participants.
2. The stray animal issue is a severe problem that effectively limits agricultural development in the Gambia. To effectively tackle the problem, one needs to adequately sensitize all the cluster villages on the issue and the need to control them, while at the same time providing practical means of intensive livestock management and fodder productionResearch into efficient money transfer mechanism into developing countries can avoid delays that hinder project implementation or limit the purchase of necessary materials.
3. Efficient communication systems (email, phone, fax) are critical for effective management in international development programs. Investing in strong and open relationships between project proponents is a great help in times of limited communication due to technical difficulties.
4. To avoid delays in the collection of baseline data and build staff capacity, baseline training was given to project staff to aid in computerized data entry and statistical analysis so that they will be able to collect and analyze project data.
5. There were some delays in project activities due to pre-payment of services requested. Policies were revised to ensure that all contracts and consultancies entered into between GAEV project staff and private consultants will now ensure payment upon delivery, along with a schedule for follow-ups to ensure project activities are completed in a timely manner.
6. There were 3 issues identified during piloting of the Mayon Turbo Stove. First was a quality control problems with stove welding. 22 stoves were repaired and are now functioning well more quality control measures will be put in place in the future. Initial field research for the Mayon Turbo Stove found that rice, millet and peanut residues work very well in the stove but are not abundant in the local villages. Other improved stoves like the rocket stove can efficiently use other locally available fuels such as baobab shells, corn cobs or dung and may be more appropriate for the project villages. Initial surveys also suggested that a larger and more durable model with a stainless steel inner cone may be appropriate for the cooking requirements of households with 10-15 people.
7. Gambia is the third country of in which REAP-Canada is developing AEV programming, and it is more evident that the concepts holistic approach of the AEV are not limited to any culture or environment, but are relevant in most agricultural communities that are facing ecological collapse due to unsustainable farming methods. In particular, the AEV structure naturally supports the development of community links and infrastructure to ensure local ownership of all activities, especially in communities with a lack of previous community organization.

FOR CIDA USE ONLY

Rating of the program or project: *(The rating provides an overview of the program or project progress and performance to date and should be selected based on the **officer's** understanding of the program or project (and not the partners'.) Use the % of progress in achieving outputs and outcomes and the following scale:*

- *a - project/program is likely to exceed expected results;*
- *b - project is viable and progressing satisfactorily;*
- *c - project has problems that are manageable;*
- *d - project has serious problems requiring major corrective actions and is unlikely to achieve expected results;*
- *e - unable to rate: provide reason e.g. "Too soon to tell".)*

Financial risks: *(As indicated in last FRAU report.)*

Sign off: Officer _____ Director

ANNEX 2: PARTNER ROLES AND RESPONSIBILITIES

Breakdown of GAEV Phase I Partner Roles and Responsibilities							
Activity	**Timeline for implementation**	**Roles and Responsibilities** *(X indicates responsibility, XX primary responsibility)*					
		VATG	**REAP**	**NATC**	**NARI**	**Farmers Groups**	**Outside Consultants**
Project Management							
Project status reporting and contract mgt with CIDA			XX				
Joint project review, assessment and planning		X	X	XX	X	X	
Coordination of Implementing Partners		X	X	XX	X	X	
Field Level Reporting		XX	X	XX	XX	X	
Field Site Monitoring		XX	X	XX	XX	X	
Activity report consolidation		X		XX	X		
Financial Management							
Overall financial report consolidation to CIDA			XX				
Financial report consolidation – Gambian expenditures		X		XX	X		
Documentation of finances, bookkeeping and accounting of individual budget allocations		XX	X	XX	X		
Audit – Gambian Operations		XX		XX			
Baseline data gathering and surveys							
Collection / processing of required baseline community data, initial agroecological asessment of farming systems		XX	X	XX	X		
Development and Analysis of socio-economic data		XX	XX	XX	X		
PM&E Program		XX	X	XX	X	X	
Monitoring of Participatory on-farm research		X	X	X	X	XX	
Case Study Development			XX				
Institutional Building Process							
Perform Participatory Rural Appraisal		XX	X	XX	X		XX
Participate in participatory rural appraisal		X	X	X	X	XX	X
Strengthening the capacity of Farmer's Organizations		XX	X	XX	XX	X	X
Community organizing/education & training		XX	X	XX	XX	X	X
Capacity building							

Develop training modules		X	XX	X	X	X	
Initial Training of Farmer Trainers		XX	X	XX	XX	X	X
Perform farmer-to-farmer trainings						XX	
Ongoing Training of Farmer Trainers		XX		XX	XX	X	X
Technical support to farmers' initiatives		XX	X	XX	XX	X	X
Develop individual ecological farm plans		X	X	X	X	XX	
Develop project gender strategy.		XX	X	XX	X	X	
Implement project gender strategy.		XX	X	XX	X	X	
Field Level implementation							
Participatory on-farm research		X	X	X	X	XX	
Learning Farm Implementation		X	X	X	X	XX	
Technical Support for learning farms							
• Intercropping		XX	X	XX	XX		X
• Vegetable /grain legume production		XX	X	XX	XX		X
• Soil fertility management		XX	X	XX	XX		X
• Livestock Management		XX	X	XX	XX		X
• Weatherproofing farms		XX	X	XX	XX		X
Technical Support for plant material improvement							
• Rice		X	X	X	X		X
• Vegetables		X	X	X	X		X
• Agro-forestry		X	X	X	X		X
• Forage improvement		X	X	X	X		X
Research and Development of Mayon Turbo Stove and sustainable cooking appropriate technologies		X	X	X	X		X
Communications and public engagement							
Disseminate information to the public through conferences, publications, websites and presentations to interested parties		X	XX	X	X		

ANNEX 3: Overview of GAEV Learning Farms

JAHAWUR MANDINKA:

NAME	CROP	PLOT SIZE	DATE OF SOWING	# KG OF SEEDS SOWN	ECOLOGICAL PRACTICE	DATE OF HARVEST	DAYS FROM SOWING TO HARVEST	# KG HARVES-TED	YIELD (KG/HA)	TREES PLANTED	Comments
Musa Kumba Jaye	Early Millet	25mx25m	28/6/05	1 kg	Intercropped with cowpea Organic manure and compost	10/10/05	105	75	1250	Lucena Gamtel tree	
Kumba Jallow	Early Millet	25mx25m	29/6/05	1 kg	Intercropped with cowpea Organic manure and compost	14/10/05	108	95	1583	Lucena Gamtel tree	
Jarra Darbo	Early Millet	25mx25m	30/6/05	1 kg	Intercropped with cowpea Organic manure	13/10/05	105	79	1317	Lucena Gamtel tree	
Jankeh Sama	Rice (Nerica)	25mx25m	1/7/05	1 kg	Intercropped with cowpea Organic manure	2/10/05	94	99	1650	Lucena Gamtel tree	
Malick Njai	Groundnut	25mx25m	3/7/05	20 kg	Intercropped with cowpea Organic manure	7/11/05	127	160	2667	Lucena Gamtel tree	
Samba Bah	Groundnut	25mx25m	4/7/05	20.5 kg	Intercropped with cowpea Organic manure	4/11/05	123	151	2517	Lucena Gamtel tree	
PMC	Early Millet Rice (Nerica)	70mx35m	1/7/05	 4kg	Intercropped with cowpea	6/10/05	97 n/a	75 n/a	1250		

GUNKURU WOLLOF:

NAME	CROP	PLOT SIZE	DATE OF SOWING	# KG OF SEEDS SOWN	ECOLOGICAL PRACTICE(S)	DATE OF HARVEST	DAYS FROM SOWING TO HARVEST	# KG HARVES-TED	YIELD (KG/HA)	TREES PLANTED	Comments
Hoja Mbya	Rice (Nerica)	25mx25m	5/7/05	3 kg	Intercropped with cowpea Organic manure and compost	6/10/05	93	101	1683	Lucena Gamtel tree	
Hatta Ceesay	Rice (Nerica)	25mx25m	5/7/05	3 kg	Intercropped with cowpea Organic manure and compost	7/10/05	94	98	1633	Lucena Gamtel tree	
Ibrima Ceesay	Rice (Nerica)	25mx25m	2/7/05	3 kg	Intercropped with cowpea Organic manure and compost	3/10/05	93	98	1633	Lucena Gamtel tree	
Njetty Jallow	Groundnut	25mx25m	2/7/05	20 kg	Intercropped with cowpea Organic manure and compost	1/11/05	122	141	2350	Lucena Gamtel tree	

Babou Mbye	Groundnut	25mx25m	4/7/05	20 kg	Intercropped with cowpea Organic manure and compost	1/11/05	121	138	2300	Lucena Gamtel tree	
Amadou Sallah	Early Millet	25mx25m	29/6/05	2 kg	Intercropped with cowpea Organic manure and compost	5/10/05	98	61	1017	Lucena Gamtel tree	
PMC	Groundnut Maize	1 ha (100mx100m)	6/7/05	50 kg 4 kg		10/11/05	126 n/a	1756 n/a	1756		

TORRO BAH:

NAME	CROP	PLOT SIZE (ha)	DATE OF SOWING/ planting	# KG OF SEEDS SOWN	ECOLOGICAL PRACTICE(S)	DATE OF HARVEST	DAYS FROM SOWING TO HARVEST	# KG HARVES-TED	YIELD (KG/HA)	TREES PLANTED	Comments
Jaila Bah	Rice	0.25	20/ 7/ 05	20kgs	Application of OM	14/10/05	86	365	1460		Although poor germination, crop performance is good
Fatoumata Bah	G/nut	0.5	4/ 7/ 05	35kgs	Application of animal manure Windrow with Cassia samia	16/11/05	135	817	1034		
Hawa Bah	G/nut	0.5	4/7/ 05	35kgs	Application of animal manure Windrow with C. Samia	16/11/05	135	897	1794		
Modou Loum	G/nut	0.5	1 /7 /05	35kgs	Application of animal manure . Windrow with C Samia Recycling of previous crop residues.	29/20/05	120	701	1402		
Juldeh Bah	Rice	0.25	26/ 7 / 05	15kgs	Application of OM	20/10/05	85	813	1626		
Alasan Gaye	Rice S potato Fodder Bank Maize	0.25 Sample Sample 0.5	19/7/05 15/8/05 13/8/05 3/7/05	20kgs Not quantified Not quantified 8 kgs	Application of animal manure.	15/10/05 16/11/05	88 136	805 800	1610 1600		The performance of the rice and potatoes are quite good, but erosion has been a big problem in the area. The Gliricidia fodder bank is also promising and the first harvest will soon take place.
Abdoulie Bah	Maize	0.5	2/7/05	8 kgs	Intercropping with cowpea. Application of animal manure. Recycling of previos crop residues.	20/10/05	110	829	1658		
Kebba Jallow	Early Millet	0.5	E/M 29/6/05 Cowpea 18 / 7 / 05	EM 8kgs CP 1kg	Application of animal manure. Intercropping with cowpea	11/10/05	104	833	1666		

Annex 4
Baseline Survey

For GAEV Project
beneficiary communities in the North Bank Division and Central River Division of the Gambia

TORRO BAH
GONKURU WOLLOF
JAHAWURU MANDINKA

Analysis of the existing Socio-economic and Farming systems

1. INTRODUCTION / JUSTIFICATION

The Gambia Agro Ecological Village Development project (GAEV) was conceived to introduce and promote sustainable agricultural production practices through the agro-ecological village (AEV) model. This involves the use of agro-ecological farming systems that emphasis the use of available on farm resources and recycling of crop residues as a means of maintaining soil fertility rather than continuous use of chemical (inorganic) fertilizers which can have long term negative effects on farm land soils.

For effective measurement of the impact of the project after it ends, there is need to establish the baseline status of beneficiaries prior to the implementation of the project. This will form the basis for the bench mark of future evaluation to determine the impact of the project on the lives of the beneficiaries. To support this, a baseline survey in the beneficiary communities was conduced.

2. OBJECTIVES / AIM

- To determine the baseline status of 20 farmer respondents from Torro Bah in the NBD and 30 farmer respondents (15 each) from Gunkuru Wollof and Jahawuru Mankinka in the CRD
- To establish a bench mark for future evaluation of the impact of the project on the lives of the beneficiaries

3. METHODOLOGY

In collecting data, questionnaires were developed and administered to 50 farmer respondents. In Torro Bah, this included the 8 farmer trainers, 8 potential (second liner) farmer trainers and 4 other farmers at random selected from the community. In the end, only 19 out of the 20 farmers were interviewed as one was unavailable during the baseline collection period. In Gunkuru Wollof the survey included 6 farmer trainers, and 9 randomly selected farmers. In Jahawuru Mankinka it included 5 farmer trainers, and 10 randomly selected farmers. The compounds were randomly selected and in most cases in Gunkuru Wollof and Jahawuru Mandinka it was the compound heads chosen as the respondents. This caused a high number of males amongst the respondents in these communities as most compound heads are males.

The baseline questionnaire developed for the GEAD (Gambia Ecological Agriculture Development) Project was used as the starting point for the GAEV survey. The project Community Organizers from each community were involved in the data collection, sometimes with the assistance of translators in order to overcome language barriers. The actual field work was begun in February 2005 and lasted for a period of over 1 month.

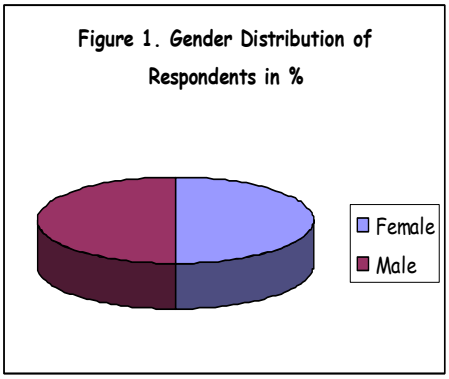
4. FINDINGS

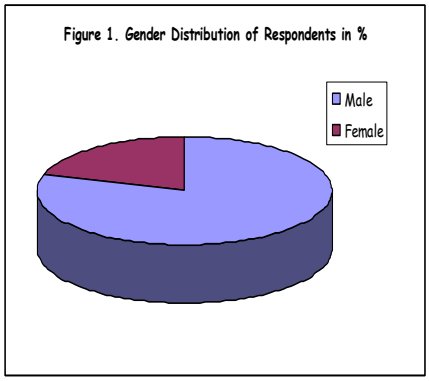
The questionnaires developed seek to provide an overview of the respondent's socio-economic profile, awareness on ecological farming systems, cost and level of production, ownership, access and control over land, and farm implements/inputs, annual crop yields and animal management amongst other things.

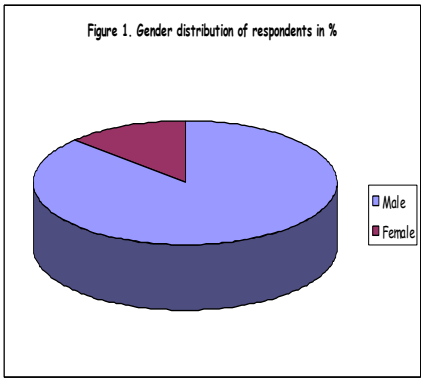
4.1 Farmer socio-economic profile

4.1.1 Gender distribution

Torro Bah	Gunkuru Wollof	Jahawuru Mankinka
The results indicate that there is an equal number of men and women (50%) participating in the survey.	The results indicate that more men than women contributed to the baseline data. The distribution is 80% men and 20% women. Though this is not an even distribution, the direct project beneficiaries (ie. the farmer trainers) are 50% male and 50% female.	The results indicate that more men than women contributed to the baseline data. The distribution is 87% men and 13% women. As in Gunkuru Wollof, this is not an even distribution, however the direct project beneficiaries are 50% male and 50% female.



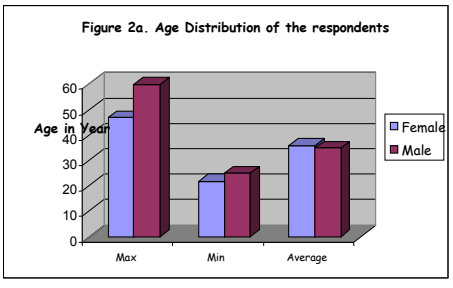


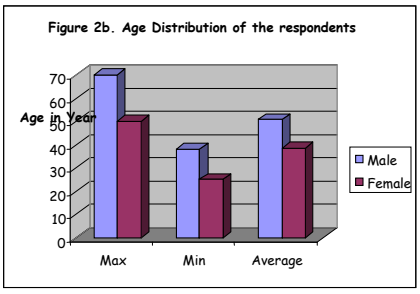


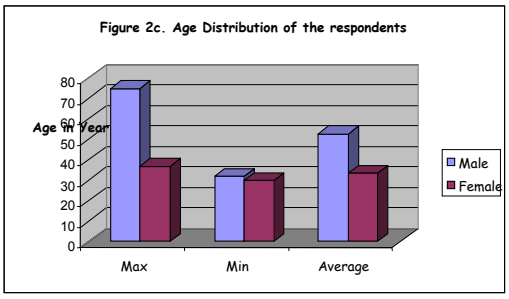
The GAEV project seems to differ from other projects that have been previously implemented in the communities, which are usually dominated by men even though they might be intended to uplift the socio-economic status of women producers.

4.1.2 Age distribution of respondents

Torro Bah	Gunkuru Wollof	Jahawuru Mankinka
Analysis of the mean age of the farmers indicated that most of them are in their thirties. The analysis further revealed that there was a wide range of ages in the participating farmers and that participating farmers are generally younger than the others.	Analysis of the mean age of the farmers indicated that most of them are middle aged. The analysis further revealed that there was a wide range of ages in the participating farmers and that participating farmers are generally older than in other communities.	Analysis of the mean age of the farmers indicated that most of them are in their thirties. The analysis further revealed that there was a wide range of ages in the participating farmers and that participating farmers are generally younger than in other communities, particularly the women with none being over 34.







Most males in all of the surveys were often above the age of 50, which was to be expected as many compound heads were surveyed. However the high number of young people involved in the

survey also suggests that some project initiatives could focus on the fact that that younger farmers are often more innovative and willing to adopt new technologies than older farmers. This could be followed through by observing the rate at which younger farmers understand and apply the improved ecological practices they are taught.

4.1.3 Ethnic groups

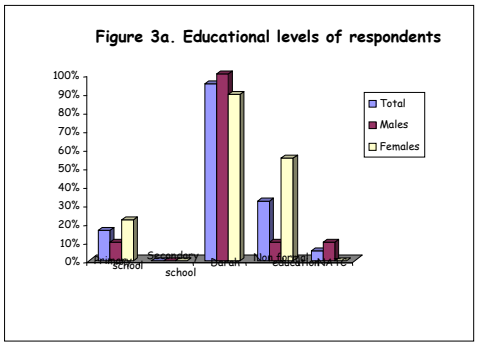
One may argue that ethnicity may not be a major factor to consider in the promotion of sound ecological farm practices. However, to develop effective strategies to promote these practices in both low and uplands, it is important to have an understanding of the ethnic composition of target beneficiaries to determine how this would effect their production decisions.

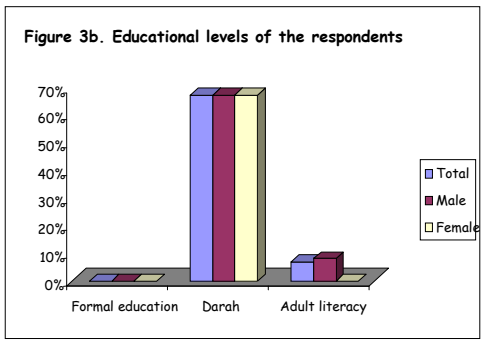
Torro Bah	Gunkuru Wollof	Jahawuru Mandinka
The majority of respondents in Torro Bah are Fulas (89%), with 1 respondent belonging to the Wolof tribe (5%) and 1 to the Bamba tribe (5%).	The majority of respondents in Gunkuru Wollof are Wollof (93%), with only 1 respondent belonging to the Fula tribe (7%).	The majority of respondents in Jahawuru Mandinka are Fula (53%), with 27% belonging to the Mandinka tribe, 2 respondents belonging to the Tukulor tribe (13%) and only 1 to the Wolof tribe (7%).

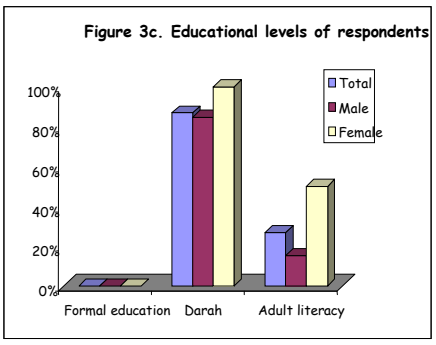
Ethnicity can be determining factor in some of the ecological agricultural practices such as manure application, which is more common to the Fula tribe as they generally keep more livestock. This could particularly be the case in the villages of Torro Bah and Jahawuru Mandinka where the majority of respondents are of Fula decent.

4.1.4 Educational levels

Torro Bah	Gunkuru Wollof	Jahawuru Mankinka
The level of formal education within the respondents is low (16%) with only 3 respondents at the primary level. Thirty two percent (32%) went through non-formal education and 95% went through Dara education. One respondent also attended NATC's Farm Training Programme. More females than males attended primary school as well as non formal education, but slightly more men attended Darah (Koranic School) which teaches them to become literate in the Arabic language.	The respondents level of formal education is zero. Sixty seven percent went through Darah (the same percentage for male and female) and only one male (7%) went through adult literacy.	The respondents level of formal education is zero. Eighty five percent went through Darah and 27% went through adult literacy. The percentage of females having gone trough Darah and adult literacy is higher than the males, but the implications of this are not strong as only 2 females were interviewed.







In general the formal education and level of literacy is very low in the project area, which has a negative impact on any form of trainings delivered. There exists a need to conduct literacy/ REFLECT classes to enhance farmer record keeping ability, for it is only through increasing the number of rural people engaged in adult education and skills development that the adoption of improved technologies such as ecological farming can be improved.

4.2 Farming systems known and cropping systems being practiced

The analysis indicated that the respondents know and practice a variety of farming and cropping systems but their level of knowledge and ability to discern advantages and disadvantages associated with different practices greatly varies. In summary, the following systems are known and practiced:

- Crop rotation
- Mixed cropping
- Mono-cropping
- Intercropping
- Mixed farming
- Bush fallowing
- Organic farming

Practice	Torro Bah	Gunkuru Wollof	Jahawuru Mankinka
Crop rotation	Out of the 19 respondents, all are said to know the system but only 12 of them (68%) are actually practicing.	None of the respondents mentioned crop rotation; however it has been observed that almost all farmers applying some level of this practice at field level.	None of the respondents mentioned crop rotation; however it has been observed that almost all farmers applying some level of this practice at field level.
Mixed cropping	6 respondents (32%) are familiar with mixed cropping but only 2 (11%) of them are actually practicing. The remaining 4 respondents, even though they are aware of it, are not practicing.	8 respondents (53%) are familiar with mixed cropping but 6 (40%) of them are actually doing the practice. The remaining 2 respondents, who even though are aware of the system, are not practicing it because of the difficulties in harvesting of this system.	2 respondents (13%) know and practice mixed cropping.
Mono cropping	This is another practice which most of the respondents seem to know about. Of the 19 respondents, 13 of them (68%) know about the practice, but only 2 (11%) are practicing. The reasons mentioned for this was that the disadvantages are more than the advantages.	27% of the respondents (4 people) know and are practicing this system.	47% of the respondents (7 people) know and are practicing this system.
Intercropping & Mixed Farming	The practice of intercropping is know by 12 respondents (63%), but practiced by only 4 (21%).	The practice of mixed farming was mentioned to be known and practiced by 3 farmers (20%). However, respondents may not be sure about the difference between mixed cropping and mixed farming as the same disadvantages are mentioned for mixed farming, which are in fact more applicable to mixed cropping (i.e. difficult to harvest).	The practice of mixed farming was mentioned to be known and practiced by 4 farmers (27%). However, respondents may not be sure about the difference between mixed cropping and mixed farming as the same disadvantages are mentioned for mixed farming, which are in fact more applicable to mixed cropping (i.e. difficult to harvest).

Bush fallowing	Only one respondent (5%) knew and was practicing bush fallowing. Discussion of the advantages and disadvantages to this system was limited because this practice is not widespread.		
Organic farming practices		One respondent (7%) answered organic farming practices as being known and practiced.	One respondent (7%) answered organic farming practices were known, but not practiced.

An additional question was posed to the respondents in order to find out when and where they obtained their farming knowledge.

Torro Bah	Gunkuru Wollof	Jahawuru Mankinka
63% of the respondents answered the question with " since long" they know about the above farming methods, 10% specified they have been aware since they started farming. The most common answer for where they learned these farming practices was "inherited by parents" (58%), for 26% it was specified that the knowledge came from the father, 5% from my brother, 5% from my mother and 5% from the grandparents. This indicates that farming knowledge is passed more frequently from fathers to sons or daughters.	The most common answer for where they learned these farming practices was "from my parents" (87%), 13% answered that the knowledge came from the grandparents, 7% from the father, 7% from the uncle and brother. The Department of Agriculture also contributed to the knowledge of the respondents in 20% of cases.	N/A

4.3 Advantages and disadvantages of farming and cropping systems identified by respondents

Table 1: Overview of advantages and disadvantages of farming and cropping systems identified by respondents.

Farming/cropping system	Advantages	Disadvantages
Crop rotation	- Improve soil fertility (82%TB) - Increase yield (47% TB) - Easy to work (11% TB) - Reduce susceptibility to pest and diseases (5% TB)	- Inadequate land (11% TB)
Mixed cropping	- Harvest 2 crops at the same time (5% TB, GW) - Supplement nutrients to the soil (5% TB) - Avoid total crop failure (GW, JM) - Increase income (GW, JM) - Good production from all crops (GW)	- Difficult to harvest (GW, JM) - Heavy loss of soil nutrients (GW, JM)
Mono cropping	- Supplement nutrients to the soil (5% TB) - Increase yield (5% TB, JM) - Increase income (cash crop) (GW, JM) - Soil nutrients will bu used lest by plants (JM) - Easy to harvest (JM)	- Inadequate land (5% TB) - Erosion (wind and water) (GM) - Can lead to crop failure (GM, JM) - Needs more fertilizer (GM, JM) - Reduces fertility of soil (GM)
Intercropping	- Increases production level (5% TB) - Gives more than one harvest (11% TB) - Supplement nutrients to the soil (11% TB) - Early maturing of some crops (5% TB)	- Not easy workable (5% TB)
Mixed Cropping	- Increases production level (GM) - Increases income (GM, JM) - Sustainable yields (JM)	- Difficult to harvest (GM, JM)

Bush fallow	- None identified (TB)	- None identified (TB)
Organic farming	- Increase production, home consumption and cash (GM)	- Difficult to get manure (JM)

TB = Torro Bah
GW = Gunkuru Wollof
JM = Jahawuru Mandinka

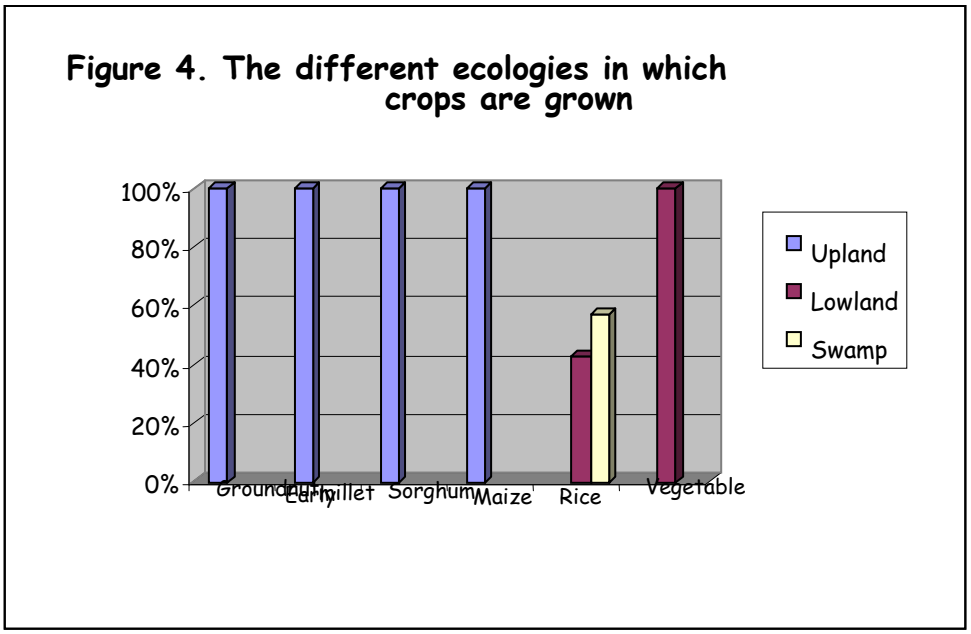
4.3.1 Further analysis of advantages and disadvantages of cropping systems

The above analysis indicated that the respondents were not very clear about the different farming and cropping systems and their advantages and or disadvantages. Even though most farmers practice mono-cropping, and to some extent mixed-cropping, this did not come out clearly in the survey when compared to the actual situation in the field. More training is needed to define and highlight the advantages and disadvantages of various cropping systems that are being practiced or that are available to the Gambian farmers.

Crop rotation is one of the most common practices. The advantages of crop rotation are clearly defined, and that why most farmers still follow the traditional rotational system. A 3 or 4-year designed crop rotation could add more advantages to their current practices.

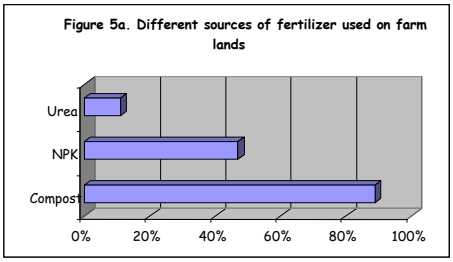
It was found that mixed cropping was often confused with intercropping, with intercropping not being addressed clearly on its own. This may either be due to lack of understanding or interest from the farmers. The disadvantage of mixed cropping – heavy loss of nutrients – is not the case if your mixed cropping system is a proper intercropping system (which can include trees as well with other annual crops).

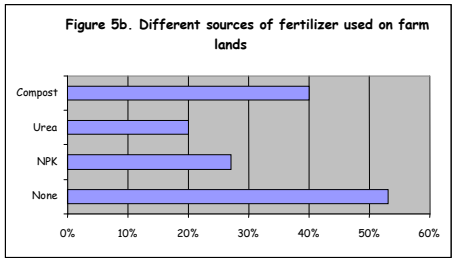
An additional question was posed in Gunkuru Wollof to determine which types of crops they are growing in which ecologies. It was found that groundnut, early millet, maize and sorghum are crops only grown in upland areas while rice is grown in the lowland and the swampland. Vegetables can be found in lowland areas (see figure 4).

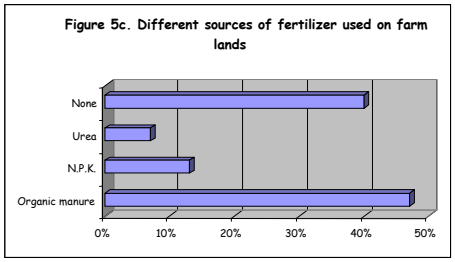


4.4 Soil fertility Management

Torro Bah	Gunkuru Wollof	Jahawuru Mankinka
The source of soil nutrients in this village is mainly from adding compost. About 88% of the respondents use organic fertilizers. 53% are also using inorganic fertilizer, 1 respondent using urea (6%) and 7 using NPK (46%). In addition, there is one farmers using Urea only, one using NPK only, and 7 respondents (41%) are using organic fertilizer only.	More than half of the respondents (53%) are not using any form of fertilizer to add nutrients to their soils. Six respondents (40%) use organic manure, half of them indicate that is their only source of fertilizer. The other 3 are also using inorganic fertilizers to supplement (20%). In total 4 respondents are using inorganic fertilizer (27%). Three out of those four are using both NPK and Urea, while one only used NPK. Those who are using (organic) fertilizers use them in small amounts which can not replenish the loss of nutrients caused by the growth of an annual crop. Over time, this will lead to the depletion of soil nutrients if an advanced crop rotation system is also not applied.	Less than half of the respondents are not using any form of fertilizer to add nutrients to their soils (40%). Seven respondents (47%) are using organic manure, and for all of them that is the only source of fertilizer. In total 2 respondents are using inorganic fertilizer (13%). One out of those two is using both NPK and Urea, while one only used NPK. The amount of chemical fertilizer used in this village is quite low.







The following table gives an overview of percentages using only compost or compost combined with other sources of fertilizers

Table 2: Overview of different sources of fertilizers used by respondents

	Use of compost	*Use of NPK*	*Use of Urea*	*Use of compost only*	*Use of inorganic fertilizer only*	*Use of both organic and inorganic*	*No use of any fertilizer*
Torro Bah	88%	47%	11%	41%	11%	47%	0%
Gunkuru Wollof	40%	27%	20%	20%	7%	20%	53%
Jahawuru Mandinka	47%	13%	7%	47%	13%	0%	40%

There is a high percentage of farmers who are using compost on their farm fields and moderately high numbers of farmers solely using organic fertilizer. There are also moderately high numbers of farmers using chemical fertilizers. However, many farmers in Gunkuru Wollof are not substituting any lost nutrients from the soil in whatsoever form, being it organic or inorganic. It was not indicated on which crops the different sources of fertilizers are applied. The next table shows the average amounts of each fertilizer used:

Table 3: Amounts of different fertilizers used by respondents

Community	Fertilizer	*No. of respondents*	*Average amount used (kg)*	*Min –Max amount applied (kg)*	*Average cost per kg (D)*	*Average transportation cost per kg (D)*	*Average application cost per kg (D)*
Torro Bah	Compost	15	1878	200 – 7500	0.99	0.11	0.05
	NPK	8	213	3 – 500	6.3	0.17	0.32
	Urea	2	75	50 – 100	7.00	0.33	0.30
Gunkuru Wollof	Compost	6	406	125 –750	1.90	0.30	0.10
	NPK	4	287.5	50 -500	7.10	0.20	0.20
	Urea	3	200	50-100	6.90	0.32	0.15
Jahawuru Mandinka	Compost	7	267	100 – 700	0.40	-	-
	NPK	2	125	50 -200	7.40	-	-
	Urea	1	50	50	6.80	-	-

The amounts of fertilizers and costs attached to it were quite diverse. On average, the amount in kilograms of compost used was highest but the overall price of this amendment per kg was the lowest.

Table 4: Overview of different types of seed dressing applied on cultivated crops

	*Number of respondents cultivated (% of total) – **Torro Bah***	*No. applying seed dressing (% of cultivators) – **Torro Bah***	*Number of respondents cultivated (% of total) – **Gunkuru Wollof***	*No. applying seed dressing (% of cultivators) – **Gunkuru Wollof***	*Number of farmers applying different seed dressings **(Torro Bah)***			
					Granox	*Suibale*	*Bovsine*	*White powder*
Groundnut	16 (94%)	13 (81%)	15 (100%)	12 (80%)	12	1	-	-
Maize	10 (60%)	7 (70%)	13 (87%)	3 (23%)	6	1	-	-
Early millet	11 (65%)	6 (55%)	15 (100%)	4 (27%)	3	2	1	-
Sorghum	1 (6%)	1 (100%)	11 (73%)	3 (27%)	1	-	-	-
Rice	8 (47%)	1 (12.5%)	11 (73%)	2 (18%)	-	-	-	1
Vegetables	3 (17%)	1 (33%)	13 (87%)	4 (31%)	-	-	-	-
Sesame	-	-	3 (20%)	1 (33%)	-	-	-	-
Beans	-	-	1 (7%)	-	-	-	-	-

Not all of the respondents used seed dressing. 17% in Torro Bah and 20% in Gunkuru Wollof did not use any form of seed dressing. All the other farmers used it on one or more crops. Six respondents mentioned to have used seed dressing on their entire planted crops, though in two cases rice was excluded. Preference crops for seed dressing are groundnuts first, followed by maize and early millet third.

In Jahawuru Mandinka chemical seed dressing was only applied on groundnut seeds. 85% of farmers who growing groundnuts used seed dressing. Except for 2 farmers who were using seed dressing on vegetable seeds, on no other crops seed dressing was applied.

4.5 Land ownership

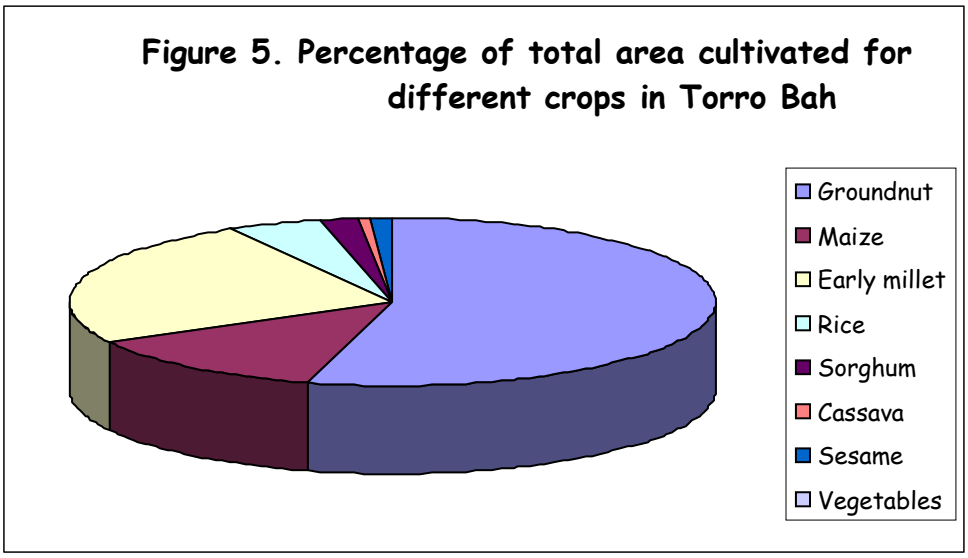
The amount of per capita land owned by the respondents is variable and ranges between 0.25 (a rice field) to 20 ha in Torro Bah, 2.5 to 15 hectares in Gunkuru Wollof and 0 to 20 ha in Jahawuru Mandinka. One respondent in Torro Bah (5%) and another in Jahawuru Mandinka does not own land at all and depends solely on others to borrow land for cultivation. In Torro Bah the total amount of land owned by all respondents is 127.75 ha with an average of 7.5 ha per respondent, in Gunkuru Wollof the total is 125.5 ha with an average of 8.6 ha per respondent in Jahawuru Mandinka each respondent has average land holdings of 3.4 ha. During 2004 an

average of 6.4 ha per respondent was cultivated in Torro Bah, 6.6 ha in Gunkuru Wollof and 5.2 in Jahawuru Mandinka.

In Torro bah, 41% borrowed land ranging from 1 to 5 ha (in total 15 ha) and another 41% rented land to others ranging from 1 to 12 ha (in total 29.5 ha). In Gunkuru Wollof, one respondent borrowed land from others (2 ha) but 67% rented land to others ranging from 1 to 5 ha (in total 30 ha). In Jahawuru Mandinka 67% borrowed land from others ranging from 0.5 to 4 ha (180 ha in total), another 20% rented land to others ranging from 2 to 7 ha (11 ha in total).

Table 5: Overview of total hectares cultivated of the different crops in Torro Bah

	Ground-nut	*Maize*	*Early millet*	*Rice*	*Sorghum*	*Cassava*	*Sesame*	*Vegetables*
Total no. of hectares cultivated	55	13	25.5	5.1	2	0.5	1	0.1 plus 8 beds
% of total amount	54%	13%	25%	5%	2%	0.5%	1%	



4.6 Crop Yields

The main crops grown as revealed in the data collected included groundnut, early millet, maize (corn), rice, sorghum, sesame, beans and vegetables. The following table shows the percent of farmers growing each crop during the past year (2004):

Table 6: Overview of farmers cultivating different crops

Crop	***Farmers cultivating crop in Torro Bah (%)***	***Farmers cultivating crop in Torro Bah Gunkuru Wollof (%)***	***Farmers cultivating crop in Torro Bah Jahawuru Mandinka (%)***
Rice	53	73	100
Groundnut	84	100	73
Early millet	95	100	100

Maize	74	87	47
Sorghum	5	73	20
Sesame	5	27	-
Cassava	5	-	-
Beans	-	7	-

The following table shows the average yield by crop for the past year (2004):

Table 7: Overview of average yields of the different crops

Crop	***Torro Bah Average yield (kg/ha)***	***Gunkuru Wollof Average yield (kg/ha)***	***Jahawuru Mandinka Average yield (kg/ha)***
Rice	301[2]	369	683
Groundnut	781[3]	1364	666
Early millet	610	404	610
Maize	794	66[4]	101[5]
Sorghum	100*	174	57
Sesame	250*	480	-
Cassava	150*	-	-
Beans	-	150*	-

*The number for average yield is based on the data from only one farmer.

Analyzing the yield data it can be seen that the productivity in the selected communities is very low. The average groundnut yield appears reasonable, but all other crops are yielding far below what is expected.

It is not possible to obtain an average yield for vegetable cultivation as the sizes of the beds cultivated have not bee specified. However, the average yields reported by the responding farmers are low.

4.7 Access to farm implements

Table 8: Ownership of different types of farm implements

Type of farm implement	***No. owning implements (%)***		
	Torro Bah	***Gunkuru Wollof***	***Jahawuru Mandinka***
Total	95%	67%	73%
Sine hoe	79%	67%	67%
Ploughing device	79%	-	-
Seeder	21%	60%	53%
Horse/Donkey Cart	-	7%	7%
Oxen	-	-	27%
Donkey	-	-	27%

[2] While 10 respondents were cultivating rice, the data of only 9 respondents were used to calculate the average yield. This because one respondent indicated a yield of 5000 kg/ha of rice which in this area is not possible

[3] While 18 respondents were cultivating groundnut, the data of only 16 respondents were used to calculate the average yield. This because the yield indicated by the two respondents left out were very high and probably not representing the reality (7300kg/ha and 3300 kg/ha respectively)

[4] One of the respondents mentioned to have a total crop failure for maize

[5] The low yield of maize is partly due to one mentioned total failure of the crop. As this is representing the reality of growing maize (frequent crop failure) this result is taken into the calculations.

None at all	5%	33%	27%

Further analysis in Torro Bah indicated that several farmers owning implements actually own two or more sine hoes, ploughing devices and seeders.

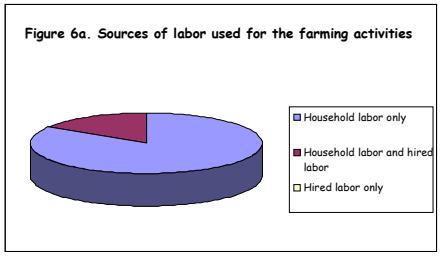
Table 9: Persons responsible for implement distribution

Implement Distribution	***No. of farmers (%)***		
	Torro Bah	***Gunkuru Wollof***	***Jahawuru Mandinka***
Determine use by themselves	28%	40%	91%
Directed in use by others	72%	40%	-
Decision by men	100%	100%	100%
Decision by Dabada Head	83%	30%	27%
Decision by younger men in compound	11%	20%	-
Decision by compound head	6%	30%	63%

4.8 Source of labor for farming activities

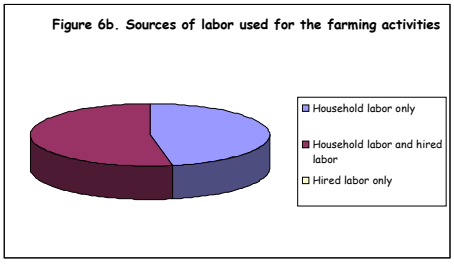
Torro Bah

The main source of farm labor in Torro Bah is household/family labor (84%), followed by mixed household/family labor and hired labor (16%).



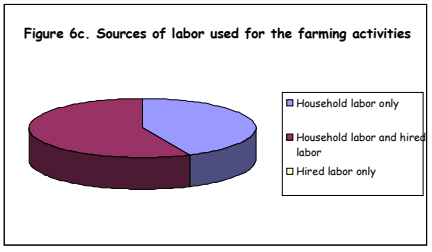
Gunkuru Wollof

The main source of farm labor in Gunkuru Wollof is mixed household/family labor and hired labor (53%), followed by household/family labor only (47%).



Jahawuru Mankinka

The main source of farm labor in Torro Bah is mixed household/family with hired labor (57%), followed by household/family labor only (43%).



The option of using hired labor only did not occur amongst the respondents. This is not surprising since in a typical rural farming community farm operations are done by every one at almost the same time thus making everyone occupied at the same time.

4.9 Cost of production

The cost of production for each crop depends on the amount of labor involved, the cost of seeds, the amount and attached cost of fertilizer (both organic and non-organic) and seed dressing applied. The labor cost is determined by adding all costs attached to the different farming operations. These are not specified to each crop, which makes it difficult to calculate the exact labor cost per crop. Piling and threshing should be attached to groundnut cultivation but in this analysis, all costs have been added and divided by the amount of hectares cultivated by the respondent in order to get an indication of the average labor cost per ha.

Table 10a: Financial return (D) based on a hectare of land cultivated in Torro Bah

Cost of operating inputs	**Rice**	**Maize**	**Early millet**	**Groundnut**

Cost of seed *(D/kg)*	9.4	5	5	21
Rate of seeding *(kg/ha)*	9.35	12	6.65	73.8
Average seed cost *(D/ha)*	98.15	56.30	32.60	1549.00
Cost of seed dressing *(D/ha)*	50	47	96	59
Cost of fertilizer*(D/ha)*	366.50	366.50	366.50	366.50
Cost of labor *(D/ha)*	6446.90	6446.90	6446.90	6446.90
Total operating cost *(D/ha)*	***6971***	***6929***	***6948***	***8495***
Average yields *(kg/ha)*	301	794	610	781
Price *(D/kg)*	4	7	7	10
Gross Revenue *(D/ha)*	**1204**	**5558**	**4270**	**7810**
Returns above (TOC-GR) *(D)*	**-5767**	**-1371**	**-2679**	**-685**

Table 10b: Financial return (D) based on a hectare of land cultivated in Gunkuru Wollof

Cost of operating inputs	Rice	Maize	Early millet	Groundnut	Sorghum
Cost of seed *(D/kg)*	8.2	6.75	6.6	7.9	7.3
Recommended rate of seeding *(kg/ha)*	80	30	8	70	8
Average seed cost *(D/ha)*[6]	656.00	202.50	52.8	53.00	58.4
Cost of seed dressing *(D/ha)*[7]	-	-	-	22[8]	
Cost of fertilizer*(D/ha)*[9]	-	-	-	-	-
Cost of labor *(D/ha)*	5159.53	5159.53	5159.53	5159.53	5159.53
Total operating cost *(D/ha)*	***5816***	***5362***	***5212***	***5734***	***5218***
Average yields *(kg/ha)*	369	65.4	404.7	1364	173.6
Price *(D/kg)*	4	7	7	10	7
Gross Revenue *(D/ha)*	**1476**	**458**	**2833**	**13640**	**1215**
Returns above (TOC-GR) *(D)*	**-4340**	**-4904**	**-2379**	**7906**	**-4003**

Table 10c: Financial return (D) based on a hectare of land cultivated in Jahawuru Mandinka

Cost of operating inputs	Rice	Maize	Early millet	Groundnut
Cost of seed *(D/kg)*	5.26	4.86	5.33	9.49
Recommended rate of seeding *(kg/ha)*	80	30	8	70
Average seed cost based on recommended seeding rate*(D/ha)*	420.80	145.80	42.64	664.30
Average actual seed cost *(D/ha)*	-	-	-	-
Cost of seed dressing *(D/ha)*	-	-	-	35[10]

[6] Calculating the average seed cost per ha, based on the baseline information, one might conclude that some extra ordinary – not realistic – amounts were spend on seeds per hectare. This might also indicate that probably the indicated number of hectares cultivated are not always realistic

[7] Cost of seed dressing was only calculated for groundnuts as this is a crop where 80% of the respondents are using seed dressing. As for all the other crops this amount was lower it was decided to leave out this item as a cost factor.

[8] This amount is calculated on basis of 11 respondents who used chemical seed dressing on their groundnuts. The average cost of seed dressing per kg of groundnut seeds is D0.31, which equals D22 per ha if 70 kg of groundnut seeds is used per one hectare sowing.

[9] Cost for fertilizer is not taken into account. The amounts used are small and not specialized for any crop. As cost of production are already very high, the few dalasis added for fertilizer will not change the return to unpaid labor significantly.

Cost of fertilizer*(D/ha)*	25 (for organic manure) 460.85 (for inorganic)			
Cost of labor *(D/ha)*	3867.81	3867.81	3867.81	3867.81
***Total operating cost** (D/ha)*	***4289***	***4014***	***3910***	***4567***
Average yields *(kg/ha)*	683	101[11]	610	666
Price *(D/kg)*	4	7	7	10
Gross Revenue *(D/ha)*	**2731**	**707**	**4270**	**6660**
Returns above (TOC-GR)	**-1503**	**- 3307**	**356**	**2093**

When reviewing this analysis in more detail, it can be seen that the labor cost per hectare is very high. This estimation of the labour cost, which actually remains unpaid as most of the work is done by family members, is the cause of the low, negative returns for crop. In combination with the low productivity (yield data may be somewhat unreliable as noted above) the gross revenue of the farm activities is for most crops negative, except for groundnuts with a fairly reasonable yield.

When considering this analysis however, it is also important to note that it is only groundnut that is actually sold for a profit. All other crops are grown as food and eaten in the household directly instead of purchased. Therefore, their actual value in the price column is underestimated considering what it would actually cost the family to purchase these essential goods in the market with their earnings.

In the Gambia, labor has proved to be the most limiting factor in all the farming operations. This is principally due to the short rainy season, which lasts for about four months just enough time for most of the rain fed crops to reach maturity if planted without delay. Often farmers spend too much time in ploughing to the extent that they are late in carrying out other time-bound activities thus resulting in low productivity.

The overall financial return is the "payment" to the producer for the labor and managerial efforts required by the crop enterprise. Each individual must make the decision whether the earned labor and management wage is sufficient when compared to what he/she could have earned elsewhere in the industry. The project tries to improve the local situation by using the most appropriate ecological farming practices and improved plant varieties and a well designed training package increase farm production, which will in turn reduce labour costs and increase on-farm income.

4.10 Livestock management / animal rearing

The survey results further indicated that most farmers keep at least some animals. Only 1 respondent in Torro Bah indicated not to own a single animal. Small ruminants (including sheep and goats) are kept most frequently (84%), followed by chicken (63%) and cattle (31%). The following table shows the frequency and average number of animals kept by the respondents.

Table 11: Type and number of animals kept by the respondents

	Torro Bah		***Gunkuru Wollof***		***Jahawuru Mandinka***	
Type of Animal	***Respondents keeping this animal (%)***	***Average animals kept***	***Respondents keeping this animal (%)***	***Average animals kept***	***Respondents keeping this animal (%)***	***Average animals kept (range)***

[10] This amount is calculated on basis of 11 respondents who used chemical seed dressing on their groundnuts. The average cost of seed dressing per kg of groundnut seeds is D0.5, which equals D35 per ha if 70 kg of groundnut seeds is used per one hectare sowing.

[11] The low yield of maize is partly due to one mentioned total failure of the crop. As this is representing the reality of growing maize (frequent crop failure) this result is taken into the calculations.

		(range)		*(range)*		
Poultry	63	6.6 (2-15)	93	6.7 (1-33)	87	5.9 (1-25)
Small ruminants	84	6.75 (1-30)	93	3.2 (1-21)	100	6.3 (1-26)
Cattle	31	3.83 (1-10)	7	27 (27)	33	23.5 (2-54)
Horse	15	1.3 (1-3)	-	-	-	-
Donkey	10	1 (1)	-	-	-	-
Other (not specified)	5	2 (2)	-	-	-	-

Further analysis shows us that the villages have similar animal management systems.

- Chicken are generally kept free range, though a small percentage (5%) are kept semi-intensive in Gunkuru Wollof.
- Small ruminants (goats and sheep) are mainly kept free range, though a small percentage (approximately 5%) are kept semi-intensive in Torro Bah and Gunkuru Wollof.
- Cows are generally managed under a semi-intensive system in Torro Bah and Jahawuru Mandinka, but mostly free range in Gunkuru Wollof with a small number semi-intensive there as well.
- Horses and donkeys (only residents in Torro Bah have these animals) are kept on a fully intensive management system.

In the Gambia, an intensive system means that almost all of the food is provided for the animal either in a grazing field or in its pen, although the animals still commonly walk freely in the village. A semi-intensive system means that some food is provided for the animal however it is mostly still left to fend for itself. Free run systems mean exactly that – no food at all is provided for the animal.

4.11 Problems

Table 12: Main constraints faced by local farmers

Constraint	***No. indicating constraint (% or ✓)***		
	Torro Bah	***Gunkuru Wollof***	***Jahawuru Mandinka***
Lack of adequate farm implements	68	47	✓
Lack of good quality seeds	63	20	✓
Poor soil fertility	16	93	✓
Lack of animals	16		
Lack of organic matter	16		
Living conditions	✓		
Pest infestation (termites, birds, etc.)	✓	13	✓
No decision power in market prices	✓		
Low yields	✓		
Salt intrusion	✓		
Lack of effective seed dressing	✓		
Poor germination		✓	✓
Damping off		✓	
Crop failure during germination		✓	
Flooding			✓
Drought			✓

Limited labor			✓
Inadequate land			✓

The respondents themselves tried to analyze the problem (causes and solutions) as this was added to the questionnaire. Some commented that the problem of the low soil fertility is caused by water erosion, deforestation and over usage of the land.

Solutions to the above stated problems mentioned by the respondents themselves are:

- Provision of adequate farm implements (74%)
- Provision of adequate seeds (53%)
- More chemical fertilizers (16%)
- Improving of soil fertility (11%)
- Effective seed dressing (11%)

Adopting organic farming practices, compost making and planting of trees were also mentioned as possible solutions.

5. CONCLUSION

Having analyzed the baseline data the following conclusions can be made:

- More females should have been included in the baseline data collection in Gunkuru Wollof and Jahawuru Mandinka in order to provide more gender-specific baseline information in these communities. The project however, is a gender responsive initiative in that the same amount of females and males are involved as direct beneficiaries and trainers in the project.
- As most of the respondents were the compound heads of randomly selected compounds, the average age is high and the formal educational level is zero.
- The majority of the beneficiaries are illiterate in the official language (English), though some (mainly men) are literate in Arabic.
- Peoples knowledge about organic farming systems is very limited and training is needed in order to increase farmers understanding of ecological farming practices.
- Knowledge of current farming practices is mostly inherited from previous generations. That is why advantages or disadvantages of many farming practices may not be expressly known. Though some of the advantages and disadvantages mentioned by the respondents are indicative of their years of experience, additional training would make their farming systems more ecologically sound and productive, with the farmers improving their management and control over their agricultural situation. Critical analysis of local farming systems is an important training need.
- Groundnut cultivation occupies more than half of all farm fields, which is a cash crop.
- Most of the farming labor is derived from household / family level which means not much cash is spent on this.
- A cost-benefit analysis of the farming inputs and outputs indicates that the current system is not economically beneficial. This is due to the high “estimated” value of labor inserted into the analysis for which the farmers are not actually paid as most labor is performed by family members. When considering this analysis however, it is important to note that it is only groundnut that is actually sold for a profit. All other crops are grown as food and eaten in the household directly instead of purchased. Therefore, their actual value is underestimated considering what it would actually cost the family to purchase these essential goods in the market with their earnings.
- Most of the respondents are keeping some animals. Traditional animal rearing systems are based on the free ranging system. To make farming systems more integrated and

ecological sound, training in improved animal management systems is a necessity, especially to make the best use of the animal manure in order to raise soil fertility levels. Use of animal manure is more common in Torro Bah, though additional training can make the farmers more efficiently use this widely available resource.

- Lack of farm implements as well as seeds is a major constraint to farmers. Any support in this area would really help farmers to improve in their farming activities.
- Low soil fertility levels (and therefore poor yields) are a large problem in most villages, particularly Gunkuru Wollof. This issue is known and emphasized by the farmers themselves. The low yields indicated in this report are likely connected with this poor soil fertility management. Proper ecological methods will improve soil fertility and therefore productivity if applied appropriate on their farms. Soil fertility management is not really practiced. More than half of the respondents are not supplementing any lost of soil nutrients by organic or non organic fertilizer. In contrast however, almost half of the respondents also indicated they use animal manure on their farms, which is far more than the number of respondents who applied non-organic fertilizers.