

CHAPTER 8

INTEGRATED SOIL CONSERVATION SYSTEMS

The preceding chapters provided the principles and considerations which must be taken into account to successfully integrate soil conservation into farming systems. This chapter:

- firstly, examines the experience of the Hillside Agricultural Project (HAP) of Jamaica where an attempt was made to involve farmer and community participation in project design and implementation: and
- secondly, examines broadly the existing systems in the Caribbean where soil conservation has been integrated into farming systems;

Exercises which the student of soil conservation should carry out using the principles outlined in the book to gain some practical experience are given in the Appendix.

8.1 Hillside Agricultural Project (HAP), Jamaica

The overall goal of HAP is to increase the economic well-being of the residents of the hillside lands in two watersheds, Rio Minho and Rio Cobre, in a manner that promotes rational land use patterns.

The project was initiated in February 1987 and is due to be completed in February 1994. It is funded by USAID at a cost of US\$10 million. HAP itself is not a project implementing agency. It consists of a core staff of a Project Manager and Deputy Project Manager and office support staff. It funds self-managing sub-projects (Hillside Agricultural Sub-Projects or HASP) that promote the production and productivity of perennial tree crops. Between 1987 and 1991, 16 sub-projects were approved and two were pending. Fourteen of the 16 sub-projects were similar in nature and were concerned with farm improvement. The other two were a Watershed Inventory sub-project and a Baseline Study sub-project. The

HAP has certain defined objectives and criteria and the sub-projects have to satisfy these conditions before they are approved.

It should be made clear that HAP was not a soil conservation project per se and this was often not the primary objective of a sub-project. However, because erosion must be controlled if the improvement of farms on hillsides is to be sustained, soil conservation is recognized as an important aspect of the project. However HASP did not emphasize soil conservation and this can be considered to be a deficiency in some cases.

The purpose of the project is to increase productivity and expand the area of both export-oriented and domestic perennial crops. This targeted increase in agricultural production is expected to result in an increase in the productive employment of hillside residents and in disposable income. The specific goals and objectives of the sub-projects varied and included: increasing tree crop production and farmer incomes, improving crop development by introducing improved technology, controlling soil erosion and land degradation, increasing community participation and strengthening local institutions.

At the sub-project level specific targets or outcomes had to be set and quantified. An important consideration is that the detailed goals and objectives should reflect local specific needs. All sub-projects had to list a set of local constraints which would be addressed. Formal detailed case assessments of local constraints through farmer interviews, walk over surveys, or rapid rural appraisal were to be undertaken but these were not frequently achieved. In some cases, the major problems common to an area were assessed through individuals or organizations with experience of previous work in the area e.g. extension officers, NGOs.

The 16 sub-projects approved and implemented are:

- St. Mary Cocoa Growers Support Sub-project (S-p)
- IICA/MINAG Farming Systems S-p
- Agro-Forestry Promotions S-p
- N.W. St. Catherine Coffee S-p
- UNITAS S-p

- Upper Clarendon Processing Company
- Manchester Rural Agricultural Development Agency (RADA) S-p
- Rio Minho Cocoa Expansion S-p
- Guys Hill Coffee S-p
- Blackwoods S-p
- Elgin S-p
- Windsor S-p
- Mango Top-working S-p
- Above Rocks S-p
- Watershed Inventory S-p
- Baseline Survey S-p

The first 14 sub-projects listed above had different specific objectives and targets but they were all concerned with perennial or tree crops. It is not feasible to outline for each project the specific objectives and targets, and the constraints to production which the projects sought to overcome, but the general approaches to project design, implementation and evaluation promulgated by HAP will be considered. The detail project proposals and progress reports are located at the HAP office.

The key pillars to HAP strategy were:

- Community participation in all phases of the project cycle or the "bottom-up approach"
- Strengthening of local institutions
- Project implementation through a sponsoring organization
- Non-monetary incentives to farmers
- Extension service to farmers
- Crop improvement through agronomic and cropping systems approach
- Inclusion of soil conservation in the sub-projects
- Sustainability of sub-projects

Community Participation

The HAP strategy calls for community participation from the problem identification or planning stage, through project design, implementation,

monitoring and evaluation i.e. the "bottom-up approach" in the true sense. Except for the IICA/MINAG Farming Systems sub-project, the projects have been weak in community participation in the first two stages of the project cycle. The HAP proposal preparation involves some discussion with farmers in targeted districts but a more in-depth process is required. In many cases this information is supplemented by information from NGOs and extension officers with experience in the area. A preliminary needs assessment is obtained during the process. Farmers and the community have not really been involved in project planning.

There has however been greater success in community involvement in project implementation. All sub-projects have incorporated this approach by establishing local management committees (LMC) which include representatives of local farmer organizations and other community representatives. The Farmer Action Committee Team (FACT) of the IICA/MINAG sub-project is the best example of farmer mobilisation and community participation in HAP. (This was discussed in Chapter 3 Volume I.) FACT has functioned in all stages of the project cycle and should be adopted by other sub-projects. Apart from FACT, communities of other projects have not participated in project monitoring and evaluation. The strategy therefore needs to be implemented more fully if it is to achieve the objective of project adoption and sustainability.

An alternative to the FACT strategy is to use existing local organizations that are functioning efficiently e.g. cooperatives, select Jamaica Agricultural Society (JAS) branches. In some cases these may need strengthening to improve their effectiveness.

Strengthening Local Institutions

One of the aims of the HAP is to strengthen the capacity of local community organizations, such as JAS branches, Coffee and Cocoa Cooperatives, and youth organizations, to initiate and implement projects. This would encourage farmer participation in project implementation and ensure sustainability. The success depends on the presence of existing functioning organizations which can benefit from the sub-project. This is not always the case.

Sponsoring Organizations or Implementing Agencies

The implementation of sub-projects through permanent organizations with suitable experience has the advantage of permanence as regards future institutional support. Organizations have different strengths, resources, capabilities and effectiveness. These must be carefully assessed in relation to the requirements of the project and the capacity of the organization to deliver efficiently.

Non-monetary Incentives

For sustainability, the project does not offer cash incentives or cash subsidies for soil conservation because farmers come to depend on cash support and never take full responsibility for soil conservation. The experience of the HAP has been that soil conservation declines or ceases with the removal of subsidies.

Extension Service to Farmers

Similar extension approaches are used by the sub-projects. District meetings are held to inform farm families of the assistance to be provided by the sub-project and to distribute applications. The applications are reviewed by the Local Management Committee and the farms are visited by the staff to decide if the farmers qualify for participation.

Training sessions are held by way of field days, seminars, demonstrations and workshops. Field visits are the primary method used to ensure that farmers utilise the appropriate cultural methods and soil conservation practices. The Socio-economic Impact Study revealed that 92% of all respondents were visited. The demonstration plots on farmers' fields are the focus of the training days which provide the mechanism for farmers both within and outside the sub-projects to learn the particular production technology. The demonstration plot was an important extension methodology but it did not cover all the techniques that needed to be demonstrated. Fertilizer application, pruning and plant spacing were the main practices demonstrated. This may be because cocoa and coffee were the primary focus and the extension message seem to be the promotion of the practices recommended by the Cocoa and Coffee Boards.

The report on the Comparative Analysis of the Hillside Agricultural Project and Sub-Projects by the Caribbean Agricultural Communications Services Ltd (CACS) revealed that soil conservation techniques received the least attention of the five primary extension messages promoted by the sub-projects. On average a third of the farmers received some instruction in soil conservation. The Above Rocks sub-project was the lowest with only 10% receiving soil conservation advice. According to the farmers, the most effective extension approach was the extension worker visits (49%); field days next (17%); group meetings (9%); and demonstration plots last with 3%. About a quarter (23%) felt that they were all equally important.

The extension service was rated as good by 80% of the respondents while the remainder felt that there needs to be better communications.

Agronomic Approach/Cropping Systems Approach/ Soil Conservation

The HAP's concept is that the most suitable form of development for small holder hillside agriculture is a perennial crop regime incorporating sound conservation practices. The perennial crops were mainly cocoa, coffee, forestry species and other tree crops (e.g. coconut, mango, avocado).

The agronomic approaches were concerned mainly with planting new trees to adjust or increase previously low plant populations and with rehabilitation by pruning fertilization and shade control. Generally, it represented the implementation of the package of practices recommended by the commodity boards, and tested over many years.

Cropping systems included the use of banana, plantains, root crops, legumes and vegetables. Many were associated with cocoa and coffee which were frequently the main crops. The improvement in the performance of the minor crops was not monitored and therefore conclusion on the effectiveness of the project on these crops could not be drawn.

Specific attempts to address soil conservation were not common in cocoa fields. There were very few gully plugs/check dams, hillside ditches, barriers. The

principle applied was that the establishment or presence of trees addressed the high priority placed on soil conservation by most sub-projects.

There was, however, sensitivity to the greater need for imposing soil conservation practices for coffee, where leaf accumulations did not parallel the cocoa situation. There was a widespread occurrence of contour grass, stone or bush barriers, as part of the cultivation system. The imposition of minimum tillage, strip cropping and mulches were emphasised on demonstration plots.

The sub-projects which have emphasised agroforestry, nursery development with youth participation, integration of fruit tree development with processing, mango top-working to convert non-commercial mangoes into exportable varieties, are commendable but the technical competence, management on a continuing basis, and marketing are not always in place and have to be given serious attention for sustainability of the activity.

8.2 Existing integrated soil conservation systems in the Caribbean

In the Caribbean many different mixed cropping or mixed farming systems exist. The systems are usually designed specifically for economic reasons but some are associated with specific agronomic or land management practices for the purpose of soil conservation. The existing farming systems have not been fully assessed economically and technologically. The Caribbean Agricultural Research and Development Institute (CARDI) attempted to address the improvement of agricultural production and productivity through a Farming Systems Research and Development (FSRD) Project. A major objective was to improve the systems employed by farmers through the incorporation and integration of appropriate technologies in the systems.

Consideration is given here to the systems on hillsides which can be grouped as follows:

- Monocropping of tree crops
- Systems based on tree crops
- Systems based on banana
- Systems without tree crops

Monocropping of tree crops

Pure stands of cocoa, citrus, coconuts, forest species and, to a lesser extent, fruit trees are the main tree crops cultivated. Grass is often associated with coconuts for grazing of livestock. These tree crops stabilize the soil, especially if leaf litter is present or allowed to accumulate. This system effectively conserves the soil on all classes of slope against erosion. Small and large livestock are sometimes introduced into the system. Large stock (cattle) can damage the soil in the wet season and increase erosion. Therefore the numbers and the system have to be carefully managed.

Systems based on tree crops

The dominant tree crop may be cocoa, citrus, spices, coconuts and coffee (at higher altitudes). The farmer then chooses from a multiplicity of cash and food crops such as vines, bushes and ground crops for filling appropriate spaces. The times of planting and harvesting are such that the ground is always covered or occupied by crops, and consequently is very effective in conserving the soil against erosion. The random distribution of the crop mix prohibits mechanization. If inorganic fertilizers are used these are applied to individual crops in relation to the time of planting.

If the tree crop is not sufficiently dominant to prevent the soil from eroding, log or trash barriers are used to reduce erosion.

Systems based on banana

Banana may be grown as the dominant crop with a tree crop (e.g. citrus, coconut) and/or one or more cash or food crops as intercrop. The favourable price of bananas over recent years has led to the gradual replacement of the tree crop which may have been the dominant crop to the point where banana is dominant or exists as pure stand. In these systems the ground is always covered or largely covered by a crop or is associated with contour drains or barriers to reduce erosion.

Systems without tree crops

A random or systematic mix of several cash or food crops is common. The farmer may choose as many as six to ten different crops in his mix mainly to spread his risk and income distribution. The mix of crops is generally randomly distributed and serves, incidentally, to ensure that the ground is always partly or completely covered by a crop and to reduce the spread of disease. Sometimes one of the crops (e.g. pigeon pea, yam, pineapple) is grown at intervals on the contour and the other crops occupy the spaces between these contour crops with or without vegetative or trash mulching.