

The Agro-Ecological Village Development Model

The *Agro-Ecological Village Model* has been developed 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
	<ul style="list-style-type: none"> • <i>Emphasizes self reliance & empowerment through maximizing on-farm resource utilization</i> • <i>Market development oriented towards import displacement</i> • <i>Minimizes human impact on local environment & biosphere</i> 	<ul style="list-style-type: none"> • <i>Emphasizes export markets to pay for imported goods</i> • <i>Approach leaves communities vulnerable to external forces</i> • <i>Degrades natural resource base locally and increases greenhouse gas emissions</i>
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
N Fertility	Intercropping, nitrogen fixing legumes, azolla, mudpress, soil mineralization, donkey and horse dung	Purchased urea fertilizer
Minerals	Minimal erosion, recycling of rice hull ash and mudpress, donkey and horse dung, good soil structure	Purchase 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,	Monoculture production emphasized

	then import displacement in local markets and value added processing	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

Central to the AEV approach is the conviction that ecological land management and sound community organizing form the basis for sustainable community development. This model emphasizes participatory development processes using a four-step plan (institutional building process, capacity building and training, farm planning, field level implementation). 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
- Increasing 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 through reduced minimized crop residue burning
- Help protect and restore biodiversity

In addition to improving the lives of farming families in Lower Badibu and Lower Saloum, the concept of the Agro-Ecological Village could also become the basis of a development model that meets the dual objectives of poverty alleviation and environmentally sound development in other regions. From our experience, this strategy has proved to be the logical evolution for rural development programming in agrarian areas.

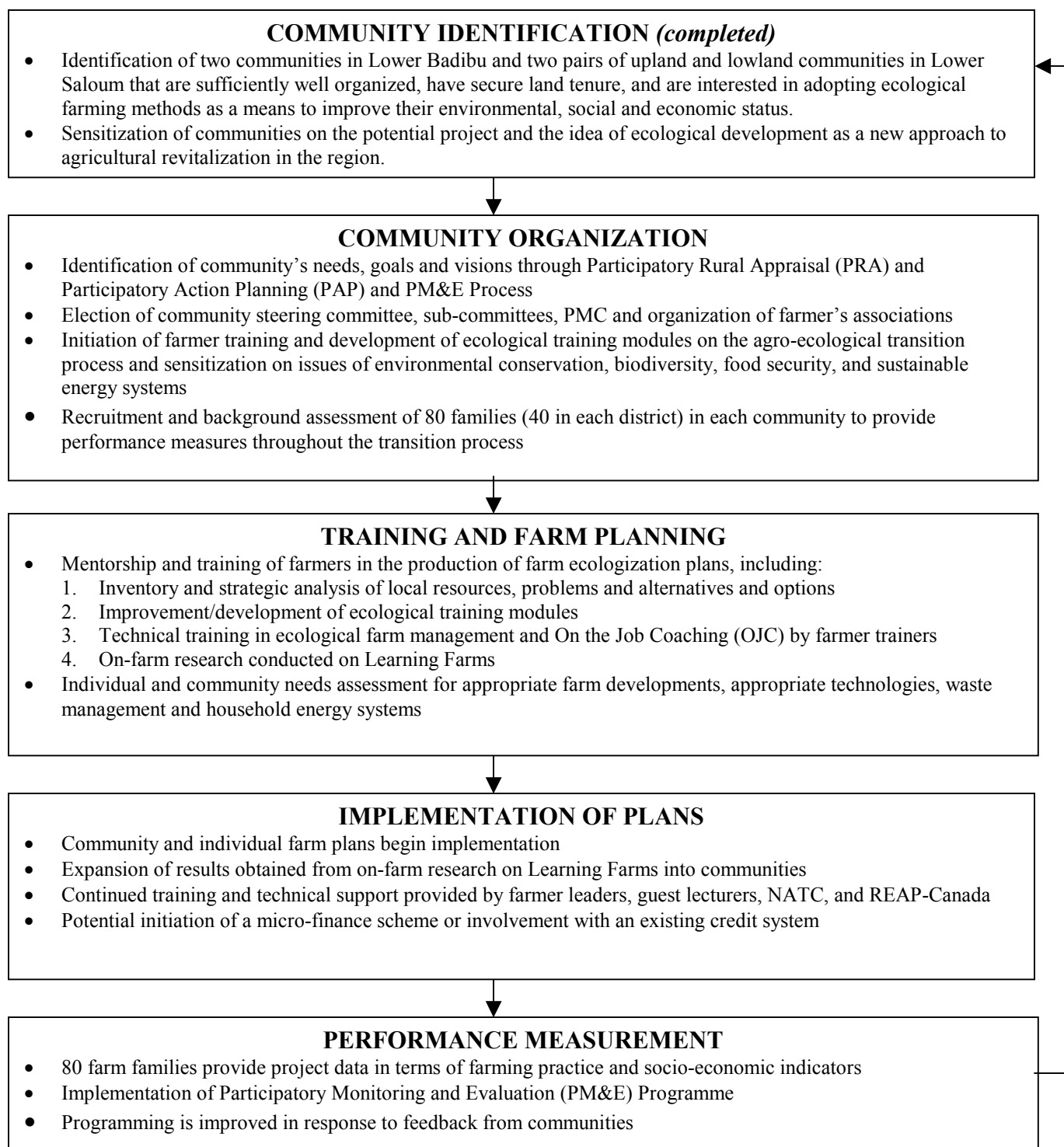
AEV objectives

1. Establish and build the capacity of farmer's organizations utilizing PRA, PM&E and other participatory processes and support gender development for all project activities.
2. To train farmer trainers on Agro-Ecological farming methods, establish a farmer-to-farmer training network and develop localized training modules to support the development of ecological farming systems and assist communities in the development and implementation of ecological farm plans.
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 IKS, intercropping, sustainable livestock management, agro-forestry and appropriate technologies.

AEV Implementation

There are five basic steps in the implementation of the Agro-Ecological Village Development Model: community identification, community organization, farming planning process, implementation of plans, and performance measurement. For illustration and greater detail of these steps, please refer to Figure 1.

Figure 1. The 5 step process of Agro-Ecological Village development implementation



Community Identification

The following criteria can be 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.

Community Organization

Drawing on the Project Proponents experience working with communities, beneficiaries will undergo an organizational development process. The needs, constraints and opportunities of the community members can be analysed through a Participatory Rural Appraisal (PRA), and their development goals and strategies will be outlined. Specific activities, targets, and monitoring indicators will arise out of this initial PRA process.

The participatory rural appraisal (PRA) approach emphasizes local knowledge and enables local people to make their own appraisal, analysis, and plans. It also increases the capacity of the local organizations to perform their own ongoing appraisals in a flexible and dynamic manner. A record of discussions, and community needs/objectives will be kept and analysis and the development of recommendations for an action plan will be prepared in a formal report. PRA techniques will continue to be used by project staff to collect data from project beneficiaries and encourage group discussions on project and community issues.

Project Proponents, community organizers, farmer trainers and community members will form a Project Management Committee (PMC) to lead the development process and to facilitate farm management decisions. The PMC will involve key male and female farmers in the village and will oversee the development of the farmer to farmer training network, the implementation of farm plans, the development of learning farms and other project activities.

Strengthening the capacity of Farmer's Organizations

Capacity building shall be an ongoing process in this project and a cross-cutting issue in all components. The main aspects of the capacity building process shall be:

- Increasing farmers' capacity through trainings using participatory approaches to analyse their local environment and apply ecological principles to their farming methods.

- Institutionalise approaches of mutual learning, support and information exchange within the community (local)
- Institutionalise approaches to network information and experiences outside the community (regional and national)

Farmer Technical Groups

One aspect of the Agro-Ecological Village model for sustainable community development would see the eventual establishment of farmer technical groups specialized in certain agricultural techniques or approaches. The members of this group would participate on their own interest and of their own accord. These technical groups would provide an effective, participatory and consensus-based method in dealing with environmental issues including water conservation, soil erosion, plant improvement, soil fertility, and environmental remediation and re-vegetation. They may also include socio-economic issues such as marketing policies or economic strategies. These groups would select relevant topics and members would be local farmers who are interested in the subjects. Mixed groups related to gender specific activities (such as gardening, groundnut production) would be encouraged. The activities of the groups will include brainstorming, elaborating discussions, field-testing, researching new information or techniques and fostering teamwork and cooperation within and between the various farmers group and local partners. These groups are designed to enhance the confidence of local people relating to their own creative thinking ability and capacity for local knowledge generation.

Kitchen Table Discussions

Once the development of the project is underway, the farmers will be encouraged to have a series of informal “kitchen table” discussions once a week when farmers have more time available (Jan-May). The participants would do so of their own interest and accord. These discussions would mirror the approach of the Ecological Farmers Association of Ontario (EFAO), an organization of Canadian farmers. The discussions would be prepared by the local farmers, and geared towards a cross learning of ideas and a tangible or practical output. They would focus on subjects requested by the farmers and could include topics such as alternative energy (animals, plants) or medicinal/holistic treatment by farm products. Discussion groups involving women’s issues would also be actively encouraged.

Farmer-to-Farmer Training

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

Fundamental to this approach is to develop experienced farmer trainers, known as "first liners" to lead training sessions. These individuals will be progressive farmers having a sound understanding and skills in farming, understanding of social and ecological issues and effective organizational and facilitation skills. *Please refer to Table 2 for Guidelines for the effective facilitation farmer-to-farmer training sessions.* Other farmers still undergoing the process of becoming an experienced farmer trainer, will be trained as "second-liners" to re-echo these lessons in their local areas to disseminate the information. During the session, these second liners will play a support role, learn through actual experience and gain confidence in the training process. Young farmers who have high potential for development will also be encouraged to become trainers during the project, and will be exposed to various subjects and trainers. The farmer trainers will be developed with participatory methods, so as to actively engage all members of the community including the women and the shy farmers. Trainer's training sessions will be provided to upgrade trainers on a periodic basis. Through this participatory peer education approach, trainers are continuously being developed, and groups are kept small as farmers are exposed to a diversity of farmer trainers and issues. This training approach can be adopted for instructing individuals how to employ organic farming, diversify their production, develop their farm in a holistic manner, and every other aspect of the agro-ecological village development.

Table 2: Guidelines for the effective facilitation of farmer-to-farmer training sessions	
<i>Important facilitating skills:</i>	<i>Barriers to effective communication</i>
<ul style="list-style-type: none"> • Organize the topics • be prepared for the topic • organize the visual aids • have a good grasp of the ideas to quickly answer questions • know how to facilitate the flow of discussions • know how to get the attention of the listeners • know how to make use of gestures to emphasize his/her point • have self-confidence and be comfortable speaking in a group • give the audience undivided attention through frequent eye contact • know how to control unnecessary mannerisms/bossy language • avoid unnecessary repetition of words/avoid redundancy • Incorporate distractions into the context of the training • Know how to manage time • be creative • have a sense of humor • be emphatic • be committed and focused • be open-minded to comments/criticisms • have a clear and audible voice • have legible penmanship • be sensitive to the needs of the participants • know how to gauge the level of listeners 	<ul style="list-style-type: none"> • Message is not clear • Seminar/meeting is not well-organized • Language/ technical terms not understood • Divided attention on the part of listeners (personal problems may get in the way ie: participants are hungry) • Audience is uninterested in the topic • The speaker is unable to get the attention of the listeners • Excessive noise • Distractions

It is essential that women are enlisted as trainers in the farmer-to-farmer training program. The purpose of this is threefold, first to build the capacity of these individual women as trainers, secondly to have women engaged as active participants in the project and ultimate in the community, and finally because it is from women that other women will learn best. This is one of the most challenging aspects of the programming as the women in these communities may be poorly educated and painfully shy. However, we must recognize that the involvement of women in every aspect of the project is fundamental to the improvement of the quality of life for the farmers, for the cohesion of the villages, and for overall success.

Development of Training Modules

A “ladderized” training program is utilized in the Agro-Ecological Village approach. Ladderized trainings are a series of training sessions presented in an order that gradually increase the technical level of information available to the farmer. The program will include formal training manuals dealing with sustainable farming techniques and farm development, but will also involve applications and mentorship including cross-site visits, on the job coaching during the growing season and kitchen table roundtables in the winter. For each training topic, an interactive training module will be developed. The modules describe all of the important concepts that should be conveyed to the farmers, and will act as a guide for the trainers to be delivered in conjunction with the on-farm test trials.

Each community will continue to undergo custom training needs analysis to determine which training sessions are most relevant to the farmers. Ongoing monitoring of the applicability of the training programs will be evaluated through expectations and feedback from participants and trainers. Initially, a sensitization of the communities is important to deepen the level of understanding of the social and economic situation the farmers are facing, both locally and nationally. The participatory, problem-solving nature of the trainings is designed to energize the farmers and encourage them into action in their communities.

Initially identified as areas of interest by rural staff and communities, the first training modules that will be adapted for local use may include those listed in Table 3.

Table 3: Agro-ecological Village Potential Farmer trainings, seminars and activities
Agro-ecological Village Project Orientation
PRA (Participatory Rural Assessment)
Introduction- Principles of ecology and sustainable agriculture <ul style="list-style-type: none"> - Ecological Principals - Agriculture in the Gambia - Ecological Farming
Soil Fertility and Organic Components of Soils <ul style="list-style-type: none"> - Introduction to Soil Fertility and tropical soils

<ul style="list-style-type: none"> - Soil Properties <ul style="list-style-type: none"> ▪ Physical ▪ Chemical ▪ Biological - Organic components of soils <ul style="list-style-type: none"> ▪ Organic Matter ▪ Composting ▪ Manure management
Cropping Systems <ul style="list-style-type: none"> - Basic Principles - Benefits of cropping systems - Examples of Crop Rotations - DIFS (Diversified Integrated Farming Systems)
Green manures and cover crops
Weed management control
Disease and Pest Control / Integrated Pest Management (IPM)
Soil and Water Conservation
Livestock Management
Holistic Farm Planning and Design (food footprint)
Agroforestry
Horticulture and Dry Season Vegetable production
Nursery Management
Gender
Food processing, preservation, storage and marketing
CBO Seminar
Training Of Trainers (TOT)
OJC (On the job coaching/mentoring)
Hungry season food security
Plant improvement (adaptability, farmer-led breeding)
Seed conservation, plant material propagation and multiplication
How to be a trainer of trainers
Group Management
Participatory Community Planning
Participatory Learning and Research (PLAR)

Training Format

The training schedule will reflect the most appropriate timeline based on the stage of development the local farmers are at. The trainings should not be conducted with more than two topics at a time, and should be done in a participatory manner involving both whole group discussion and small group activities with both lecturing by the trainers and speaking/analyzing done by the farmers themselves. Special efforts shall be taken during the trainings to involve the women in activities and discussions (it may be beneficial to break them into small groups of women only at the beginning if they are uncomfortable or quiet) to ensure they are actively participating. A 2 hour “situational” analysis will be

held on the first morning of each session to discuss the social, economic, and environmental current events affecting the farmers. This process furthers the sensitization of the farmers and encourages them to actively evaluate their local and national conditions. At the end of the training session, it will be reviewed whether the expectations have been met, and a record of both the positive and negative feedback made to further improve the training process.

The trainings will last for 2 days, but can be extended from 1-3 days depending on the need and circumstances. They would be held all year round with the majority concentrated in the months when farmers are less busy. The training sessions will have from 10 to a maximum of 25 participants. The training will be free for participants and healthy, well-balanced meals will be provided during the sessions. The farmers will generally not be reimbursed for the trainings to ensure the sustainability of the community groups after completion, as well as to ensure the farmers see the free education as a benefit and attend for interests' sake. The trainings will be held in an area close to the locations of the farmers so that they will not have to travel far, in a building with adequate facilities (chalkboard etc.), light and fresh air. Trainings will also be held outdoors or "off-site" during the warm season where participants are less susceptible to distractions to enable more focused and extended discussions. There is also more opportunity for discussion than in a formal setting, and shy people are encouraged to ask more questions. Farmers are generally more comfortable in rural settings, and the off-site trainings can provide the opportunity for visits to nearby farms. The trainings will be primarily during the winter season and at other less busy times during the year.

Farm Planning

When the communities have undergone sufficient training, they will engage in an extensive farm diversification planning process. Phase 1 will involve the training of "first-liner" farmer trainers in ecological farm management. After the initial training of the first liners, they will train others in their communities to be "second liners" who can eventually conduct trainings on farm development on their own. In this way the process of training and development of new local trainers in each community can continue. The farmer trainers will provide support to other farming families to create detailed action plans for their individual farms. These plans will include land use maps, workplans and predicted expenditures for the proposed farm diversification and ecologization. Farmers will discuss sustainable farming strategies including how to conserve water and soil, improve local soil quality and minimize the use of synthetic pesticides and fertilizers.

To develop their farm plans, farmers will utilize seasonal calendars, transect maps, workplans, cropping systems and rotation information, green manures, 5 and 10 year land use goals, predicted expenditures and other planning techniques. Farmers will discuss strategies to conserve water and soil and minimize the use of fossil fuels and synthetic pesticides and fertilizers. Individual farm transformations may include intercropping, diversified vegetable and grain legume production, organic rice cultivation, improved crop rotations and sustainable agro-forestry activities. The farm planning process will provide the basis for farm transformation and plans will be revised as necessary through the

conversion process. Farmers will be advised to concentrate most of their planning efforts on the first few years of transformation, although less detailed planning of longer term farm plans will be encouraged. Community members will also create management plans for communal areas. They will assess their own need for appropriate technologies such as irrigation, and ecological cooking energy, as well as farm implements like hand-held tools, micro-irrigation, and draft animals.

The ecological farm-planning guide will be used as the main tool for guiding the communities through their farm planning process. The existing ‘Introduction to farm planning’ training module will be modified on an ongoing basis to improve suitability for farmers and the local agronomic situation. These ongoing modifications to the farm-planning module will be made by the farmer trainers themselves.

Farmers will be advised to concentrate most of their planning efforts on the first year of transformation, although less detailed planning of longer term farm transformations will be encouraged. They will assess their own need for appropriate technologies such as bio-gas and solar cooking and heating systems, as well as farm implements like hand-held tools, micro-irrigation and draft animals. The farm planning process will provide the basis for farm transformation and plans will be revised as necessary through the conversion process. Monitoring and analysis by the training team will be performed, along with individual on the job coaching for implementation.

Food Footprint

One potential management strategy called the Ecological Food Footprint Analysis will be utilized to further develop local farm planning. The Food Footprint Analysis is a simple and effective tool that provides a relevant and clear representation of household food consumption. It is a simplified adaptation of the Ecological Footprint Analysis developed by Wackernagel and Reese and introduced in “*Our Ecological Footprint: Reducing Human Impact On the Earth.*” The Food Footprint quantifies the amount of land required to grow the main agricultural components of household food requirements. Land production rations (e.g. tonnes/ha) are defined for each crop and multiplied by annual consumption amounts (kg) to give the land requirements for each food component. The Food Footprint for each crop is then summed to give the total land area that is required to feed a household or an individual *sustainably*, meaning that the same plot of land must be available for production the following year for the same crop.

The Food Footprint is extremely effective in assessing household food security. In order to secure basic dietary requirements, households will first assess existing land usage, looking at the planted area and the associated agriculture returns. The Food Footprint can also be applied as a planning tool, encouraging farmers to reduce household Food Footprints while more efficiently managing farmland to produce higher and sustainable yields.

Farm Implementation

Farming families will put their farm plans into action under the guidance of farmer trainers, community organizers, village coordinators and REAP-Canada support staff. The communities will have the opportunity for continual training on sustainable farming. Sustainable farming techniques will be demonstrated on a field level by community members and project organizers through the development of “Learning Farms.” These will expose farmers to ecological practices that could be implemented on a larger scale throughout the community.

Learning farms will combine several approaches to introducing sustainable farming to communities:

- Adaptability trials (new varieties/crops, drought/water/salt resistant)
- Demonstration of (EFS) Ecological Farming Systems (contouring, composting, intercropping, multiple cropping, green manures, soil fertility management etc.)
- Soil and water conservation (windbreaks, checkdams, drip irrigation)
- Seed bank (living gene bank) and plant material multiplication (tree nursery)
- Breeding
- Appro-tech (farm equipment, on-farm energy management)
- Livestock (new varieties, sustainable fodder production)
- Weatherproofing farms (reducing vulnerability to vagaries of the weather)

These farms are coordinated by farmer trainers or other interested farmers that are willing to share their experiences and ideas with others. In this way, the farmer trainers can 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 also establishes a stronger connection between the test trials and the ecological trainings, and is ideal for farm visits and “out of class” field trips.

Learning farms can broaden development efforts by integrating several key ideas as techniques on one “regular” farm. They also avoid the concept of a terminal “Model Farm” with one model farmer, by placing the farmer and the farm 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 in farmers. 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.

Activities at the learning farms will involve farmers developing tests and records of the new techniques and materials. Plant materials will be assessed by the farmers for various agronomic traits, performance and yield. Promising varieties will then be increased into larger field strips through the crop verification process. Trials testing new varieties of interest and confirming characteristics of varieties that demonstrated high adaptability to local conditions will also be undertaken. Other on farm testing of plants and livestock systems will also be developed based on priorities identified by the community through the PRA process. The overall goal is 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. Efforts will be made to further the local understanding of

the links between the farmers and the environmental conditions through the farmer training program and field trials.

The learning approach encourages the exchange and progression of ideas and the constant observation and assessment by the farmer trainer and others in the community. This process is greatly stimulates brainstorming sessions which can occur when the community gets together at the farm or during cross site visits that occur when from farmer trainers and farmers come from other communities. Overall we believe this concept to be an important new orientation that is a logical evolution for the development of farmer-led ecological farming systems research and extension as it enables scarce resources for rural development to be used as effectively as possible.

As a summary, some of the initial ideas and potential demonstrations and projects to be included in the learning farms are as follows:

- New plant materials and plant material/seed propagation
- Drought resistant vegetables
- Water-conserving plants
- Drought tolerant tree species that improve ground water availability
- Drought resistant animal fodder such as sorghum sudan grass or millets
- Controlled grazing systems
- Improving soil fertility through green manures, improved crop rotations
- Reduced use of fertilizers by improving organic matter through minimal tillage, composting, growing crops with large root masses and crop residue utilization
- Multiple cropping systems
- Reduced use of pesticides, herbicides and fertilizers through weed, insect and disease control.
- Small scale soil and water conservation initiatives like windrows, mini-checkdams, permanent terracing, permanent pastures, cover cropping
- Salt-tolerant/ reducing plants into low-lying areas with high salt accumulation
- Management strategies for damaging pests
- Investigation of improved on-farm technologies such as threshing, weeding, hoeing, plowing and harvesting to reduce the work burden on women

To identify and establish local learning farms/gardens, the following steps will be followed:

- Assessment of best farms in region through farm visits and field trips
- Adaptability trials: small sites to test new/improved varieties/species that may be potentially successful. Emphasis on local farmer assessments (not scientific), both by leading farmers and under low-input management
- Scale up of those already deemed successful by NARI/ locals for distribution in local communities
- Prepare sites for planting (trees, seedbeds)
- Give local farmers that are already developing certain crops (like the fellows working on tomatoes, cassava) access to improved varieties and ask them to assess them

Intercropping

Local trials will be conducted by the farmers and collectively monitored.

Vegetable and Grain Legume Diversification

Vegetable and grain legume diversification has the potential to significantly improve nutrition and diversify the landscape, with an emphasis on those varieties that locals are interested in. Alternative varieties of vegetable and grain legumes will be established including easy-to-grow crops and more difficult crops for farmers with more advanced farming skills. Seed conservation methods will also be demonstrated. As conventional vegetable production involves the intensive use of synthetic pesticides, biological pest control methods will be encouraged.

Improved cooking technologies

To alleviate the dependency on fuelwood, villagers will be exposed to alternative fuel stoves. These include evaluating the viability of the Mayon Turbo Stove and solar-powered cookers. Developed by REAP-Canada in the Philippines, the Mayon Turbo Stove allows for efficient combustion of rice hull and this can be supplemented with other local fuels such as corn cobs and peanut shells. Testing will be undertaken to determine if the stove can efficiently burn millet husk residues, which is a widely available crop residue.

Sustainable Soil Fertility Management

It appears that soil fertility conditions have seriously degraded in both communities due to intensive cropping of annual crops such as peanuts and millet. This is particularly the case for row crops, which can generate serious soil degradation problems. A number of new possible strategies will be introduced to work towards developing farming systems which maintain or build up soil fertility on the farms, these include:

- Reducing soil tillage: Where possible, reduce fall soil tillage. Minimum tillage systems should be tested and promoted to reduce soil erosion and the intensity of soil cultivation.
- Introducing drought tolerant grain legumes: Developing chickpeas, and higher water use efficiency field peas as new crops to expand crop rotations in the communities and enable a reduction in the acreage of annual row crops
- Introducing moderate to high yielding perennial forage crops on marginal lands to reduce cultivation of annual crops.
- Reduce the collection of field crop residues for livestock feeding and household energy use: Allow decomposition of residues in the field where possible to reduce soil erosion risks (by increasing residue cover) and for soil improvement.
- Composting: making compost from livestock manure and organic residues to help increase soil organic matter levels and increase soil biological activity. Turning manure into compost also helps facilitate application to more distant fields where manure is infrequently applied. These areas often have the most serious problems with declining soil organic matter levels.
- Introduce annual green manure crops periodically into the crop rotation, which help maintain soil organic matter levels and improve overall soil fertility.

Livestock Management

The free-range system for livestock husbandry is one of the most significant impediments to the advancement of sustainable farming. Understanding that this system has been practiced for generations and that farmers are generally concerned with the scarcity of fodder during the “hungry season,” considerable efforts will be made to identify the weaknesses of the current system and develop local solutions. Field trials will be conducted to assess the feasibility of using a semi-intensive livestock management plan where forage grasses and fodder trees will be cultivated in a rangeland environment. Live-fencing is proving effective against livestock infiltration in community gardens, and farmers will integrate this concept into the project to protect their communities.

“Weatherproofing Farms” through Improving Water Conservation and Water Use Efficiency

Water management remains a critical issue in increasing farm production and in providing more stable crop yields in the communities. A number of strategies can be taken to improve plant soil water relations.

- Emphasize soil organic matter improvement, more water is held in soils with high soil organic matter content.
- Introduce more drought tolerant annual crops: Good possibilities for the communities are new annual crops and more water use efficient crops. These can be tested in community trial farms.
- Introduce grasses which are drought tolerant because of their high water efficiency and have deep root systems (2-3 metres deep) that can improve soil quality.
- Introduce drought resistant animal fodder such as sorghum sudan grass or millets
- Increase reliance on the use of biological N sources through expanded use of grain legumes, improved manure management systems and soil mineralization processes as chemical fertilizer tends to increase water stress problems for plants from the salts present in the fertilizer.
- Expand the use of trees in windbreaks to create a more favourable microenvironment for plant growth. Windbreaks reduce evaporation and can increase humidity levels. Fodder types of trees can be planted to also provide forage in dry periods for livestock. Species selected should improve ground water availability

Plant Material Improvement

Can include the following

- RICE improvement
- Vegetable Improvement
- Agro-forestry
- Forage Improvement

Indigenous Knowledge Systems

AEV Sustainability

The long-term impact this project intends to make is 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 project envisions the successful implementation of a low-cost community development model that can easily be replicated in other areas of the world to reach the millions of peasant farmers who desire to improve their quality of life. 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. 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 both in the Philippines and in western China, and in 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.