Soil and water conservation in Burkina Faso — The role of community organizations

Innovative but now well-known conservation techniques have been developed over the last decade in Burkina Faso. Simon Batterbury asks how local community organizations and farmer groups are involved in managing these important activities, and what role they play in overseeing and directing change in the region.

THE CENTRAL PLATEAU of Burkina Faso, the heartland of the Mossi people, has been a laboratory for some of the most innovative techniques in soil and water conservation and water harvesting systems in sub-Saharan Africa. Yet as recently as fifteen years ago, the record of soil and water conservation programmes in the area was poor. Several internationally supported projects placed too much faith in ambitious technical solutions to land degradation, such as large earthern bunds built with heavy machinery, or in the promotion of unrealistically expensive agricultural technologies; the latter including costly inorganic fertilizers and ox-drawn tillage systems.

The techniques in use – and the institutions promoting them – have changed since then. Today the work of the more popular environmental programmes is modest, less costly, and rooted in local skills and technology. Many farmers have designed and built cheap and effective conservation systems using techniques adapted from a repertoire of old and new skills. These systems have proved more sensitive to the existing soil type and land use, and almost always avoid the use of expensive inputs or machinery. They include:

- Permeable and semi-permeable contour stone lines and stone bunds of varying sizes, spacing, and height, built from rock or stones placed across the land contour. These preserve farmland or communal areas where soils are noticeably degraded by continued use, or lack sufficient moisture to ensure reliable crop growth.
- Larger rock dams, built on the same principle but used to slow and eventually halt the flow of water brought downslope in gullies, thereby improving infiltration rates.
- Other methods to bring degraded land back into productive use (that is, to expand the cultivated area): these include *paillage* (the covering of the soil surface with nutrient-rich crop stover), and the digging of planting pits (*zay*) to which organic manures (the nutrients are more readily available when composted) are added prior to planting.
- Biological methods of erosion control, including 'trash lines' of millet stalks and branches; grass strips (commonly of andropogon grasses); and the selective planting and pruning of certain trees and shrubs on fields and in bush areas.
- Conservation-orientated cropping practices which increase soil cover or surface roughness, including planting in patterns oriented across the slope; incorporating manures from compost pits; contour tilling and ploughing (using cheaper donkey-drawn ploughs); and spacing crops according to the micro-topography of the field.
- The protection of *brousse libre* (communal bush areas) through access restrictions and 'set-aside' (*mise en defens*) zones where animal grazing and fuelwood cutting is minimized and the growth of useful species is encouraged.

These systems have been adapted by individual cultivators to meet their own needs, which depend on the type of land rights they enjoy, the amount of work they can expect from family and neighbours, and local differences in soil types and topography.

Farming on the poor soils of the Central Plateau requires great skill, and the constant adaptation of traditional and modern practices to variations in both rainfall and land quality. While most farmers do experiment with conservation techniques when they have enough time or resources, it has not always been possible for them to keep pace with the naturally high rates of soil erosion encountered on friable sandy soils or, given the unpredictability of the short annual rains, to capture sufficient precipitation and runoff on their fields. In addition, Plateau soils are naturally low in key nutrients which, combined with problems of soil structure and moisture retention, imposes severe constraints on agriculture.

Stone lines

Contour stone lines and bunds are the 'miracle' technology for which the farmers of the Central Plateau have become well known in recent years (see photo opposite). These methods of water harvesting are often described as the saviour of highly degraded agricultural systems in sub-Saharan Africa because they are replicable, are built by farmers themselves, and appear to be an appropriate remedy to soil fertility decline and falling crop yields on most soil types. Although they are hard work to build, contour stone lines are cheap to construct, require a minimum of complex planning — other than some time spent estimating contours and slope angles with simple levelling devices – and have strong positive effects on yields of the staple dryland crops of millet, sorghum, and maize. Stone lines act as braking mechanisms, slowing the passage of floodwaters downslope, which occurs during the strong rains of the cropping season from May to October. This encourages both the infiltration of water on the field and the deposition of nutrient-rich sediment where it can be of most benefit to crops and vegetation. Soil fertility is improved, particularly on *zipellé*, the hardened crusts left behind after runoff has stripped away fertile topsoil. Larger rock dams require greater quantities of stones to be moved

Contour stone bunds being constructed by a village work party in Rollo Department, Bam Province.

to the site; they are used to reclaim gullies, which form where floodwaters carve out deep channels through sandy soil. Again, crops thrive on the moist soils behind the dams (see photo opposite).

Innovation or intervention?

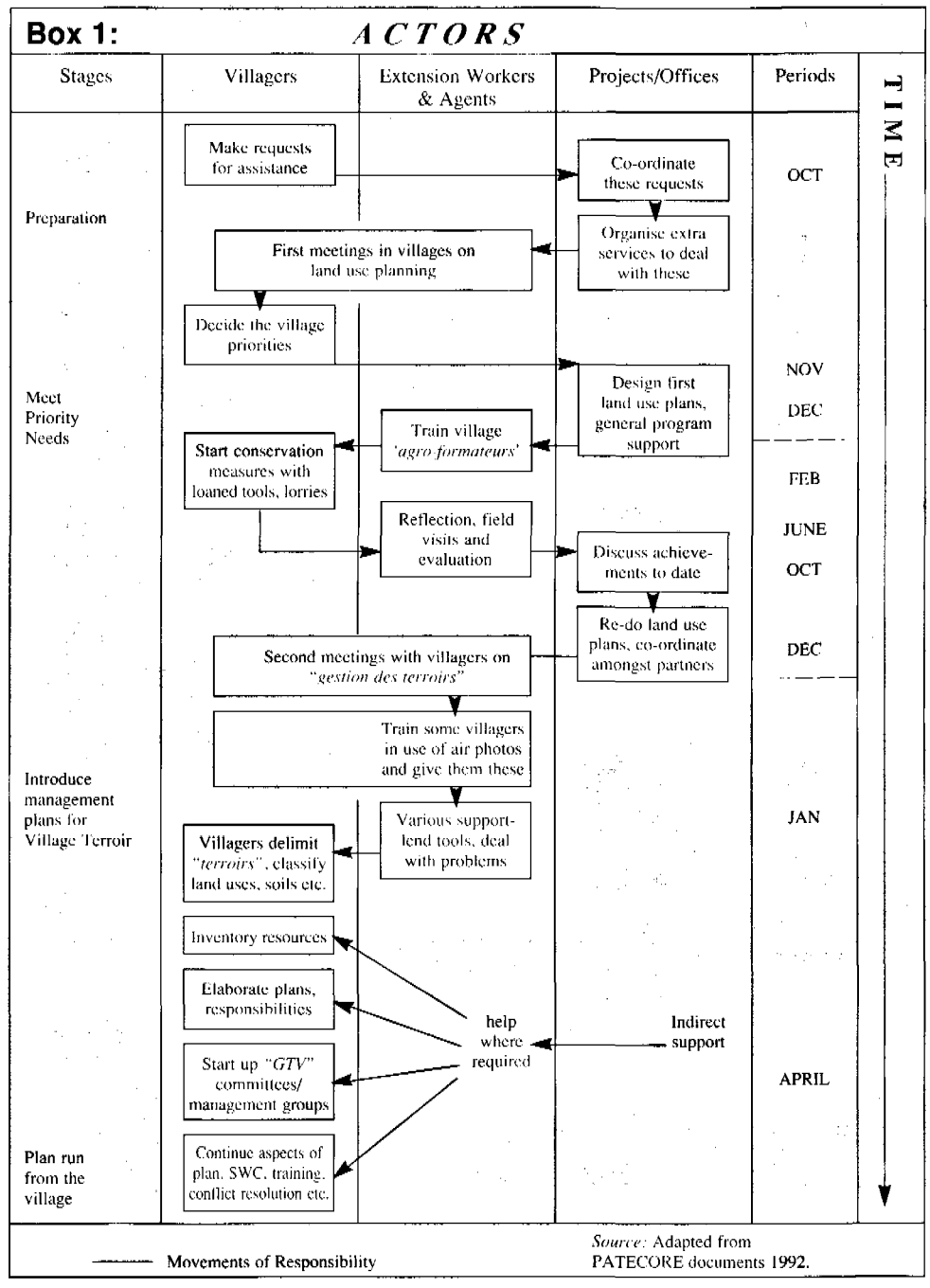
Semi-permeable stone lines and rock dams may be locally developed technologies, but they are not a wholly indigenous response to land degradation; their design has been much adapted and improved by a succession of foreign volunteers, NGO staff, and extension workers operating in the area since the late 1970s. Innovation has come from these different actors, or been learned from neighbours, family, or through travel to other communities or regions. It is the most 'participatory' soil and water conservation projects -- those with a relaxed approach to farmer experimentation and decison-making and few strictures about technology 'adoption' or 'results' — which have supported the most impressive examples of farmers' own conservation efforts. The approach taken by outsiders involved in these programmes has not been 'technocratic'. Instead, the idea of self-built conservation structures, such as contour stone lines, has been developed in concert with individual cultivators and farmer organizations who are, after all, the people who maintain them once projects and their staff have moved on (see photo page 8).

Once the advantages of semi-permeable stone stuctures became clear through the early experiences of pioneering villages, this knowledge spread, aided by the publicity associated with the many NGOs and bilateral environmental programmes set up on the Plateau over the last three decades, and through local language advice issued on national radio. Also, some development projects, such as PATECORE in Bam Province, have set up enclosed demonstration plots where the effects of various stone lines and other techniques are clearly visible to visiting farmers. This project also conducts training for farmers which allows one or two individuals in certain villages (those who expressed a prior interest in conservation work) to learn the necessary skills to train others in stone bund construction and other conservation methods.

Community organizations

The construction of stone lines and rock bunds, and many of the other management practices mentioned above, occurs in the dry season from December to May. Building these structures is a very labour-intensive activity, requiring a major investment of both time and energy on the part of the farmer. Most, but not all, Plateau villages have some form of *association villageois* — a farmer organization or community group. In some cases these date from the mid-1980s, having evolved from committees set up under the regime of Burkina Faso's revolutionary leader, Thomas Sankara. In others they replicate a traditional unit of social organization which traverses individual households, the *saka*. The *sakas* include representatives from the various lineages which reside in the village, and

A permeable stone dam built across a gully, with millet cultivated on the sediment trapped upstream.



How projects and community organizations can work together. The early stages of gestion des terroirs *land-use planning begins and ends with villagers themselves.*

they work alongside the other traditional authority structures which are built around chiefs, elders, and earth priests. Some of the newer organizations are very formalized, with sub-committees responsible for different aspects of village affairs; others are built around the enthusiasm of key individuals who retain prominent roles in decision-making, or have grown up as membership 'clubs' to purchase inputs and materials at favourable prices. These associations rarely include those not resident in the village, nor do they have a large enough constituency to link neighbouring communities. Nonetheless they are absolutely vital to both the slow process of building and maintaining water harvesting systems and any of the other conservation activities that require large amounts of labour or time from farmers. This is because traditional social institutions, at least among the Mossi (who form the predominant ethnic group here) are concerned with customary law and internal decision-making, and have only rarely made decisions about resource management for the entire village.

In order to manage the village *terroir* (territory) effectively, institutions need sufficient organizational capacity to inspire their members to work together and to see through a plan of action over several years: soil and water conservation is a slow business. *Gestion des terroirs* (village land use management) is a policy instrument used by some development projects, and the Burkinabè government, which tries to do just this: to enable villages to manage the whole *terroir* over which they enjoy traditional land rights (see Box 1). It is the modern-day associations and other farmer organizations which are assuming the task of resource management on this scale, and it is they who form the bridge between individual farmers, development projects, and local government extension activities. Their roles are varied, and they act as:

- Contact points or 'bridges' — they convene their members to listen to development organizations and sometimes extension agents and other visitors, who use meetings held in the village to discuss environmental concerns and the programming and content of conservation activities.
- A form of 'management committee' or regulatory body with diverse responsibilities ranging from lobbying, to unravelling disputes and conflicts, to taking control of the entire process of conservation activities in the *gestion des terroirs*. The group in Box 1, the association of a small village of Yarsé farmers, has taken on all conservation efforts in the village *terroir*. It meets regularly to discuss the division of responsibility for care of seedlings, tree planting, stone bund construction, and so forth.
- Instigators of group projects, including the cultivation of communal plots, and as managers of items such as donkey carts, handtools for anti-erosion works, and ploughs bought from members' funds or donated by projects. These are rented out to farmers on a short-term basis.

Observers of rural development often wonder what the much-hyped 'community organizations', such as those of the Central Plateau, actually achieve. Box 1 gives an example of the types of activity undertaken by subsistence cultivators in a village of around 300 people in Rollo Department, Bam Province, over a two-year period. Information was collected from the villagers' own records or observed by the author. A very wide range of resource management activities have been performed by the group. Note the relationship between male and female participation in these activities, and the large numbers involved in the construction of the contour stone lines which the villagers have built in the heavily degraded central portion of their village lands. In this initial stage of conservation work (the stone line technique was first applied here in 1991) planning is almost always conducted in group meetings, since the management of communal areas concerns the whole community. Today, with several kilometres of stone lines built in the centre of the village, the group is turning its attention to restoring the fertility of the bush fields of its members, and is beginning to lobby for the provision of government services such as primary schools and health services.

Village organizations among Mossi cultivators involve most individuals of the village, but women often run their own groups with a separate membership fee. They may pool their scarce resources to farm a collective field for a cash crop such as groundnuts. Some women's groups are beginning to assume other responsibilities, including the management of credit schemes for the purchase of sheep and goats. Their role in environmental management has been limited, in part because women have no formal land rights (at least among the Mossi and Yarsé), and are reliant on their husbands for the plots on which they cultivate small amounts of crops they can sell or use to supplement the household food stores.

Box 2: What do village groups do? Male and female participation in *groupe Tengsongho*, near Rollo, Bam Province

Date	Activities	People Participating: Men	Women
Jan 1990	Tree planting: digging planting holes		
	Meet with forestry extension agents	72	63
	Tree planting: digging planting holes	48	0
	Tree planting: finish planting holes (900)	72	0
	Tree planting: plant seedlings	69	0
	Tree planting: plant seedlings	52	0
NO RECORDS			
Sept. 1990	Village meeting on soil conservation	–	
	Village meeting with agricultural extn. agents	41	90
Nov. 1990	Begin collection of stones for contour bunds		
Feb. 1991	Collection of stones from hills with PATECORE truck	40	109
		53	149
		43	107
Mar. 1991		59	139
		40	100
		66	159
		72	128
April 1991	Training on contour bund work (extension agents)	63	142
	Building contour bunds in village centre	59	153
		61	102
		62	139
		57	146
		32	150
		72	142
June 1991	Village meeting decides to start a communal field (1ha)		
	Communal field prepared and seeded for millett	70	127
July 1991	Communal field is weeded	36	43
	Tree planting: tidy saplings in plantations	—	
	Meeting with head of primary health service (advice on guinea-worm)	42	59
	Tree planting: replace dead saplings	48	0
	Meeting with agricultural extension agents on land husbandry techniques	47	63
	Tree planting: prepare new plantation	25	0
	Plant grasses next to contour bunds	15	0
		25	0
		15	0
Aug. 1991	Communal field: second weeding	35	15
	Women's communal field (peanuts): first weeding	35	75
	Tree planting: re-digging planting holes	36	0
	Communal field: third weeding	17	42
	Tree planting: along tracks	39	42
	Meeting with local officials	79	43
Sept. 1991	Communal field: harvest	43	62
Oct. 1991	Repair communal meeting place	39	0
	Tree planting: repair fencing	49	0
Nov. 1991	Meeting with forestry and agriculture extension agents	40	0
Dec. 1991	Meeting with extension agents and PATECORE	22	36
	Building contour stone bunds in village centre	63	42
	Collection of stones from hills with PATECORE truck	25	16
Feb. 1992		37	25
	Make bricks for communal granary	47	0
	Buy and transport chicken wire	3	0
Mar. 1992	Meeting with forestry and agricultural extn. agents	25	0
	Prepare 'demonstration plot'	32	0
		42	0
April 1992	Visit from farmers from other region	—	—
May 1992	Collection of stones from hills with PATECORE truck	23	67
	Building contour bunds in village centre	52	0
June 1992	Work on the 'demonstration plot'	55	0
	Collection of stones from hills with PATECORE truck	37	60
	Comunal field prepared and seeded for millett	48	67
NO RECORDS			
Oct 1992	Meeting with PATECORE agents	—	—
	Rebuild old compound to host visitors	—	—
	5 days of participatory rural appraisal with team of 8 visitors	all	all
Dec. 1992	Meeting with PATECORE agents	40	60
	Collection of stones by truck	42	66
		51	60

Source: Records of village group (confidentiality preserved)

The primary emphasis of environmental programmes on the Central Plateau now is ensuring that the fruits of effective local soil and water conservation begin to reach all sectors of the community, including those disadvantaged by gender, by lack of access to land, or by social status. Assuming that conservation efforts are a 'good thing', because they restore productive potential or at least ensure more reliable crop yields, how may all those who wish to do so benefit from these new technologies?

The challenge

Research efforts in the region are starting to explore these issues. On the positive side, it appears that 'rich' farmers do not take all the benefits invested in soil and water conservation. Sometimes a chief or the members of a powerful family ask that structures be built first in their fields. Yet many associations, like the ones studied here, select the areas to receive structures based upon other issues: the quality of degraded lands, or proximity to the village centre. Richer farmers and traditional leaders cannot dominate these discussions. In a village close to Rollo, the group constructed stone lines across the modest fields of a widow who farms alone. In a neighbouring village, structures have been used to reclaim a large area to which three separate family groups — one with little capital and no animal herds — have rights over the land. Here, the chief's fields are far from the village and of poor quality. Because of the strong cultural pressures placed on individuals not to 'opt out' of communal activities organized by the association, several unmarried young men have returned to this village from the Ivory Coast (where the Mossi migrate in large numbers to seek paid work) to assist in these endeavours and to farm with their families. Some said the opportunity to participate in the activities of the group and to learn new skills helped draw them back, at least for a season or two.

There are still problems with promoting and managing this particular, unique form of technological change at the village level. First, individuals without secure access to land obviously benefit less, if at all, from soil and water conservation, yet they are still expected to contribute their labour to the group. They may participate in building stone bunds in the village centre, while their own land lies elsewhere and — in the case of 'loaned' plots — cannot be treated in the same way if their landowner would see such work as an unwelcome assertion of 'squatter's rights'. Secondly, women's personal fields — their *beologo* — are useful sources of supplementary food and income, but lack of land rights and heavy workload makes it extremely difficult for them to make, or receive, the same level of investment in structures or other forms of inputs. This is ironic, since women contribute their share to construction works elsewhere. Women's groups are still inexperienced in defining responsibilites, lobbying for services, and running co-operative ventures. This problem will only be solved by allowing the women time to learn new skills and apply them in sometimes highly traditional (and suspicious) patriarchal communities. Thirdly, it has been argued that there is a need to work at different levels of the complex social environments of Mossi communities and those of other agriculturalists in the region. While retaining the village association as the primary point of contact with development organizations, it is still vital to target extension advice and occasional assistance at individual farmers — particularly women — and to listen and learn from them. This recognizes that not everybody has a voice in the village group, and that individuals make important technical innovations on their own land and in their own households.

Farmers rank the benefits of different forms of soil conservation during a 'participatory rural appraisal' session with trainers.

Village-level institutions are appropriate vehicles for initiating technological changes on the Central Plateau, a region of Africa where high rates of land degradation have been met with concerted action by farmers. Institutions such as the associations act as a conduit between traditional authority, farmers, and development projects offering access to training and limited development assistance. These community endeavours are needed, given the limitations of traditional power structures, to mobilize all households. They are also important interface points at a time when the initial impetus of conservation still rests with development projects and extension services. The challenge for the future is a difficult one: to develop an institutional environment where farmers, extension workers, and local government and project staff work harmoniously towards the refinement and development of the new agro-ecologies now beginning to emerge. This will require that the technical innovations promoted by outsiders are self-replicating — where their adoption (and experimentation with them in different micro-environments) is by individual farmers, who pool the tools, transportation, and capital at their disposal and work together. To date, it has been development projects which have motivated farmers — rarely the reverse. The delinking and 'scaling down' of development projects, as farmers 'scale up' their own activities, is the only realistic option to ensure the durability of local-level soil and water conservation in the region. One hopes that the role of 'outsider' institutions is to support and nurture this process of indigenous adaptation and change — in which farmers, and their own institutions, play a vital role. The evidence from villages involved in *gestion des terroirs* initiatives in Bam Province is encouraging, but the road is long. ●

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